PROCEEDINGS OF THE 1987 AND 1988 PROGRAM OF THE RESEARCH CENTER ADMINISTRATOR'S SOCIETY

February 2 and 3, 1987
Nashville, TN

February 1 and 2, 1988
New Orleans, LA

This Society is affiliated with the Southern Association of Agricultural Scientists and has membership from each of the southern states. The Executive Committee consists of a representative from each state (listed with the state), the current officers and the immediate past chairman.

Alabama
Wallace Griffey

Arkansas
Bill Loe

Florida
Will Waters

Georgia
Charles Perry

Kentucky
Donnie Davis

Louisiana
Nelson Philpot

Mississippi
Gene Morrison

Missouri
Jack Cooley

New Mexico
Vacant

North Carolina
Carl Tart

Oklahoma
Glenn Taylor

Puerto Rico
Fernando Abruna

South Carolina
James R. Hill

Tennessee
Joe High, Jr.

Texas
Jaroy Moore

Virginia
J. L. Tramel, Jr.

Jere McBride,	Immediate past chairman
Howard Malstrom,	Chairman
Bill Loe,	First vice-chairman
Edward Worley,	Second vice-chairman
Will Waters,	Secretary/Treasurer

FORWARD

These proceedings are a culmination of some thinking, planning, organizing and above all, some plain hard work. This organization, as is true with every organization, must increase its scope to increase its effectiveness. It was this thought that prompted your executive committee to establish an editorial board to see to it that the papers given at the 1988 meeting were published. In short, we were ready to begin to maintain a permanent record of the excellent contributions we have been getting over the years.

This editorial committee has laid down another stone on the stairway to greater prestige, success and accomplishment. The Superintendents Section was begun informally about 1964. Many people participated and each year they made a contribution which led to an improvement of the Society. We have been able to determine from available records, the following officers who served as far back as 1970. We would appreciate it if a knowledgeable person can supply the officers of the earliest years.

Research Center Administrators Society

Officers of Past Years

Year/Location	Officers	
1988-1989	Chairman	Howard Malstrom
Nashville	1st Vice-Chairman	Bill Loe
	2nd Vice-Chairman	Edward Worley
	Secretary/Treasurer	Will Waters
1987-1988	Chairman	Jere McBride
New Orleans	1st Vice-Chairman	Howard Malstrom
	2nd Vice-Chairman	Bill Loe
	Secretary/Treasurer	Edward Worley
1986-1987	Chairman	Robert Freeland
Nashville	1st Vice-Chairman	Jere McBride
	2nd Vice-Chairman	Howard Malstrom
	Secretary/Treasurer	Bill Loe
1985-1986	Chairman	Norman Justus
Orlando	Vice-Chairman	Robert Freeland
	Secretary/Treasurer	Jere McBride
1984-1985	Chairman	Gary Elmstrom
Biloxi	Vice-Chairman	Norman Justus
	Secretary/Treasurer	Robert Freeland
1983-1984	Chairman	Bill Webb
Nashville	Vice Chairman	Gary Elmstrom
	Secreary/Treasurer	Norman Justus
1982-1983	Chairman	Wallace Griffey
Atlanta	Vice Chairman	Bill Webb
	Secretary/Treasurer	Gary Elmstrom

Year/Location	Officers	
1981-1982 Orlando	Chairman Vice Chairman Secretary/Treasurer	Freddy Peterson Wallace Griffey Bill Webb
1980-1981 Atlanta	Chairman Vice Chairman Secretary/Treasurer	Julian Craigmiles Freddy Peterson Wallace Griffey
1979-1980 Hot Springs, AR	Chairman Vice Chairman Secretary/Treasurer	Joe High, Jr. Julian Craigmiles Freddy Peterson
1978-1979 New Orleans	Chairman Vice Chairman Secretary/Treasurer	Robert Moss Joe High, Jr. Julian Craigmiles
1977-1978 Houston	Chairman Vice-Chairman Secretary/Treasurer	E. G. Morrison Robert Moss Joe High, Jr.
1976-1977 Atlanta	Chairman Vice-Chairman Secretary/Treasurer	H. Rouse Caffey E. G. Morrison Edward Worley
1975-1976 Mobile	Chairman Vice-Chairman Secretary/Treasurer	Tom Corley H. Rouse Caffey Lee Mason
1974-1975 New Orleans	Chairman Vice-Chairman Secretary/Treasurer	Henry Marshall W. A. Nipper C. G. Shepherd
1973-1974 Memphis	Chairman Vice-Chairman Secretary/Treasurer	D. M. Gosset Tom Corley H. W. Luck
1972-1973 Atlanta	Chairman Vice-Chairman Secretary/Treasurer	Charles Douglas Henry Marshall Preston Reid
1971-1972	Chairman Vice-Chairman	Charles Douglas Henry Marshall
1970-1971	Chairman	Preston Reed
1969-1970	Chairman	Robert Moss

RED RIVER RESEARCH STATION

LOUISIANA AGRICULTURAL EXPERIMENT STATION
LOUISIANA STATE UNIVERSITY AGRICULTURAL CENTER

Post Office Box 8550
Bossier City, LA 71113-8550
318 747-0130

Members
Research Center Administrators Society
Southern Association of Agricultural
Scientists

Re: Proceedings

Dear Members:

Only a few of our active members were around in the early '60s for the "Branch Station Superintendent's" meetings, but many of our honorary associates often recall those informal gatherings as beneficial. It was our founder, Dr. John Ewing, who first recognized the need for superintendents to discuss common interests and problems. And, even though the group had its staunch supporters, attendance at the annual meetings generally reflected the quality of the program. The structure of the organization was very loose; therefore, quality programming relied on luck and generally the hard work of one or two individuals.

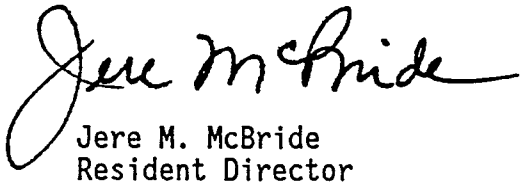
The fortunes of the organization began to change in 1983. Wallace Griffey, chairman, asked that a survey be made to get the members' views in order to provide direction for the organization. The by-laws, adopted in 1985, created the executive committee charged with developing quality programs for the annual meetings. The ensuing programs have reflected conscientious planning by the executive committee. The membership has responded with increased interest and record attendance. The camaraderie among the members has also strengthened, a clear signal of the organization's progress.

This first publication of the "Research Center Administrator's Society Proceedings" is another indication of the organization's commitment to succeed. The 1988 meeting was a continuation of quality programming--timely topics and presentations made by excellent speakers. It is appropriate, therefore, that these presentations be preserved for our members. Of course, putting the "Proceedings" together was no small task.

On behalf of the RCAS, I extend our special thanks to Howard Malstrom who coordinated the development of the program and the "Proceedings." Taping, transcribing, typing, editing, binding, etc., required many hours of diligent work by Howard and his staff and those members selected to edit the papers--Nelson Philpot and Glen Taylor. To all, thank you.

I also want to thank the organization for letting me serve as your chairman in 1987-88. As I look back at my year I do so with a great deal of pride. Much was accomplished by the officers, the executive committee, and the active members. Members can now look to the RCAS as their professional organization. It will respond to their needs as administrators and provide for their future growth and development. The RCAS has a solid foundation and I challenge our future leaders to keep it strong.

Sincerely,



Jere M. McBride
Resident Director
1987-88 Chairman

gw

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Acknowledgements

The editorial committee wishes to thank the authors of all manuscripts for their time and effort in preparing and editing various versions and transcripts in a timely manner. The help of Joe High, Jr., Bill Webb and Wallace Griffey in providing historical records is also appreciated.

The committee wishes to extend its most sincere gratitude to Ms. Rosa Maese, without whose expertise with the word processor and endless hours of diligent effort, these proceedings would have never been completed.

Editorial Committee

Howard Malstrom, chm
Nelson Philpot
Glenn Taylor

OVERVIEW OF THE LOUISIANA AGRICULTURAL EXPERIMENT STATION

C. Oran Little, Director

Louisiana Agricultural Experiment Station
Baton Rouge, LA 70893

It is a sincere pleasure to have you meet in Louisiana and to be a part of your active and growing organization. Today, agriculture is an integral part of the economics of our states, its past has been significantly impacted by the results of our research and its future will likely be determined by our collective efforts in continuing the expansion of appropriate knowledge bases and development of new and more effective technologies.

I am most certainly aware of the geographical diversity and even the significant diversity of research emphasis represented here this morning. But each of us has strong ties to the State Agricultural Experiment Station System. This nationwide system for research was created by the **Hatch Act** one hundred years ago with a mission orientation to serve the agricultural sector of our respective states, and collectively, to serve the food and fiber interests of the United States. The **Hatch Act** centennial activities have focused much attention on the accomplishments of agricultural research, and the track record is certainly magnificent. You may better examine the tremendous expansion of knowledge in your disciplines and the rapid adaptation of new technologies in your areas. Perhaps the most exciting record we all should put up on the flagpole is revealed by the return on funds invested in our efforts. Various economic assessment studies reveal that a $28 to $30 return has been realized in benefits for each $1 of public monies invested in the State Agricultural Experiment Stations since their beginning. No other research system comes close.

As we begin the second century of our existence, the focus must now look to the future. The people you and I work for, our clientele, need to know about past accomplishments; but they are more likely to want to know what we are going to do for them tomorrow. The Louisiana Stations 1988 Annual Conference was developed around the theme **"THE FUTURE IS OURS TO SHAPE."** That is really what research is all about and let me briefly share a perspective of where we are going. In so doing, please consider your location and your role. I think you will see similarities and find common denominators as the mission is perused.

Louisiana finds itself in a situation where the economy has been geared to the oil and gas industry for a long time. We wonder sometimes why didn't agriculture expand more. When you have the nurse cow that rocks back and forth pumping that black gold you don't worry about putting improved management into your livestock or grazing or crop production practices. The public is looking down the gun barrel at us and asking "Where has agriculture been all of these years." Likewise, we must be aware that our natural resources are being exhausted and this will have a profound effect on the future of agricultural research.

Louisiana has all of those ingredients needed to be a leader in food and fiber production. First, we have fertile soil and ample good quality water. Louisiana also has an excellent long growing season, and an abundance of crops that provide wide diversification.

Another vital ingredient in agriculture is transportation. Transportation routes in Louisiana are important primarily because we border the Mississippi River and New Orleans is located near its exit into the Gulf. Some figures indicate that from 75 to 85% of the agriculture exports of the Central and Southern U.S. go out of the ports along the Mississippi River. We also look at population centers and our proximity to them. All of us must evaluate transportation and market accessibility and evaluate our comparative advantages.

Our agriculture has to be concerned with the management of such resources. I think we have more carefully evaluated these assets as we begin our second century. However, we must identify particularly how we will help develop those resources. Most every research program represented in this room has three focuses. The primary focus, most often mentioned and which puts you under most pressure, is problem solving research. The second focus, always in the minds of good researchers, relates to how we prevent those problems before they happen. I think we recognize that we must address these. An important third consideration for us is to identify and develop the potentials so that agriculture again becomes a significant economic force and asserts itself in the Louisiana economy.

Exciting things are beginning to happen. We are directing those efforts primarily to the more efficient use of resources in the process of food and fiber production. We are taking an additional step of not merely looking at production, but also building on the value added concept and following through to market development. I think these are some of the exciting things that are happening and I know they are also going on in your states. These are the emphases to which we are directing our efforts in the Louisiana Station as we approach the future. The challenge is to develop this tremendous potential provided by the resource base of this state.

The Louisiana organization is somewhat unique, buy I realize most every state can make the same claim. The Agricultural Experiment Station is part of the LSU Agricultural Center which operates as an independent campus in our education system. We have close ties to the service programs of Cooperative Extension and to the instructional programs based in the College of Agriculture.

The research programs of the Louisiana Agricultural Experiment Station are based in five colleges represented by 21 departments on the Baton Rouge Campus. In addition, we have 17 branch stations located at strategic sites throughout the state. With five distinctly different geographical areas in respect to soil and water resource bases and twenty major commodities, each location relates to unique resource-commodity combinations. May I also emphasize that Louisiana has only one agricultural experiment station. There are many people at several locations, separated sometimes by hundreds of miles, making their individual contributions; however only by moving in the same direction in a coordinated effort can we hope to continue to realize the high return on the dollar investment in research.

We are going through the legislative budget process right now as are many other states represented here. Our legislature meets in April each year. Prior to presenting our budget to them, we must conduct the Board of Regents hearings, the Division of Administration hearings and various legislative committee hearings. The one question which is always brought up in these hearings is "What will it take for agriculture to realize its potential in Louisiana?" This is the kind of question I think all of you want to hear because **good research is the answer**.

As a research administrator I consider my primary role as shaping organization, providing general direction and facilitating a faculty and staff to get their jobs done well. It is a privilege to work with some well educated people who are sound scientists with imagination and creativity. We are attempting to put a premium on productivity and results. Admittedly, a few are satisfied with just redoing others work, but for the most they are operating on the cutting edge of technology. As opportunities arise the next person we hire must be better than the last for the future will be shaped by those who are capable of new approaches and committed to doing a better job. Accordingly, it is a particular pleasure to welcome you to Louisiana for the 1988 SAAS meetings. Dr. Philpot will give you more detail of the nature of our Branch Stations and the research programs that are dealing with the diverse problems and potentials.

I would like to close by saying that if one really studies and analyzes the related economies, it is logical to conclude that one reason for the generous return of $28 to $30 per $1 investment in agriculture research is because we as a country have underinvested in such endeavors. We in research must continue to tell our story, convince others and develop advocates of agricultural research throughout all segments of society. Please take aggressive advantage of all opportunities.

Thank you for inviting me to address your organization.

PERSPECTIVE ON THE BRANCH STATION SYSTEM OF THE LOUISIANA AGRICULTURAL EXPERIMENT STATION

W. Nelson Philpot, Resident Director

Hill Farm Research Station
Louisiana Agricultural Experiment Station
Louisiana State University Agricultural Center
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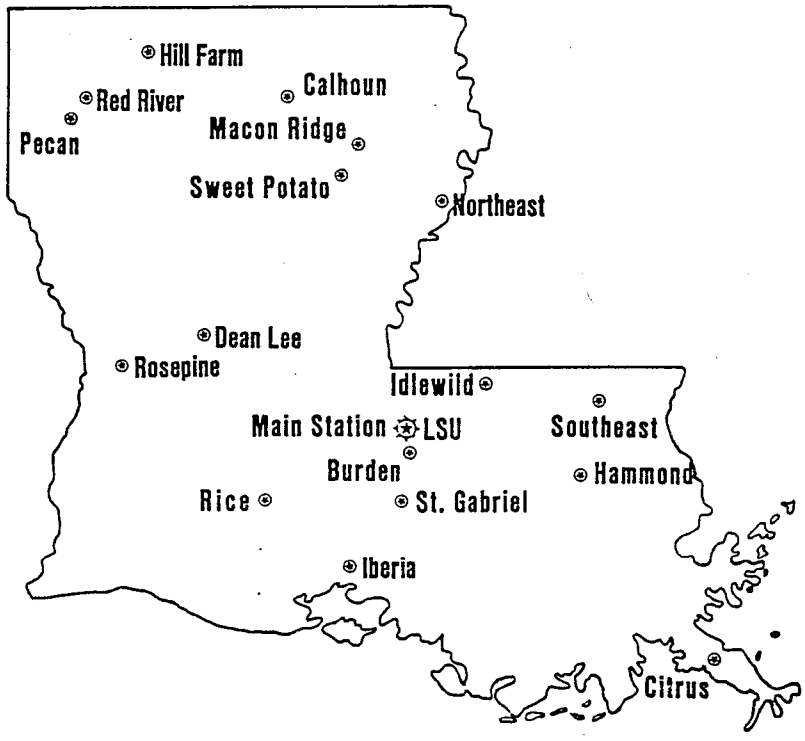
Homer, LA 71040

This paper was illustrated with 138 slides that depicted the facilities and programs of work at the research stations in Louisiana. Our branch station system comprises 16 research stations at 17 locations as shown in the figure below.



The research stations are located strategically throughout Louisiana and are charged with the responsibility of conducting pertinent research under the different soil, topographic, and microclimatic conditions that exist in the different regions of the state. Each research station is an independent research facility headed by a resident director who reports to the Vice Chancellor for Research and Director of the Louisiana Agricultural Experiment Station. Approximately 99% of the scientists at the different locations hold 100% research appointments with the Louisiana State University Agricultural Center, though some are also Adjunct Professors with discipline departments in the College of Agriculture in Baton Rouge. The joint appointments permit staff members to serve on the Graduate Faculty,

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but full administrative responsibility remains with the research station resident director. Several of our staff members serve as full members of the Graduate Faculty and chair committees for M.S. and Ph.D. candidates.

The research stations comprise a total of 15,663 acres and range in size from 99 to 3,113 acres. The topography ranges from infertile hills to fertile river valleys. There are 140 miles of roads and approximately 300 miles of fencing on the various stations. The value of land, buildings, and equipment exceeds 35 million dollars.

The operating budgets for the research stations for the current fiscal year total approximately 9 million dollars, which represents approximately one-third of the Louisiana Agricultural Experiment Station's total budget. A recent inventory indicated that there are 159 separate research projects at the research stations. Research subjects range from the very applied to the very basic, including biotechnology.

The total number of employees is approximately 340. More than 60 of these hold the rank of Assistant Professor or above, and more than 55 hold the Ph.D. There are more than 30 supervisory personnel, approximately 30 clerical staff, and more than 140 laborers and tradesmen. Also, a large number of transient employees are hired on a seasonal basis.

Some of the most productive scientists in the Louisiana Agricultural Experiment Station are located at research stations. Several of the research programs are recognized nationally and internationally.

Research at the Idlewild Research Station includes pecans, peaches, beef cattle, erosion control, timber management, and wildlife management.

The Burden Research Station is the site of our Rural Life Museum which is visited by some 100,000 persons per year. Research includes horticulture, turf grasses, vegetable crops, and soybeans.

Research at the St. Gabriel Research Station includes crossbreeding of beef cattle, embryo splitting, sugarcane, and insect control (both in the field and in screen houses).

Next, we move to the three research stations located south and east of Baton Rouge. The Citrus Research Station conducts research on citrus crops (including insects and pests), cantaloupes, cucumbers, and other vegetable crops.

At the Hammond Research Station emphasis is placed on horticultural crops such as irradiated poinsettias, blueberries, grapes, strawberries, various ornamentals, and turf grasses.

The Southeast Research Station recently received a major addition to the office building, and a new half million dollar Forage Testing Laboratory was completed which supports forage researchers at that station, as well as at other locations throughout the state. Research includes evaluating pasture crops with dairy cattle, crop varieties in plots, alfalfa, no-till corn, and extensive studies on silage.

Stations located in northeast Louisiana include the Northeast, Sweet Potato, and the Calhoun stations. The Northeast Research Station has two locations, one on alluvial soil adjacent to the Mississippi river had a second at Macon Ridge on upland soil. Research is conducted on cotton, soybeans, irrigation, rice, grain sorghum, corn, and beef production.

The Sweet Potato Research Station is one of several stations that has received a new office building in recent years. The station has been very successful in developing improved varieties of sweet potatoes and conducts research on vegetable crops such as tomatoes and cabbage.

The Calhoun Research Station is our oldest research station, being established in 1888. The emphasis is on peach breeding and productions, other horticultural crops, egg production, and evaluation of bermudagrass cultivars with beef cattle.

In north and northwest Louisiana there are three research stations, the Hill Farm, Red River, and Pecan stations. The Hill Farm Research Station is our most northern station. The station was established in 1947 and is comprised of 1,500 acres of land. It has 16 residences, 10 miles of hard surfaced roads, and more than 60 miles of fencing. Research is underway on producing slaughter beef using optimum levels of forage, crossbreeding beef cattle, pine plantation management, multiple land use, varietal testing of forage crops, and control of mastitis in dairy cattle. The latter program of work has received both national and international recognition. Work at the Hill Farm on Coastal bermudagrass has helped to convert the Coastal Plains region from a hay deficient area to a hay surplus area.

The Red River Research Station is another of our stations that recently received a new office building. This is a multi-disciplined station with research underway on cotton, double cropping soybeans, disease control on various crops, production practices, minimum-till soil preparation, irrigation, and several aspects of beef cattle production.

Research at the Pecan Research and Extension Station includes production and harvesting practices, disease control, laboratory studies, and seedling propagation. Tour groups visit this, and each of the other stations, on a regular basis and are always welcome.

In the central and west central part of the state, we have two stations. The Dean Lee Research Station at Alexandria conducts research on silage, swine, bull testing, beef cattle, soybeans, wheat, and weed control. Also located at this station is our foundation seed facility for the state.

The Rosepine Research Station concentrates on several aspects of beef production, including extensive management of cattle on timber land, intensive management of various pasture crops, summer legumes, and cow-calf systems.

Finally, we turn our attention to the southwestern and south central areas of the state where the Rice and Iberia Stations are located. The Rice Research Station emphasizes rice breeding, rice fertilization, forage varieties, soybeans, land preparation, tissue culture techniques, beef production, and crawfish production. The tissue culture program is the

largest biotechnology research effort at a public institution anywhere in the world.

At the Iberia Research Station the feedlot phase of a state-wide forage-fed beef project has been conducted. Other work includes production of beef on pastures, crop variety trials, soybean research, and work on sugarcane.

INTEGRATION OF GRANT AND CONTRACT FUNDING IN THE RESEARCH CENTER

J. D. Dodd, Assistant to the Director
for Grants and Contracts

Texas Agricultural Experiment Station
College Station, TX 77843

Motivation is an important and pervasive topic in your morning session today and it is an important factor to a successful grants and contracts program as well. This is true regardless if you are stationed on a main campus or at research and extension center. For motivation to work, incentives must be involved. Individuals do not work overtime and accomplish high levels of productivity if there is not some kind of incentive. Much of that is admittedly professional pride, a desire to develop as a professional. Beyond that, however, administrators have to provide some impetus, some additional reward.

I have reviewed proposals submitted through the Texas Agricultural Experiment Station so I believe I am in a position to comment, not only on the ability of the scientists, but also on that of their administrators. I was introduced as one who serves as liaison with federal funding agencies and that is correct. However, I think that over the years one of the most interesting parts of my job has been learning to work with administrators. It has become obvious to me that a large part of the incentive for the scientist has to be provided by the resident director and then proceed up the administrative line.

I want to discuss some of the important aspects of the process of obtaining grants and contracts and place special emphasis on motivation. Some important factors are the environment in which the scientist works, the services available, the preproposal, the proposal, interactions between the requesting scientist(s) and the sponsor, how various sponsors view proposals and an overview of potential granting agencies for scientists at stations.

ENVIRONMENT

Components of the environment include the organization, its goals and method of operation. The attitude of the organization, the administration and the scientist; communication and the services available for identification of funding opportunities and proposal submission are important. You, as leader, must provide an environment in which the scientist feels comfortable in developing a program and writing competitive proposals. There are certain attitudes that a successful scientist must have and resident directors have to provide some of the stimulus for development. You have a definite role in determining how fast your scientists adjust to these conditions. It is difficult for scientists, particularly if new at a center, to understand the mission, and what is expected of them. They should ask these questions, but if they do not, resident directors should anticipate and discuss without inquiry:

- What do you as a resident director expect?
- Do you expect them to develop a program based in large part on extramural funding?
- Do you expect the research to be applied or more fundamental?
- Do you expect integration of both applied and basic approaches into the program?
- Are grant proposals important for tenure?
- For promotion?
- For merit pay increases?

Many scientists could ask if there is a policy for time off to write proposals. Remember, a proposal is often equivalent to a scientific publication in time and effort. The answer of course is no, preparing proposals is part of the job. However, if incentives are not obvious, at least some will be reluctant to prepare competitive proposals.

Scientists need encouragement and you must be willing to sit down and discuss their proposal and help develop their idea(s). Again, a resident director needs to be aware of funding opportunities and inform the scientist of competitive programs as early as possible. You need to assist the scientists
in developing a positive attitude into their program. A negative approach in proposal preparation guarantees rejection.

Communication is one of the most important considerations. It is pretty discouraging for a new, young, or even established scientist to work hard to prepare a proposal and find out that for some unannounced reason someone up the line is not going to sign. The scientist perhaps did not inform. . . No one likes surprises. A major objective of our office is to keep the lines of communication open so that everyone knows what is going on.

Communications is a key factor when funding unexpectedly and suddenly becomes available, requiring a "short turn around" for proposal responses. The resident director must be aware of ways to shorten the system approval procedure. You must be willing to get on the phone to ramrod the proposal through for the required signatures, usually on the main campus. If you know that the time frame is impossible, you need to communicate this to the scientists before initiation of proposal preparation. If you do not stay on top of these things, the morale in your unit will decline and so will the number of proposals submitted and the success rate.

We must always keep in mind that writing proposals for outside funding should not determine the direction of the research at a center. Your scientists must know what their mission is and how the preparation of grant proposals "fit" into the overall mission. The professional development of

the scientist is an important consideration and grant proposals, handled properly, can and should fit into professional development.

SERVICES

There are some questions with regard to proposal preparation that you need to anticipate from your scientist.

- o What avenues of communication are available in your system?
- o How quickly will information on program announcements and guidelines be available?
- o How will information be provided to scientist?
- o What assistance is available in proposal preparation, not only in terms of the text, but also in regard to budget preparation and completing the forms?
- o What are possible financial constraints?

Specifically, you need to inform the scientists of the types of assistance they can expect during proposal preparation.

Frequently scientists spend time in proposal preparation on such things as determining the level and method of calculation of employee benefits and the indirect cost rate. It strikes me that these functions should not be the responsibility of the scientists. Scientists are technically trained and expertise should be available in the Center for preparation of such items as the budget. Scientists need to know the procedures to be used in submitting a proposal. Most policies are administrative in nature; therefore, it is your responsibility to establish a policy or mechanism so all scientists understand the requirements well in advance of submission.

In each state experiment station, there probably is someone assigned the responsibility of reviewing periodicals such as the Commerce Business Daily, the Research Monitor, and the Federal Register for the purpose of identifying notices of funds available for specific research endeavors. Communication lines must be established to provide a link to you and the scientist. Often, these type announcements require a 30 day or less turn around. A communication system must be present to respond in an orderly fashion for success in acquiring grant and contract funds.

Probably the most important part of the whole process is providing recognition to the scientist. They might say, "Oh Shucks, we don't expect anything." However, you know they like to be told, "thank you", for turning in a proposal and for the extramural funds acquired. Who is going to tell them? The resident director or someone else? Who is going to say once they get an award, "Son of a gun we appreciate the heck out of what you have done, you have helped us and our programs." These need to be a common occurrence in your management scheme.

PREPROPOSAL

The preproposal is important to you, the scientist and the granting agency. It is a document which is ultimately used to contact granting sources for feedback on their interest in the proposed research topic and approach. However, it is valuable to the scientist because it forces organization and documentation of intent. It also lets you know what their identified goals are. It is a good idea to discuss the broad goals with the scientist when discussing the preproposal, this permits your input. Make certain that you are helping the scientist "fit" into the overall mission for the unit.

A preproposal must be technically sound. However, it is primarily a sales document. A new scientist, one recently out of graduate school with little experience, is up against three major obstacles.

- o No demonstrated research management ability.
- o No demonstrated financial or personnel management experience.
- o No demonstrated productivity, in terms of publications.

You must help the scientist address these points in the preproposal and vitae.

The preproposal title must be concise and precise. Titles which utilize phrases like "determine the effects of" are not currently acceptable. Granting agencies essentially want a key word title that refers specifically to a process or function of interest to the scientist. The objectives, also an important segment, identify the specific questions the research will answer.

Presentation of the research should be addressed after the objectives. This section is vital for a favorable reaction from the potential sponsor. The scientist needs to expound on his/her virtues and indicate an awareness of the problem. It is a must to indicate "hands on" experience. This can be established by the use of preliminary data. The scientist can begin by saying "Our (my) laboratory, has observed this condition and this is supported by our (my) preliminary observations and data."

Discussion of the research is covered in a two to four paragraph section. The scientist must be confident--indicating the availability of facilities and resources. In addition to mentioning preliminary data, the following points should be conveyed:

- o Most of the equipment is available
- o The operation and techniques are known

It should be conveyed that acceptable data collection, summarization and analysis techniques are currently utilized. Phrases like "our preliminary data have shown..." or "by utilizing this technique ... has happened" indicate that the facilities, the equipment, and the ability to handle all phases of the proposed research are currently employed.

A number of program managers have said that the "statement of significance" is the most important aspect of the preproposal. Identification of significance indicates the potential of the scientist to interpret data as well as the value of the data. In a strictly basic--oriented preproposal the technical significance should be stressed. This section should be positive, definite and confident that the results will contribute to the major emphasis of the proposed research. It is also useful and wise to indicate at the end of the significance the possible beneficial or practical uses of the data to be generated.

To summarize the preproposal mechanism, it must be remembered that the individuals reviewing these are extremely busy. They cannot be expected to spend a lot of time reading extraneous material. Therefore, preproposals should be short (no more than 2 pages), concise and yet tell the sponsor what they need to know. There are a few things you do not put in a preproposal--do not cite references or include a budget. The scientist is selling himself, not other scientists, and only after the potential sponsor indicates an interest is the cost discussed.

VITAE

The vitae is important and must convey the expertise and experience of the scientist. It is necessary to indicate who the scientist worked under for the masters and doctors degree. Many major professors are often distinguished individuals and this information often is a strong indication of the specific training and interests of the young scientist.

Many young scientists do not fully indicate their financial and personal management experience. Graduate research usually is funded under some type of extramural funding. Thus, the new scientist has probably written a proposal, conducted research and contributed to reports. This can be indicated by "My PhD work was conducted under NSF grant so and so and my responsibility was preparation of proposal, conduct research, ..." This shows not only management experience, but also some productivity through publications resulting from the sponsored research. Properly constructed, the preproposal and vitae sheet provides the potential sponsor with a good insight into the proposed research activity and the scientist involved.

SPONSOR INTERACTION

What happens after the preproposal and vitae have been developed? You may have a liaison person like myself in your organization, who spends much time traveling and can carry these directly to a sponsor representative. This one on one situation has an advantage because detailed questions can be asked and normally the answers help in determining the sponsor interest in the proposed topic. Regardless if hand carried or mailed, the potential sponsor will review the material and give one of three responses:

- Yes, we are interested and if a sound competitive proposal is prepared it has a chance of funding.
- Yes, we are interested in the general context of the preproposal, but could some aspects be modified to include ...?

- o No, if no, the next question should be, "Is it viable research?" If the answer is yes, inquire as to the proper sponsor and follow-up.

PROPOSAL PREPARATION

In the preparation of a formal proposal a number of items must be considered:

- o Be sure proposed research "fits" the specific program.
- o Become familiar with the sponsor's guidelines--and adhere.
- o Meet the published deadline for submission.
- o Proposal must be clearly written, neat, and easy to read.
- o Reviewers can evaluate only what is provided in the proposal.
- o Objectives should be clearly and concisely stated in a logical sequence.
- o Be sure proposed research activities are within the capability documented by the vitae and publications.
- o Proposed research activity can be completed with the available facilities, equipment, and expertise.
- o Indicate how the financial and personnel resources will be managed.
- o Identify concisely the product to result from the research activity.
- o Evaluate: objective(s) + procedures + data collection + data analysis + budget = product.

An important point is that preliminary data is crucial for extramural funding. Today, at least with the federal agencies, you need to have a certain amount of high quality preliminary data. Therefore, a scientist must realize that planning is essential. Preliminary research done in advance of proposal submission must be a part of the planning process.

I think it is worthy to discuss basic vs. applied research approaches as they apply to proposal preparation. Although we all know the difference is a matter of perception, that perception can be a key ingredient in determining funding success. In general, most federal granting agencies now expect proposals to be written from a basic approach and relate to a process or function. Words like quantitate, qualitate and document should be used. It is equally important to incorporate some of these words into the title to influence the reviewers first impression.

One of the most difficult tasks in working with scientists is to convince them that a proposal should not emphasize the commodity of their primary interest. The process, function or technology is the important element and the commodity just happens to provide the best test organism and the data collected can be extrapolated to other species.

Some agencies prefer to fund applied research, defined as commodity-oriented research. For these agencies the proposal can be rewritten stressing the commodity. It does not really take a great deal of effort to convert a basic oriented proposal into applied and vice versa. It does however, take an understanding of the meaning of the key words and how they can affect the reviewers' perception of the proposed activity. It is your responsibility as administrator and leader to become familiar with this aspect and to work with your scientists.

SPONSOR

When you begin to analyze funding sources, your first requirement is to look at your center, your mission, resources and personnel. This will form the basis for determining the type of funding most related to the existing situation. Utilization of this coupled with the expertise and interest of your scientist(s) will help identify specific sponsors. The three major classes of funding agencies are government, industrial and foundation. I am convinced that today there is little difference in the requirements for each group.

The amount of money available for grant funding by federal agencies has increased at least slightly in recent years. You have been led to believe the opposite is true. However, competition for these federal funds has increased due to the number of proposals submitted. The result is a highly competitive atmosphere with an overall declining success rate.

Availability of program descriptions and due dates varies by agency. Some agencies like National Science Foundation (NSF) and National Institutes of Health (NIH) can provide at least a one-year notice based on program descriptions available to the public. The USDA Competitive Grants Program have program descriptions that vary only slightly between years. Currently most announcements are published to provide for a 60-90 day turn around (time from when notices are sent out until proposals are due).

The USDA Competitive Grants Program continue to be major source of competitive funds for scientists in agriculture. In general, it is felt the funding level for these programs will stay high and perhaps increase slightly in the near future. The management system of EPA has changed from extramural funded programs from headquarters (Washington, D.C.) to the regional laboratories. One on one communication, either between you as a resident director and someone at the regional center or between your scientist and a scientist at a regional center are the most promising methods of identifying available funds.

Funding for NSF is increasing slightly, but only basic research is funded. Research orientation at NIH is similar to NSF. However, NIH does fund clinical research. The Department of Energy (DOE) is primarily operated at the various regional laboratories.

It appears that one of the better sources of funds for station scientists is the United States-Israel Binational Agricultural Research and Development Fund (BARD). In general, this program covers all aspects of agricultural research. Proposals can be for either applied or basic research. This requires the involvement of scientists from both countries.

Thus, proposal preparation needs to be initiated several months prior to the single annual deadline.

Other sources that have extramural programs, applicable to agriculture include the Department of Defense (DOD), Department of Interior (DOI), Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA) and the Food and Drug Administration (FDA). These agencies have been providing some funds for selected phases of primarily basic research related to agriculture. Availability of funds in the future from these agencies is unclear.

SUMMARY

This is an attempt to briefly present what is considered to be some of the important aspects of grant and contract programs. Obviously, you know there is much more to it. Thank you for asking me to address your group. I have enjoyed it.

GRANT AND CONTRACT FUNDING
PRIVATE SECTOR

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Before I get into the various kinds of private funding I should like to make some general comments. There is a good deal of similarity between public and private funding situations and requirements. And, there is an urgent need for clarity and conciseness in the preparation of proposals. My experience of dealing with proposals over the past several years leads me to conclude that many scientists simply do not know how to write. It is the responsibility of the administrator--your responsibility--to make certain that the proposals are organized and written lucidly.

Deadline pressure for proposals is probably less in the private sector than in the public; but, the necessity to address proper objectives is not lessened. One of the biggest causes for rejection of proposals submitted to the private sector is because the authors do not properly address the needs for the research being requested.

Generally, a private company has a preconceived idea of need and will request proposals outlining a research approach in that area. It is hard to understand why so many scientists fail to address that clearly outlined situation.

I make these statements because I believe it to be your responsibility as administrators to help these scientists develop a properly prepared proposal. The scientist has to do the research as well as write the proposal. It is understandable if perhaps they do not understand exactly how to do it. But administrators should make it their business to communicate with the potential funding source, understand what is wanted and be able to help the scientist construct and organize a proposal that will be successful.

Grant funding needs to be differentiated from contract funding. Grant funding is basically a request by a research facility for support, in whole, or in part, of a particular area which those facility personnel propose to investigate.

Contract funding, on the other hand, is usually a request by a corporation or foundation <u>of</u> the research facility to conduct specific research.

GRANT FUNDING

Grant funding is initiated by the researcher or the research facility proposing to do work in a general or specific area. Grants may be solicited from a number of different organizations including companies, corporations, and foundations.

FOUNDATION GRANTS

There are four basic types of foundations which might fund agricultural research:

(1) The independent foundation is an autonomous grant-making organization, which receives an endowment generally from a single source, such as an individual, family or group. This type generally limits awards for specific fields in their local area. An example is the McKnight Foundation or Bush Foundation where monies are given by the families, both of whom were early 3M leaders.

(2) A company-sponsored foundation is a grantmaking organization with close affiliation to the sponsoring corporation. Endowments are from a profit-making corporation, and awards tend to be in fields related to corporate activities and in communities where the corporation has facilities. Examples are The General Mills Foundation and The Pillsbury Company.

(3) Operating foundations use their resources, usually derived from a single source, for their own research, or social welfare or other programs determined by their governing bodies. This type of foundation does not usually make grants. An example is The Wilder Foundation or Minneapolis, MN.

(4) The community foundation is a publicly-supported foundation, and makes grants for social, education, religious or other purposes. Funds are derived from many donors. Examples are: The United Way; Nature Conservacy. The latter solicits research but many also fund requests for funding specific projects, mostly, but not always of an ecological nature.

A check of a funding sourcebook published by the National Network of Grantmakers indicates some exceptions to these general guidelines. For example, the William H. Donner Foundation, New York has interest in: Canadian-US relations, coastal, and inland water resources and nutrition education. In 1983 it concentrated on the need to make physicians more aware of nutrition in health management. The foundation gives preference to projects that are national in scope, and experimental endeavors for which seed money is not always available.

According to Judith Margolin in The Individual's Guide to Grants, large foundations generally have assets in excess of $25 million. However, nearly half of foundation awards also come from small foundations. The typical small foundation grant award averages from $3,000 to $11,000. The larger foundations receive more proposals than smaller ones and can be more selective. The latter generally prefer grant ideas that will function as models or prototype projects with national impact in particular fields. Smaller foundations are more likely to fund general operating budgets for longer periods of time.

CORPORATE GRANTS

Corporations and/or corporate foundations are likely to be of the most assistance for agricultural research institutions or universities. Corporations give to enhance the communities of their families and employees; to improve their public image, for tax advantages, to aid their research and development projects, to keep pace with the competition, to increase productivity, to entice prospective new employees and to associate with quality. Corporate foundations or corporations that fund various civic and environmental areas usually have specific guidelines associated with the corporate mission in order to concentrate their philanthropic resources for maximum impact. Company contributions may come in the form of cash grants, in-kind donations and/or technical assistance. An example is The Toro Company Giving Program.

Let me use The Toro Company and two foundations, Pillsbury and General Mills, to illustrate a point. The mission of The Toro Company is, in part, to provide support to local, regional, national and international organizations whose purpose and programs further enhance the cultural, civic, social and environmental causes covered in our scope of operations. The scope of the Toro Company involves primarily the communities in which we have facilities. Toro interprets environmental issues in a rather general and broad manner, but prefers specific studies related to its products and services.

The two foundations are quite similar in many respects. For example, because of their food product orientation and youthful employment base (fast food restaurants) General Mills and Pillsbury favor hunger and youth issues.

General Mills specifically states: "...favors grants that address the current needs of families, children and the disadvantaged."

Some areas of funding for these three organizations include:

> Pillsbury - technical assistance which uses food industry expertise, public information and awareness programs on hunger and malnutrition, career planning and training programs for youth.
>
> General Mills - a focus on programs encouraging local initiative in community problems or opportunities specifically in areas where their facilities and employees are located.
>
> Toro - programs which promote the turfgrass industry specifically golf and sportsfield turfgrass research and education, horticulturally related events and public education regarding water conservation and environmental beautification and preservation. Also included are scholarships placed at college and universities that offer programs in landscaping, agronomy, engineering and other disciplines pertinent to our business.

WHAT IS NOT FUNDED

General areas not considered for funding by any of the three organizations reviewed included:

- individual persons
- religious organizations for religious purposes
- political campaigns or lobbying efforts
- travel support for individuals or groups
- advertising whether print, film or television
- local organizations other than those serving the company facilities

WHO AND WHERE ARE THE FUNDERS?

The library reference section has several good directories of funding sources such as: The Annual Register of Grant Support, and The Foundation Directory. These directories list foundation addresses, sources of income, decision making processes, preferred method and timing of application, areas of specific funding, IRS information and other pertinent data relevant to the grant seeker.

HOW TO APPLY

Develop a list of prospective funding organizations that may in interested in your project. (Review criteria in published directories, gather annual reports of foundations and corporations and consider locale).

Send an introductory letter and a written proposal to the highest contact person, preferably the director of corporate contributions, or if unknown, to the CEO in which case it will then be routed. Your proposal should outline but not limited to:

1) a brief description of the organization requesting the grant i.e., its history and purpose and list of officers;

2) a definition of the project including specific objectives and goals which the project is designed to meet;

3) evidence that the individuals/facility proposing the project are qualified to carry it to completion;

4) a specific budget for the project as well as an operating budget for the organization's current fiscal year; sources of revenue and expenses;

5) the methodology for evaluating the completed project;

6) a donor list for the current and most recent fiscal years indicating amounts from each donor including private, corporate and foundation support.

Follow up with a phone call a week or so later to determine interest, and arrange an appointment to discuss details if the prospective funder expresses interest.

One proposal may suffice for submission to several foundations, however, consideration may need to be given to specific data which may be

required by some organizations and not others, so adapt your proposal accordingly.

SOURCES OF INFORMATION

1) GRANT SEEKERS GUIDE - FUNDING SOURCEBOOK
National Network of Grantmakers, Jill R. Shellow, Editor, Moyer Bell Limited, Mt. Kisco, NY

2) Annual Register of Grant Support
A Directory of Funding Sources 1987-88 - 21st Edition, National Register Publishing Co., National Register Publishing Co., Macmillan Directory Division, 3004 Glenview Rd., Wilmette, IL 60091

3) The Foundation Directory - Published by The Foundation Center, NY

4) The Individual's Guide to Grants
Judith B. Margolin, Plenum Press, NY and London

5) The Fund Raising Resource Manual
Thomas W. Tenbrunsel, Prentice-Hall, Inc. NJ

6) Corporate Foundation Directory
Washington, D.C. Taft Corporation. Reports on corporate foundations.

7) Standard & Poor's Register of Corporation, Directors and Executives
New York, Standard and Poor's Corp.

8) Million Dollar Directory
New York: Dunn & Bradstreet Corp., Covers corporation with sales over $1 million

9) Middle Market Directory
New York: Dunn & Bradstreet Corp., (Locates corporation by name, geographic area and product classification).

10) Corporate annual reports of interested corporations.

CONTRACT FUNDING

Contract funding requests most often are based on the need of an organization, a company; or, an individual to:

(1) investigate a specific area in support of established objectives;
(2) to develop or to elucidate information pertaining to a particular problem, topic, or, in some cases a project or product.

The United States Golf Association, Green Section turfgrass research program provides an example of contract funding; though it might be considered limiting and restrictive in scope. This program is scheduled to be funded over a 10-year period which began 1982. A research committee was appointed to develop guidelines, objectives and monitoring procedures. Two

(1) to reduce water use on golf courses by 50 percent; and
(2) to reduce golf course maintenance costs by 50 percent.

Both objectives are to be accomplished without impairing the playing quality of the golf course. In other words, quality from a playing standpoint is to be as good as or better than it is presently.

The USGA publicized appointment of the committee and its intent through their various publications such as: Green Section Record and the Golf Journal. The committee solicited proposals from members of C-5, the Turfgrass Division of the American Society of Agronomy; some 55 responses were received, 15 of which were accepted and funded.

It may be of interest to note that more than 50 percent of the proposals did not respond to the request for specific support of the objectives as stated. This continued to be a problem throughout the first 5 years of the program. It ultimately, led to a discontinuation of general solicitation. Specific requests are now being directed to individuals known to have expertise in a particular discipline and locations and institutions are being screened to determine if they have adequate facilities to support the type of research requested.

Initial proposals accepted by the committee spoke directly to the objectives and how they expected to contribute through the proposed research. Some examples are breeding of grass species used for turf purposes; selection and breeding of native grasses for stress tolerance (heat, cold, salinity and drought), identification of stress mechanisms, and evaluation of direct and interacting cultural practices;

A second example of contract funding is that which comes from a specific department of a corporation. For example, the Toro Company has, over the past several years, requested projects to evaluate:

(1) Mulching vs. clipping removal. Early studies indicated desirability of mulching. This led to development of a "mulching" mower, which, although very desirable from an agronomic standpoint, was not accepted by the public. We built a second, improved version a few years later - it still did not sell - "mulching" simply was not accepted by the public - yet!

(2) Techniques and devices to conserve water. Proposals were solicited from individuals known to have expertise in these areas. Proposals were reviewed by a committee representing university and Toro personnel in departments of agronomy, engineering, electronics, marketing and sales. In some cases, where we needed expertise not found in the company, we asked a known or recognized authority in the field to serve as a consultant.

Individuals submitting the selected proposals were invited to appear in person and present their proposal to an internal committee including a consultant who had been working with us on another, closely-related project. Following presentation, one was selected and was funded.

A second example of this approach was a request of research personnel located in pre-determined geographic areas to evaluate soil moisture sensing devices. Geographic location entered into the selection of the individuals (and their facilities) sinceinformation was desired for arid, semi-arid, sub-humid and humid regions. In this case, the individuals and their facility were selected by the one individual desiring the information.

MANAGEMENT METHODS TO INSTILL MOTIVATION

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Motivation is defined by Webster as "inciting action." In our respective organizations, however, we tend to think about motivation in a much broader sense than merely inciting people to action; we usually have some objectives in mind, and a specific time frame within which these objectives should be accomplished. Furthermore, we usually attempt to relate specific objectives and actions to the mission of the organization. For most of us, therefore, motivation is really management of our personnel to achieve specific goals and objectives within an established period of time. In other words, motivation is really the classical definition of management: getting things done through people. My purpose is to characterize the different management functions and to describe how these relate to the accomplishment of organizational goals and objectives.

There are two different but highly interrelated aspects of management; one is called "administrative" management, and the other "executive" management. Before proceeding further, however, lets resolve some semantic differences between management and administration. In academic institutions, the two terms are intended to mean essentially the same thing. To the extent to which there is any difference, administration suggests a "soft" approach to management; in the military, the opposite is intended in that the term command implies a "hard" and more decisive approach to management. My use of administration in this paper, however, is not meant as a soft alternative to management; rather, it is used as a component of the total range of activities that constitute management.

The administrative functions discussed herein are what George Keller describes in his book on Academic Strategies as the "thousand little things" that have to be done to enable an organization to function well. Executive management, in contrast, deals with the planning and leadership functions. Administrative functions keep the ship afloat; executive functions give it direction and result in acceptable progress in reaching a destination. Administrative functions are directed at efficiency, or "doing things right". Executive functions, on the other hand, are primarily directed at effectiveness, or "doing the right things."

My purpose in introducing these concepts as a preface for discussing motivation is this: if the ship doesn't float, it doesn't go anywhere! This is a problem that many managers, particularly new managers, have to face. How do you keep this ship afloat and still have time to perform the so-called executive functions?

One way of approaching administrative management functions is to hire the stereotypical "little old lady" bookkeeper. She is the kind of person who knows how to do everything, and who to contact when there is a problem. Of course, you'd better hope that she doesn't ever get sick or die, or take

long vacations. One problem with this approach to administration is that you are heavily dependent upon one person for the handling of innumerable details. The question arises: do you really want to surrender that much control to one person in your organization?

There is an alternative approach to administrative management that deserves serious consideration. You can develop an "administrative support system." This involves three steps; the first is to proceduralize all of the administrative tasks. This involves taking all procedures and related information from that little old lady bookkeeper's mind and put it down on paper. You might add specific forms (filled out properly for reference) and sample correspondence, and place them in a procedures notebook for handy reference. Everything is proceduralized task by task, category by category--personnel administration, finance administration, facility administration, program administration, etc. That little procedures notebook will be a "bible" for those people who are charged with responsibility for the areas covered. If your operation is computerized, much of this information can be maintained in computer files.

The second step is to train people in the proper implementation of those administrative tasks. Don't rely on just one person; cross-train at least two people on each procedure. Delegate all of the authority necessary to those people and follow up to ensure that all tasks are performed properly. This system provides backup in case someone leaves or gets sick.

The third step in the development of the support system is to schedule administrative tasks when possible. This is especially useful for procedural situations that are predictable. For example, you have X number of experiment station projects and Y number of them are going to be due for revision this year. You can look at the calendar and figure when they are due. Don't wait until the last minute. If the process must be completed by May, maybe you can initiate the first phase in November, the second in January and the final one in March. Thus, people will have plenty of time to respond and there are no surprises.

We developed a system in my department called FYCAT - or, fiscal year calendar administrative tasks - to ensure the timely completion of scheduled administrative tasks. It identifies the tasks, the month due and person who is assigned responsibility for carrying out that task. I meet with the key people--administrative aide, accounting clerk, and head secretary--once each month for a review to ensure that everything has been accomplished based on the FYCAT calendar. We look for unfinished or overlooked items and bring all items up to date. We also review the items due the following month, and we try to anticipate and deal with any potential problems. We continually evaluate the administrative support system for changes that will improve its effectiveness.

The advantage of the administrative support system is that you do not vest power in one individual, you have an almost instantaneous oversight capability, and you command the whole process with little allocation of your time. The less time you invest in this aspect of management, the more time you have for the executive side of management. That is really the purpose behind the support system, to create efficiency, not only for the organization, but also for you as the manager.

Executive management means two things to me. It means planning and leadership. Planning basically says, "I want to control the future of my organization. I don't want circumstances to control it. I don't want to just react to things that happen. I want to anticipate things that are going to happen and direct them in a way that is advantageous to me and my organization."

Planning was defined by Allen Lakein as "bringing the future into present so that you can do something about it now." It essentially means that you are more likely to make better decisions in advance than you are at the time they absolutely must be made. Obviously, making decisions for the future means you have had more time to make a careful assessment and to consider all the alternatives. You can also involve other people in the decision if given adequate time. You can tap the thinking, ideas, insights, experience and perspectives of your faculty and staff to help you make sound decisions. Talking to secretaries, clerk typists, technicians and farm hands can yield some amazing and useful results. How would they improve this? What could they suggest about that? Their contributions to the efficacy of an organization can be significant and it doesn't cost you a dime. All you have to do is ask.

While I was inspecting the agronomy farm last summer, I saw a mechanic working on a piece of equipment, a small grain thresher, something about which I know very little. We discussed what it was and how it worked. I asked, "Is it safe?" He said he had been using it for 23 years and never had an accident. I asked him, "Are you convinced that it is safe enough for your son to use? If you had the opportunity, would you do something to make it safer or more efficient in accomplishing the purpose for which it is used?" You would be delighted to see what he did to that thresher to make it safer. It is amazing what people will contribute if they are asked to challenged to do so. Every person in your unit can contribute something important to the organization.

Planning is both an opportunity to make good decisions for the future and an opportunity to have everybody in your organization involved in the decision-making process. Remember, when you get your people involved, they become stockholders of the organization, not just the victims of somebody else's decisions.

Has any of the foregoing related to motivation? Haven't we really been talking about motivation all along? If you support people well, as a good administrative support system does, that contributes to their motivation to do a good job. If you invite people to be part of the decision making process and plan the future of the organization, that has some influence on their motivation to want to do a good job in the organization.

The other aspect of executive management is leadership. What is leadership, and how do you define it? Listen to presidential candidates. All they talk about is leadership. But what is leadership? I'll tell you what I think it is. I think it's primarily communication. Specifically, it's communication about goals and objectives, and performance evaluation and opportunities for improvement. It's asking questions such as: What is our organization all about? What are we doing? Why are we doing it? Why

is it important? And why is it important for us to discuss it together? Perhaps the answer to the last question is that it makes people feel more a part of the process, a part of the organization, and important, regardless of their specific position within the organization.

I think it makes a lot of sense to spend time doing that. I think it makes a lot of sense to get out of the office after you've developed a workable and efficient administrative support system and spend time communicating with faculty, staff and students and others who are part of your organization.

The measuring and assessing of employee work performance can be done in a very negative sense. For instance, does that mean: "God you're awful. If I could fire you, I would replace you tomorrow with somebody decent." That's not an especially good way to gain support from employees, nor is it a fair and appropriate feedback to the employee regarding his performance and opportunities for improvement. The theory of the carrot and stick approach--kick them or seduce them--was once a common method of personnel management. Today this approach is largely obsolete. You <u>can</u> actually fire somebody with sufficient cause, but it is such a difficult and complicated procedure that is may not be worth the time and effort. You can do it but you have to do it well, document bad behavior very carefully over a long period of time. So a stick in the form of dismissal is a negative incentive that requires enormous amount of time to implement successfully.

What about using the carrot approach--incentive and rewards? How many incentives do you really have? Do you have extra money to reward somebody who is doing a good job? If you do, I would like to share it with you because I don't. Do you have possibilities of big promotions that you can offer to everyone for doing a good job? Most of us in small organizations have limited opportunities for advancement for our employees. In the final analysis, disciplinary actions or rewards are very limited. The old carrot and stick approach is increasingly irrelevant as a means to foster motivation.

What do we have available to us as a means to motivate people? Let's assume that most people are doing a good job. For those who are not, there is probably a reason for it. Unless adequately addressed, they probably won't respond favorably to a kick in the pants. Perhaps, their lack of motivation is due to the fact that they don't feel appreciated or listened to, or they are frustrated. The communication process which lets them know that they are part of planning the future of the organization may have broken down or be nonexistent. They may have no feel for the missions and goals, their ideas have not been sought, and they have not been challenged to contribute--not only the work with their hands--but the ideas and insights gained from their experiences. It is that overall approach to management that can address the issue of employee motivation. It can make them do even better than they thought they were capable of doing, and it can make you a better manager than perhaps you thought you were capable of being.

EMPLOYEE MOTIVATION

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The three subjects that most people are hesitant to deal with are love, leadership, and motivation. When I discuss motivation, I also relate to leadership because you can't have one without the other.

I think of motivation as a function of **CARE** and it begins when you hire a person. It doesn't start after they are in the plots. So, this morning I want to discuss C-Competency, A-Attitude, R-Resources, and E-Environment as they relate to motivation.

Competency means hiring the best person available. No one person will have everything we are looking for, whether it is a hoe hand or a new superintendent. The big question is, can the person be taught, can he learn?

As directors of research facilities there are some things you want to ask yourself as well as prospective employees. For example, can the person follow directions? If a person is going to learn, and if you are going to be a teacher, there should be an organized plan to accomplish your objectives. Is the person willing to try what you share with them or is he going to back off and say "That is not way we did back where I came from?" You want someone who will say, "I am willing to try."

Another component is honesty. Is the person honest? We are associated with both science and business and thus honesty is our bottom line.

The next segment of care is **attitude**---the attitude of the employee and the attitude of the person in the leadership role. Attitude in this context is really the mindset of the individual. The quantity and quality of responsibility which a person is willing to accept is directly related to attitude and the capacity of the mind. Try to provide opportunities for people to do just a little more than they thought they could do, stretch them to full capacity.

I have a friend who has spent a lot of time analyzing people. He estimates that 2% of the population thinks, defined as getting an idea and following it through to the point of taking some form of action; he went on to postulate that about 3% thinks they think. In other words, they can conceive of an idea but do not implement it and nothing tangible happens. He went on to say that about 95% of the population would rather die than think. For those of us in this room to be successful, we must be in that upper 2%.

Everyone coming to your station brings **resources** with them. Each person can do something extremely well. One of the challenges for leaders is to identify the various talents of our personnel and support those talents. In fact, we might even take it a step farther and say that we need

to provide the opportunity for us to teach others what we do best. Then many of the responsibilities are cross-linked and the individual becomes an integrated part of the organization.

Little things can make a difference in motivation, particularly as we look at resources. If I send someone out to prepare a field and the tractor is inoperative, then the morale of the tractor driver goes down, particularly if it happens repeatedly. Moreover, if I ask someone to do something and I don't supply the proper tools for him, I begin to create a situation where that person feels trapped. He also becomes harder to motivate.

There is one way to capitalize on a person's total resources, namely, give them an opportunity to be a leader within their group. When they become recognized as a leader they are rewarded in self-esteem and are encouraged to try harder.

The fourth part of the care formula is **environment**. If we are going to motivate, we must create a positive environment. The environment should help people realize their potential beyond the apparent availability of resources. Let me give you an example of which I am proud. When I became department head at Mississippi State University, we had abysmal resources of equipment and dollars. However, we did have something that we often overlook, namely people and their committment to meeting the needs of the citizens of Mississippi. All I did as the leader--as the motivator--was to plant some seeds of what might be accomplished, and then I got out of the way and let them go. When I look at what has happened with that group compared to ten years ago, I am extremely proud of what was accomplished. I did create an environment, encouraged them to go for it, and provided the resources and encouragement within my capability.

Communication is always extremely important in employee relations. The component of communication that is probably most important is listening. But communication can become tangled, involved and misunderstood if not carried out carefully.

We must be sure we are talking the same language if we are to communicate effectively. The concept of sharing the goals of the organization is excellent. Ask the employees, how can we do this better? When I was at Griffin, Georgia, I spent time talking with the department faculty and support staff and asked them to tell me what was going on in their section. I found out some things I hadn't even thought about and many little things were corrected easily.

When I referee soccer games one of the things I try to do is talk to the players. Some of my friends who are also officials ask, why do I talk to them? They think officials should direct the action. What I do out there is management by wandering around, getting out with people. If they are getting a little foxy with the elbows or stepping on someone's heels, I let them know I've observed their actions. I think it is important that we tell people why their jobs are important, and that includes the newest hired, the person doing the lowest job on the station, as well as the most senior person. The establishment of why a person's job is important should be a primary goal. You tend to make the individual part of the organization, stockholders so to speak and they are willing to do that little extra.

We need to provide each employee the opportunity to gain our trust and respect. Trust and respect are things you don't give--you earn them. If I am trying to get to a point so that Joe will trust and respect me, and if he doesn't open up enough to let me earn it then I am never going to get it. Conversely, just because you are the boss don't ever forget what boss spells backwards--a double SOB. Work diligently to earn your employee's trust and respect---so it is a two way street that all of us have to work toward.

When making evaluations, remember that a kick in seat of the pants and a pat in the back are about 14 inches apart. The results are usually significantly different. Don't use evaluation of performance as a whip. Use it as a way to accentuate the positive things that people are doing and use it to clarify the negatives. Simply put, let people know what you expect of them, and then reinforce with them how well they are doing.

Administrators should be trying to motivate people, but the process is like a battery. If you don't keep that battery charged it is awfully hard to make anything go. Remember that there is no such thing as status quo. Nothing can stay the same---whether it is a biological system, a physical system, or a social system. Change is the only constant. So, all of us must remember to grow.

Someone came up to me this morning and said, "Do you have your suspenders on?" Yeah, I wear suspenders. I have been wearing them for a long time. When I look in the mirror and see these suspenders I am reminded that I have to stretch just a little bit more today than I did yesterday. I must grow just a little bit more than I was comfortable with before. As agricultural researchers, we are in the risk business. Rather, we are in the risk reduction business for our clientele. We are trying to take science and put it into a form of technology that reduces the risk for those who depend upon us.

There is one problem with risks. We can fail. But failure isn't always bad. First, it tells us that there are probably several ways to get from A to B so it forces us to think. Secondly, we are kept from always traveling the same path. Remember there is no such thing as status quo. As leaders we must continue to grow, to do things a little bit better today than yesterday, and much better in the future.

I have heard people say "We don't have the resources in our state that you do in your state." That doesn't worry me, because I am not going to compete against you. I am going to compete against me. You go ahead and do what you do best. Just let me do things better today than I did yesterday. Suddenly, this attitude becomes contagious among employees. We need to know ourselves and we need to know our resources. We need to know what motivates us. We need to know what we do best and then how can we do it better than we ever thought we could. If we are going to keep our batteries operative, we must keep them charged.

One of the things I find most disturbing is the answer some scientists give when asked about the most exciting thing happening in their research programs. Too often, they quote data from five years ago. If I don't have my greatest expectations in front of me, something is wrong. That is what I

hope each one of you aspires to--that your greatest expectation is ahead of you and that you are instilling this attitude in the people around you. Again, the objective is to get them to buy into those expectations.

There are a couple of words that should be eliminated from our discussions. One of these words is never, and the other is impossible. Never means that we have stopped thinking. In the context of impossible, think about how many things there are in your house, or associated with research today, that five years ago you would have said are impossible. My son gave me a small plaque inscribed with "the impossible takes a little longer." I keep it to remind me that I want to exclude "impossible" from my vocabulary.

Research center administrators have a tremendous obligation and responsibility in addressing today's needs and tomorrow's challenges. Southern agriculture is fortunate to have each one of you as a leader. I want you to make a difference in the lives of the people you deal with. I am proud to be associated with your organization.

EQUAL EMPLOYMENT OPPORTUNITY AND ITS RAMIFICATIONS

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Equal Employment Opportunity (EEO) and affirmative action, are topics which stimulate attitudes, thoughts and motivations from all of you. If you are a manager, you think of EEO and affirmative action as hindrances, something that you have to do that you don't want to do. On the other hand, if you have ever been a victim of discrimination and filed a complaint, you have found out that the system is very slow and tedious. I want to discuss some general areas in detail, namely EEO, affirmative action, sexual harassment and reverse discrimination.

Most of those laws are very misunderstood processes. These laws cover just about every component of our society. Women, blacks, religious groups, people over 40, Vietnam veterans, and disabled veterans are all covered under this umbrella in one way or other. Equally important with EEO and affirmative action is that these processes are very dynamic. I don't have the same attitudes about these concepts now that I had as a 25 year old investigator with the department of labor. I just had my 40th birthday and my son sent me a card saying that 40 isn't very old if you are a tree. So it all depends on your perspective.

EQUAL EMPLOYMENT OPPORTUNITY

The early history of the United States emphasized agriculture. The hiring process was governed by needs. In the spring and summer farmers needed extra help to plow the fields and care for the crops so they hired extra people during those seasons. Extra people were hired in the fall when extra help was needed for harvest. When the work was completed and the farmer no longer needed their services, they were terminated. At that time it was a fairly simple system.

The next level in the history of human resource and personnel management was with the emerging railroads. This occurred when they started laying track across our country. If someone was injured or died on the job, someone had to carry the bad news to the family. These constituted the initial phases of personnel dealings as we know them today.

Over the years there have been several state and federal protective laws passed that have impacted the personnel or human resource area. The first at the federal level toward equal employment was by President Truman. In the armed forces, racial groups had been segregated and given menial jobs during World War II. Most of the blacks were cooks or they did janitorial work. President Truman, in a presidential directive, said that businesses that contracted with the government should take affirmative steps to integrate individuals into all types of jobs.

The next major federal bill was the Civil Rights Act of 1964. This bill, in addition to restating several other civil rights acts, clearly stated that discrimination in hiring, promotion, termination, or factors related to employment will be unlawful. I want to discuss 3 court cases affected by this law that have set a precedent for the way we are now required to do things in the area of employment.

Green vs. McDonald Douglas The first test case was fairly straight forward but it is a common situation and is still prevalent in housing today. Green was a member of what was considered a protected group--black male. He applied for a job at McDonald Douglas for which he was qualified. He was told that there were no jobs available in that category. However, the following week he saw the job for which he had applied advertised by McDonald Douglas in the Sunday paper.

That was a first test case and it dealt with four principles. An individual must belong to a protected group, must have applied for a job, must have been rejected and must show that the employer has continued to seek applications for that particular job. Another aspect of this situation is related to the equal housing act. An apartment or house is advertised in the paper and a member of a protected group wants to rent or buy. The person is told I am sorry but the apartment was just rented. Soon after the same ad appears in the paper.

These were considered basic barriers that the courts recognized were discriminatory. Be advised that if your organization conducts some of its business this way they stand a good chance of having a complaint filed against them. If they do and go to court, they will probably lose the case.

Griggs vs. Duke Power Employers soon realized that the approach struck down in Green vs. McDonald Douglas would no longer work. Thus, they used a different approach which was also tested in court, and become known as the Griggs vs. Duke Power case.

An individual named Griggs was a black male. He applied for a job at the Duke Power company. Mr. Griggs was told he could not be hired because he did not have a high school diploma. Mr. Griggs thought about it and concluded, "Why do I need a high school diploma for laborer job." He could understand oral instructions, and he could read simple instructions that a laborer would be given. This really impacted on personnel classification and performance evaluation systems. The court decision in essence said that the qualifications must be job related. The basic question was does a person need a high school diploma to sweep floors, clean a shop area or to help skilled craft individuals do their job. The courts said no, you don't.

The courts also took a look at the selection rates. The Supreme Court said that for two comparable groups you have to run a test of 4/5. This refers to the number of white people hired, promoted or terminated as a percentage of the total in that grouping. The same would apply to a pool of black applicants or employees. In other words, if you hire four white males from a pool of ten white applicants your hire rate is 40%. If you hire two black males from a pool of ten black applicants your hire rate is 20%. The ratio of 20% to 40% is 0.5.

The courts have said this ratio cannot be less than 0.8. If it is lower the employer must provide a reason why there is the large difference in that hiring rate. If firms have a procedure in place where some of the jobs require tests, they have to provide validation for the tests. The federal enforcement agencies require contractors with the federal government to validate testing but it is generally not used. These new requirements necessitate that organizations maintain applicant flow information. The federal government reviews these files periodically.

Hazelwood School District vs. United States The third case that was significant is used more in the affirmative action reviews than for the normal Title VII cases. The Hazelwood School District, near St. Louis had about a 50-50% mix of black and white employees overall. Yet the Hazelwood School District had 90% white and 10% black teachers. The court said that this disparity in the samples 90% vs 10% where it should be approximately 50-50 could not occur by chance. There had to be a reason for it.

You should be introspective and look at your organization and determine how you hire people in the composition of your groups. You should compare the ratio of employees you feel would qualify for positions your organization compare with the internal composition. If there is a disparity in the ratios, that should be a reason for some concern. This is especially important if you are a federal contractor. Most of you are associated with universities which receive federal financing, so this should be a real concern for you.

AFFIRMATIVE ACTION

Probably the most significant and publicized affirmative action case took place not far from New Orleans, in Gramercy. This was the Bryan Weber vs. Kaiser Aluminum & Chemical case that concerned an apprenticeship program. Mr. Weber was a male and he argued reverse discrimination as it pertained to entry into the apprenticeship program. The Supreme Court upheld the methods of the Kaiser Company's program.

A significant feature of this case was a perception on the part of many people that on the one hand equal employment opportunity is supposed to mean everyone is treated the same. However, in actuality it appeared that affirmative action gives preferential treatment to certain classes or groups of people. This concept was tested in the courts and after the Supreme Court ruling confusion still exists.

We must look at affirmative action in terms of opportunities to get a perspective. The administrative support system mentioned in an earlier talk is generally run by a woman, women, a secretary(s). The secretary that knows how to do everything is a woman. However, the compensation doesn't always seem to be in line with the level of responsibilities. Figures from a number of job categories seem to support the concept that women in similar jobs held by men on average earn 59 1/2 cents for every dollar that the man earns. Further more, it is reported that, in some employment conditions on the average, a white male who drops out of high school will earn more money than a white female who graduates from college.

Another reason for affirmative action is to redress some of the individual past biases. We must look at past discrimination and how we make up for past denial of opportunity. I have an uncle who graduated from Cal Tech--a brilliant guy, an electrical engineer. He just happened to graduate in 1942 when Japanese electrical engineers were not in demand. So there wasn't any way he could make a career in electrical engineering. He finally went into contracting and carpentry. He built a relatively large business--he did interiors of the K-mart Departments Stores in the country. He did all right, but he was denied a basic opportunity.

My sister is probably the most brilliant one in our family. She is currently a stock broker and is doing very well financially. She graduated from high school about 25-30 years ago and one day she told my parents that she did not intend to go to college. A college education is something my parents value and they scrimp and save to get all of their children to go to college. My parents asked her why and she said because "I don't want to be a teacher, or I don't want to be a nurse." These were the two career opportunities available to women graduates 25-30 years ago.

Things are changing, but how do we view affirmative action in terms of making up for some past discrimination. This is really a dilemma for the courts. It is a dilemma between the federal enforcement agencies and the US attorney general. This has been contested for the past 6-7 years and we still are not sure what is going to happen. This is one reason there was so much controversy over the Bork nomination to the Supreme Court. Had Mr. Bork been confirmed by the Senate there could have been a very different tone in terms of some EEO and affirmative action laws.

SEXUAL HARASSMENT

Another area that is becoming more important, and has special application to you because there are 100% men in this room, is sexual harassment. The Vincent vs. Meritor Bank case was the precedent setting case. Middle level managers can subject their institution to considerable liability and can cause themselves embarrassment and personal liability if they are not aware of the ramifications of this situation. The liability could be personal and could come out of your pocket.

I think it is important to emphasize this aspect to all male groups because surveys have shown that, on average, 65-75% of you have or will have been at risk of violation sometime during your career. What do we mean by sexual harassment? How do we define it? This can be defined from the mild, almost innocent extreme, where you tell a lady in your work force, "Gee, you really look nice today." Except you don't say it quite that way, you tell them, "Gee you really look nice today" in a kind of leery and lecherous tone. From there you go one notch higher where maybe you tell a dirty joke in the office. From there you might escalate to placing a Miss Nude World picture above your desk. You make suggestive comments about it in the presence of women. From there it might go to office tag. You know, you chase each other around the desk with a little bit of patting and groping. And then you get into the most severe areas where criminal liability may come in. This is sexual molestation and rape. This is what the Vincent vs Merider Bank case was all about.

The bank president or the branch manager thought there shouldn't be any problem because this woman was hired and began work based on her credentials. A relationship developed between her and the branch manager and things got out of hand. She got a boyfriend elsewhere and wanted to break off the relationship. She went to court and the result changed the whole area of sexual harassment. It places a tremendous burden upon the employer.

Some critical issues are outlined which will determine whether a company will be subject to liability in the event of a charge of sexual harassment. Managers might use their position to create a hostile work environment even though their behavior was purely personal.

Let's look at the type of women that are potential victims. Recent high school graduates are used to father authoritative figures. Managers may continue to project that image and pat the girl on the butt, or take them out for a drink after work. These young women are very pliable and impressionable.

Another group at risk are women that are recently divorced and have children, single head of household. They really need that job. People take advantage of that. Those two basic situations can be subtle and critical and you as a manager need to step back and assess your situation. You should be aware of the legal liability involved.

As a manager, you are in a position to use the stature of your job to harass an individual if you desire. Did the company know about the problem, or should it have known? Did the employer take effective action to stop it? The employer is obligated to have supervisors go through EEO training. There should never be an excuse of "I didn't know that I wasn't suppose to do this." You as a supervisor representing the company have a responsibility and you must take some kind of action if you become aware of possible sexual harassment. The company must have a well articulated grievance procedure which makes it reasonably easy for employees to discuss sexual harassment with someone who could correct a situation. A lot of grievance procedures require the victim to first go to their boss who is often the one who is doing the harassing. You want to provide them with a way out of an uncomfortable situation like that.

An organization needs to protect its first line administrators as well as itself. The top level person in charge must establish a policy and make it known to all employees. It needs to stipulate that sexual harassment is illegal, that victims will get help and that offenders will be disciplined. The procedure needs to provided for prompt action and access to a manager not involved in the harassment. Periodic meetings and training sessions for managers and employees should remind them about their responsibilities concerning sexual harassment. This should not only apply to managers and supervisors, but also to other workers at the same rank.

The most important element is a prompt and fair resolution. One important reason for that is that all alleged victims may not be victims. Reverse harassment can occur. A woman employee who is not performing very well may be subject to termination. She could say that if you try that, I am going to tell them that you did this to me. We must also protect the

managers interest. That is why all organizations need to have someone who can treat these problems objectively and promptly.

There are many ramifications that come from a sexual harassment court case. If it is a legitimate accusation and you are the perpetrator, you are going to lose in court. The institution and the victim also lose. How many of you are going to want to go into court and hear testimony about what you did with your wife present? On the other hand, many of you are fathers and have daughters. I certainly don't think that any of you would want your daughter or your wife subjected to sexual harassment.

REVERSE DISCRIMINATION

One area of affirmative action that we have to consider is reverse discrimination. When do we carry affirmative action too far? Affirmative action is allowed in training programs, in hiring, in promotions but it is not allowed in layoffs.

I have a number of publications, reprints, etc that deal with this issue. One outline in particular by Walt Connolly, who was a management attorney, covers situations well. He used to win most EEO court tests when I was employed by the Federal Government. I asked him why he was so successful and he indicated that he held numerous workshops and seminars for supervisors and managers. Well-informed people are less likely to make mistakes. We had him put together a brief outline which I can give to any of you on request.

One of the toughest jobs I have as an EEO manager is making the upper level managers in the medical center realize that EEO, affirmative action and sex discrimination are important. Walt Connolly gives valid and salient reasons why such a program is being held. He also ties it to lawsuits. Defending a lawsuit is expensive and losing a lawsuit is more expensive. General Motors paid $44 million, and AT&T paid $125 million to settle two major EEO cases. If you have a good EEO, affirmative action program, you improve morale and productivity by providing a sense of security.

Many times managers do not like to do things by the book--as it pertains to EEO and affirmative action. This is especially true in the hiring process. Somebody says "Gee, I have this dynamite guy who is by far well-qualified for the position. Do I have to go the Board of Regents to get the consent decree and do I have to advertise in the paper when I know I want to hire this person?" You will find that it takes just as much time to do it the wrong way as the right way and this is true for any process related to human resource management. As a responsible person, you want to be able to articulate the reasons that you hired the most qualified employee for the position.

This is a lot of information to give you in 40 minutes. I hope especially that in the section on sexual harassment you are aware of the potential liability you might be subject to. I also hope you have learned of some of the steps you can take to avoid this liability.

In particular, I hope you will have time to read through the brochure, "Equal Employment Training for Supervisors and Managers" by Walter Connolly.

He presents many hypothetical, but practical examples. Knowledge of these potential situations could save you some embarrassment and heartburn some day.

I have enjoyed talking to you this morning and I thank you for this opportunity.

THE ROLE OF AGRICULTURAL TECHNOLOGY IN A CHANGING WORLD

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Those of you in this room, as employees of branch stations, in many cases are your university to a very large segment of your society. I think we often forget that our institutions are owned by stockholders. I think that is one of the things we don't understand. For example, the University of Georgia is a 100% publicly held corporation and the stockholders are the taxpayers. Those stockholders chartered U.GA. in 1785, and it was the first charter ever written for a public institution of higher education. I have read that charter many times, and I am always struck by the fact that, in this beautifully written document, there is not one phrase that guarantees perpetuity. The charter gives our stockholders the right to starve us to death if we don't serve them.

A key point is the perception; the stockholders must know that they are served. No other group of people anywhere act as front line commanders of those who represent the institution to the clientele in a truer sense than you do. It must be said again and again that to many people, where you are as university representatives, there is the university. It is a pleasure to address this group on a subject in which I am interested, because I am trying to recruit your interest. If I am able to reinforce that interest in you, you will pass it on to clientele in the field. There are at least six of our Georgia people in this audience so I have to be very careful what I say since they will know if I am telling the truth or not.

I am reminded of a story I heard about a circus that lost its lion tamer and had two applicants for the job. One of them was a pretty young lady and the other one was a middle-aged sort of jaded fellow who had been around the circus business for a long time. The owner decided the best way to chose was to let them demonstrate their abilities with the lions. They let the young lady proceed and she got into her tights which made her even more attractive, in fact she was just plain beautiful. She got in the cage and the lions did everything she asked them to do. For a finale, she placed them all up on their barrels except the biggest, meanest lion. She got that lion to just crawl over to her and put its head on her knee and purr. The owner was standing there with the second applicant, and asked "Can you do better than that?" The applicant replied, "You get those lions out of that cage. . ."

I want to specifically discuss the new agriculture. Biotechnology, which has gotten to be a buzzword, is part of that. A while back I reflected on my age, 58 years old, and my conscious experience, the experience that I can remember. The past that I relate to, that I can see in my mind's eye is about 50 years. I looked back 50 years, 1987-1937 and was amazed by what I found.

In 1937, we had a wealth of information available to us. By 1937, Lawrence and Oppenheimer knew what was in the atom and in fact knew how to get the energy out. We just hadn't quite mastered it yet. The first jet engine was on the stand in 1937 and Goddard had already shot rockets into the sky. Television was operating in the laboratory in 1937 and the first radar was in place. We were communicating with anybody we wanted to in 1937; we were bouncing long waves off our ionosphere instead of short waves off of satellites. We had electromechanical computers and understood the binary system to make them work. Medicine was moving into the age of chemotherapy, the sulfanamides were developed. We hadn't produced the antibiotics yet, but we knew the basic physiology and we knew the pharmacology. In 1937, we had a wealth of information in different places, much of which was a novelty.

The United States was just another country in relation to its world power in 1937. It was not outstanding, it was in the middle of the pack economically and power-wise. Germany was poised and had set for itself a course of territorial expansion. Japan had already moved into Korea, China, and Indochina looking for gas and oil.

Now let's look ten years later at 1947, just a speck of time in human history. We had ushered in the atomic age, the jet age, the computer age. In the 10 year period of 1937-1947, the space, the atomic, the modern medicine, communications, computer ages had become a reality. There had never been such an explosion of brilliance of application in human history.

Why? We did it because we had to. We did it because our survival depended on it. World War II forced us to apply information that was just lying around. By 1947 the United States emerged as the most powerful nation in the world by anybody's standards and no one questioned it. We were first in education, first in medicine, first in science, first in manufacturing and first in business. We were first in everything. Let's look ahead 40 years to 1987--what happened to us? We are not first anymore, and that hurts us.

General Motors is not the biggest automobile manufacturer in the world--Toyota is. Of the ten largest banks in the world, one is ours, eight are Japanese. We have ceased to apply our science. We have become tentative and shy and have decided we are going to legislate and regulate ourselves into safe harbors. We have forgotten how to use our scientific fundamentals.

What can we do to change this non-productive course on which are embarked? We must first discredit several myths which have been permitted to develop. The first is that the US has moved from an agriculture economy to a manufacturing society and thus it is perfectly reasonable that we will subsequently move to a service and information based economy. That is a myth on both ends.

We have never moved away from an agricultural economy in this country. We merely moved the work force away from agriculture. We took the information we had and put it to work and were so efficient and effective that we could retain our productivity and move the work force to other areas. The transition of the work force away from agriculture occurred

little by little over a number of years. That work force was risk oriented, it had a high work ethic and it moved into the manufacturing sector that saw us through World War II. Unfortunately, we did not move it beyond that level. The fourth generation of people is doing the same thing on an assembly line somewhere today. However, we never moved away from the security of an agricultural economy.

That we have not moved or should not move to a service economy can be seen by the example of England. The entire industrial revolution began in England, a little island about the size of Japan. England became an economic, manufacturing and political empire that in total influence is rivaled only by the Roman empire. England entered World War II with an aging manufacturing plant and stressed that plant to the point of moribundity. England's great misfortune was that she wasn't destroyed during the war. Had she been, we would have rebuilt that nation as well.

It was commonly believed that England would always sit at the head table because she was the seat of information and service: banking and insurance. Ten years after the war, England wasn't at the head table. England is now a second class country. Her people are just as good, just as intelligent, just as mentally tough, just as strong as in the past, but they forgot that you can't insure national wealth without a commodity. Is the USA now forgetting that? You can't produce security if you don't control the essential commodities. The essential commodities are food, fiber, fuel and basic chemical feed stocks.

The second myth is that our trade deficits are the result of the strength or quality of our dollar. Trade deficits are a consequence of the strength or quality of our product as a Japanese economist made clear to me. He said, "You are worried about your trade deficit and you ought to be. Next to your fiscal deficit, it is your biggest problem and you have a monumental international problem. But don't blame us, we are going to take advantage of the market. Besides, you don't even know what causes a trade deficit anymore. There is only one reason for a trade deficit which is that you consume more than you produce. When you understand that, you can begin to think of a solution. You can consume less, you can produce more or combination of the two."

Which answer will we choose? I know I am personally tired of being colonized as a consumer and that is what is happening to us today. That is a short road to nowhere. We must return to production. We have to start thinking about and talking about production. I know most of you in this room are thinking that we are involved in agricultural production and that we have overproduced. I have an answer for that.

There is a third myth under which, in my opinion, we falsely labor. We think everybody in the world wishes us well. They don't. The world is competitive and we have competitors now that we never had in the past most of whom are east Asian. I know a lot of them as friends but let me tell you they are out to win. They are not out to make friends and I think we have to understand that.

The last myth in America is that we still think that our past performance guarantees our future dominance. That doesn't work. In our world, that position holds true for one generation only.

We have summarized some of the myths, now how do we stand today? What do we face? What we face is a crisis potentially far more damaging than we faced in World War II. We could have lost the war and lost an awful lot, but we probably would have survived somehow. Our present confrontation is one we can't afford to lose because the stakes are more pervasive than just the survival of US.

Let me detail this crisis as I see it. Twenty-one years ago when I became president of the University of Georgia, it was relatively easy to define goals, though they were more difficult to achieve. One goal was to build a world class research university and the other was to stop the flow of good students from Georgia to schools in other states. We thought we had those problems pretty well under control by the mid-70's. However, that is when the subtle danger always sets in. When you think you have succeeded, inertia can set in and you are in trouble. I began to think of the issues that didn't have answers. How can you relate the university and its great research capability to what the state of Georgia has in assets? What are the problems you can't immediately see or anticipate?

It was obvious, even though it has been an overworked cliche, that one of these problems is the world population increase. That impending crisis had been predicted all my life, but now it has finally happened. In 1975, the world's population was 4 billion people and we were told that it would go to six billion people in 25 years. That is a 50% increase in 25 years and we don't have any cultural history to prepare us for that kind of growth. I traveled around the world just to prove to myself that it was happening, and it was. It is a lot more impressive when you see it in person, as compared with an intellectual understanding derived only from reading graphs, charts and reports.

Unfortunately for us, the demagraphers now predict that population will be more than six billion by century's end. We are already well past five and the rate of increase is accelerating. The total could reach seven billion by the year 2000 unless some intrusion like the four horsemen of the apocalypse--war, pestilence, disease, famine--intervenes. Furthermore, estimates now are that world population will not stabilize short of 12-15 billion people.

Likewise, the composition of that population will be different than that to which we are accustomed. Kenya has the highest population growth in the world, 4% per year and over half of that population is under 16 years of age. Over half of the population of the Philipines, South Korea and Nepal is under 20 years old. The United States has an aging population. The rest of the world has a young population. We in the USA still think linearly. The countries already burdened by population are the ones growing at an exponential rate.

The first response from people employed in agriculture to a population problem is we have to feed all those people. That is not the aspect I want to talk about particularly. We can feed ourselves, although we might sink to a level we don't like. We will eat.

Well, if we are not talking about feeding people, then we must be talking about energy. Well frankly, I really do not want to emphasize energy. I do, however, want to discuss another relationship; the depletion of the nonrenewable resource base with time, which is also proceeding exponentially. The marker in the downward curve is oil. Forty percent of the oil we use does not go into energy. We don't use it to drive cars, or generate electricity, or heat homes. We use it for basic chemical feed stocks. We use it to feed factories and create the economy that we have come to enjoy.

There are about 700 billion barrels of total known petroleum reserves in the world, both oil and gas. The US controls 4% of it and we are the biggest consumer. The U.S.S.R. controls about 8.6% and is the second biggest user. Saudi Arabia controls 25% and uses almost none.

Why are wars really fought? Wars generally are not fought over ideological differences. Wars are fought because of population pressure against finite resources, or to simplify that, wars are fought because you have something I want. We are creating unprecedented pressures today of population demand against a declining nonrenewable resource base, in a very fragile world. One small spark can set off a great deal of trouble.

Less than a year ago, I had an opportunity to talk to Vice President Bush. I asked the vice president to fantasize what the world would be like if oil wasn't important, if you could wake up one morning and oil was not important. You would have revamp the priorities of the state department for one thing. The Persian Gulf would be relegated to a sixth grade geography question, since that is how unimportant it would become. Russia wouldn't be concerned with Afghanistan. An Iran and Iraq war would just be a religious war of consequence only to the participants. The world in essence is now hostage to a commodity that we must have but no longer control and one that will be almost depleted during the next century.

What is the importance of the foregoing as it relates to agriculture? The new agriculture has to learn to change direction and begin to feed our factories. The world cannot continue to depend upon what it doesn't have. The time frame for depletion of oil is much shorter than most people think. How do we produce a renewable economy? We must revert to what we can grow, produce, convert and process. Where are we going to get ethylene, acetates and other chemicals that we have been obtaining from oil?

Oil is an organic base that was processed out of living material and stored for later use. We break it down back to the incremental components that we need for different uses. Why not start at the front end of this progression and directly produce the form of material we need for each specific application?

We haven't yet come to realize that you can't keep using what you might not have. We are going to have to use the new technologies that are available to us through biotechnology to convert agriculture the same way we took all the dissimilar information that was available in 1937 and converted it into a new economy. Our job in agricultural technology is to produce a renewable resource-based economy in order to maintain a civilized world. Agriculture can do that if it has the courage to use the new tools and has sufficient vision to look beyond where we stand now.

We have the science and technology to do anything we want in agriculture. Very soon we will be able to introduce salt tolerance into plants. Since certain species will grow in salt water, there obviously is a gene that allows that to happen and that gene is transferable. If a chrysanthemum in Africa can produce its own pyrethrin and protect itself from insects, that ability can be transferred to other plants. If sorghum is more drought tolerant than corn, the genetic marker that allows it to conserve water can be transferred. If a legume can create an environment in which it harbors bacteria that allow it to fix nitrogen, other plants can do the same and our biggest fertilizer cost would be reduced. By the second or third generation of biotechnology application, we can teach any plant to do that.

We can teach plants to produce things directly that they have not produced before, such as oil or chemicals. These mechanisms would create alternate markets for agricultural products, where the produce isn't locked into the human food chain. If those agricultural products could go to industry, then you have created a competitive market for non-perishable products. This approach is the ultimate answer to the farm problem.

Eventually, there is no way that agriculture will overproduce. Our problem will be to produce enough. The biggest problem today isn't our ability to do this but rather our willingness or our ability to give leadership to make it happen. Leadership in this endeavor means those of us involved in agricultural research. We can't put that responsibility on anyone else.

Our biggest challenge today is learning to distinguish between fear and risk. We don't know the difference anymore in this country and that in itself should be our biggest fear. I can illustrate this situation with a story that carries an important message. We have become the kind of society which knows that there are going to be in excess of 200,000 deaths this year from smoking related illnesses. Yet we don't fear cigarettes although we recognize the risks. Likewise, 50,000 people this year will die as a result of automobile accidents. Yet we don't fear automobiles. What we fear are sharks. Go to the bureau of medical statistics and you'll find they don't even keep a record of yearly deaths caused by sharks. Now, go to a crowded beach, stand on a high dune and shout, "Shark, shark, shark." Everyone will rush out of the water, run to their car, light up a cigarette and drive off.

Let me give you an example of how poor we have become in understanding the use of science. The National Academy of Science exists to see that Congress is aware of scientific problems and is scientifically literate. What can we say about its effectiveness in doing this when we permit Congress to pass a DeLaney Clause. The DeLaney Clause mandates zero tolerance in anything we eat that is shown to be carcinogenic. The Congressmen who voted for this apparently have no idea of the fact that zero tolerance is a scientific abortion. Our analytical methods are so imprecise that we can't trust them when you are dealing with parts per billion or trillion. Yet, our Congress would act on that matter emotionally, and then raise the speed limit 10 miles per hour which will probably kill an additional 5,000 people per year. Regardless how you feel about the speed limit, it shows that we are no longer making decisions based on a knowledge of what science is.

Likewise, our society does not understand the most basic element of science, the use of the control group. I recently read about a fellow, a scientist by trade, who was involved with a local school board when the "new math" technique came to be popular. He said, "I think this is great, and what we need to do is to divide the school into two groups, one of which will be taught the new math, the other the old math as a control group. That way we will see which one works the best and we will adopt that method." They almost ran him off the board, telling him that he was not going to conduct a lottery with their children. We are all going to do one thing or we are all going to do the other, so we all did the wrong thing in that case.

We have completely lost sight in our community of what science is and how it works. We make emotional responses. We have a big problem with AIDS. We are not attacking it as a medical problem. We are approaching it as a social problem. It is not a social problem, it is a medical problem. We have a disease with no known treatment, no cure and no prevention. Yet we won't even try to determine where it is, so we can isolate it. That shows a lack fundamental understanding about what science is about. That attitude is what stands in the way of putting new technologies into practice.

In my travels around our country discussing biotechnology, I have gotten many responses to the effect that, "don't mess around with Mother Nature, that is dangerous." Some see monsters under the door. Well, the plain facts are that we have been messing around with Mother Nature since the beginning of civilization. The history of civilization is nothing but a record of man's attempts to modify his environment to his advantage. We can do that so much better now than we ever could before.

I think we will see some work with cows, in particular, that is going to be astounding and vital to us. We have made just about all the improvements we can in the cow using traditional genetic approaches. We have cows that are milk factories, and those that can convert feed efficiently to meat. The milk cow is just a milk machine, but with a couple of faults. One is that the sugar in milk is lactose and a third of the world's population can't tolerate lactose. It is also lacking some essential amino acids.

I suspect that within 10 years we will have milk cows whose milk sugar is not lactose. We will be able to genetically alter the cow so that its milk sugar will be broken down into glucose and galactose before she is ever milked. We will also insert those other amino acids into milk and then we will have a perfect food. We will be able to do this, but whether we will do it remains to be seen.

The succeeding generation of cows (after that discussed above) is going to be even more fascinating. The protein in cow's milk is casein. It doesn't have to be. Laboratories today have already converted the protein in mouse milk to growth hormone. Nothing in the world says that eventually we can't find a gene marker that will produce a protein of choice in the cow. It may be a pharmaceutical, it may a high value commercial enzyme, it may be anything we want.

We will see a whole new age if we are willing to bring it about. All at once we are talking about a renewable economy that can could put us back in the market with a product that nobody else has. That is the best kind of product because you don't have competition, at least initially. Then our factories are safe, our productive economy is safe, agriculture is safe and my grandchild is safe. We are on the edge today of the most important economic event in 6,000 years of recorded history and it comes right back to agriculture, if we are willing to do it.

I have been associated with people, of all types--individuals, companies, scientists, societies, institutions--over the years. I have decided after all of these experiences that individuals or nations have to have two qualities to really make a difference. They have to have wisdom and they have to have courage. Wisdom has to be information based. However, you can have all the wisdom in the world and with no courage, you still fail. A wise man who never can make a decision will destroy himself. Conversely, we can have courage and not have any information then we are dangerous. We have the information today, that is not the issue. Do we have the courage? You people at the leading edge of science have to answer that.

Agriculture has the greatest responsibility and opportunity it has ever had. We deal with a society that doesn't understand agriculture any more than it understands why it shouldn't have a DeLaney Clause. Those in political life who like to highlight government waste enjoy pointing to "worthless research." There is no such thing as really worthless research. Two-thirds of the people out there on the street don't know what a molecule is. You people can change that perception. In fact you are probably the ONLY people who can change that. You are going to have to start talking to your service clubs and church groups about this. That is your business.

There is something else that is very important to me and that you would understand better than most people in a university. Research information that's generated, must be applied to be useful. Information for information's sake is great, but if it isn't applied, it essentially didn't happen. Today's world is like a pipeline that flows from new information to application. The United States is still the best at generating new information but we are not the best at application.

The Japanese have no supply of new information but they are the best at application. The real question right now is whether we can get our pipeline cleaned out before they get their front end built. They are modifying their entire educational system to introduce creativity. They are modifying the most successful kindergarten through 12th grade system in the world, to introduce creativity. They don't presently have a university in Japan that could match the University of Georgia as a generator of information. They are now putting graduate programs in every single discipline they have. They are putting in their technopolis program in which they are creating information generating centers.

That is the competition. I have every confidence that we can maintain our information generating advantage while we develop methods of application. We will succeed only if we develop the courage to do so. And that is your job.

SALES CROPS AND ANIMALS — PANEL DISCUSSION

Four branch station leaders were asked to summarize the important sales crops from their stations and how the revenues are handled in their state. People were selected from four states representing a diversity of situations. The following are their reports.

OKLAHOMA

Glenn 'Cat' Taylor, Resident Director

Wes Watkins Agricultural Research & Extension Center
Lane, OK 74555

Greetings from the 46th State -- Oklahoma -- also known as the 'home of the redman'.

The two leading generators of new wealth in Oklahoma are 1) oil and 2) agriculture. The Oklahoma Agricultural Experiment Station (OAES) plays an important role in fostering a healthy agricultural economy in our state. The OAES operates through eleven departments in the Oklahoma State University (OSU) Division of Agriculture and several research programs in the colleges of Veterinary Medicine, Home Economics and Arts and Sciences.

In addition to laboratories, greenhouses and plots at the OSU campus in Stillwater, the OAES conducts research at sixteen branch station locations. Each branch station location is managed by a related department. Eleven locations are directed by the Agronomy department, Animal Science operates 2 locations, Forestry operates 1, and Horticulture directs 4 branch station locations. More than one department operates separate units at two of the branch station locations.

Research derived products are normally merchandised off-the-stations through normal marketing avenues of auctions, bids, treaty negotiations, etc. Only in a few instances are sales made directly to the consuming public.

With the exception of Animal Science research units, station sales are handled entirely within the related department. Sales income is dispersed to department projects, research units or utilized otherwise at the discretion of the department head with the approval of the OAES director's office.

Animal Science research sales are considerably greater than those of other departments. Animal Science sales revenues also fluctuate more from year to year than other departments depending upon herd dispersals, livestock prices, and termination of projects.

In order to provide the Animal Science department with predictable and uniform base research allocations, an average annual sales figure is derived from research sales receipts of the past years. This sales figure becomes a part of the department budget. The OAES then makes annual supplemental allocations to the Animal Science Department based on upcoming annual sales being equal to the annual average figure. Proceeds from Animal Science sales come directly to the OAES director's office.

In 1986 and 1987 all stations sales represented 5.5% and 7.5% respectively of the total Oklahoma Agricultural Experimentation budgets.

Moderater Loe, I realize several are yet to follow on this panel so I conclude for the present with a Thank you for the kind attention of this group.

ARKANSAS "BIG POT METHOD" OF HANDLING SALES

T. O. Evrard, Resident Director

Northeast Research & Extension Center
University of Arkansas
Keiser, AR 72351

All monies received from sales go into the Experiment Station depository account. This is a "one way" account. You put money in but you can't take it out. This account is managed by the Director of the Experiment Station and is part of his overall budget.

Deposits are derived from

A. Sales of produce - soybeans, cotton, wheat, rice, milo, corn, vegetables, fruits, timber, christmas trees, meat, animals, milk and other dairy products, eggs, wool and conservation payments.

B. Foundation seed of public varieties - rice, soybeans, wheat and oats.

C. Certified seed - cotton.

D. Miscellaneous - dividends from co-op stock, sales of scrape iron, etc.

These deposits make up approximately 10% of the total state appropriations and 5% of the total Experiment Station budget. These monies are allocated back to the units by the Director.

Each year sales are estimated. This estimate becomes part of the Experiment Station budget and is built into the budget request submitted to the state legislature through the Department of Higher Education. If sales are below budgeted amounts available funds are down. If sales are above the budgeted amounts the Director is happy.

There are exceptions to the depositing of money into the "Big Pot". There is a revolving cattle fund where the researcher can purchase cattle for research. After the study is completed the purchase cost of the animal is put back into the research fund from the money from the sale of the animals. In addition, the Department of Animal Science has a revolving fund from sales of milk and beef to pay for the maintenance cost of the animals.

Also, if a study is done entirely with grant money, the sales of products may be returned to the research who holds the grant.

Advantages - All units participate in receiving benefits. The Director has discretion on where monies should go and its use.

Eliminates jealousy towards those units that can raise money and could use these receipts to plow back into the unit for support of research at that unit.

Eliminates research units farming just to make money.

Disadvantages - Units do not have an incentive to produce. All expenses to grow a crop come out of the units maintenance budget and the unit manager does not see a direct return. The amount the unit gets back is hidden in the total budget allocated to the unit. The money does not necessarily come back to the unit in proportion to what the unit contributes. The unit manager can see the direct cost to produce a crop but not the return. He is tempted to let land idle or produce the crops which are least expensive to grow.

No acknowledgement is given to the units that do contribute.

The receipts can't be used to build up the unit or support the research at the unit.

Sales are looked on by the legislatures as part of total budget of state appropriated funds.

NORTH CAROLINA

Fred Cumbo, Superintendent

Horticultural Crops Research Station
Clinton, NC 28328-9501

The policy in North Carolina is that all surplus produce belongs to the state and is disposed of to the advantage of the state. Equipment, buildings, timber, livestock, vehicles and so forth, are sold by sealed bids. Some commodities, such as corn, other grains and livestock are sold through established marketing channels. We can also sell our produce to other state agencies, if appropriate.

Horticultural crops are primarily grown at my station and my total receipts are limited. Crops for research will be harvested routinely but in some cases where potentially toxic materials are sprayed on crops we don't harvest it unless the scientists specify.

We don't use our resources to generate income. Income is the by-product of the research that we do. Income from sales crops goes into the General Fund and cannot be budgeted directly for operating funds.

However, receipts do help in reducing the amount of appropriations required. That is good in the sense that it takes pressure off my trying to generate income.

Much labor is involved with the harvesting and marketing of vegetable crops. Therefore, it may not be economically worthwhile to consider marketing the produce. Station superintendents are not in the marketing business. It may be possible to sell produce on the plant or by consignment. However, quality control and uniformity of produce are considerations and the nature of our research work results in mixtures of vegetables and varieties. For example, we have several lines of cucumbers. There are pickle processing plants within 15 miles but they don't want the different selections of cucumbers mixed.

We don't mind discing under crops that are not worthwhile to harvest. Our situation may be different than that many of you experience. I happen to like it. I don't have to worry about generating income for this station. We feel that our business is research and our resources are so directed.

The administrative guidelines on sales provisions for our division are listed below:

A. GENERAL: Products of the station, surplus to the needs of the program are sold on the market to the best advantage or are transferred to some other state department at a price which is mutually agreeable. Receipts from the sale of surplus products go into the General Fund and cannot be budgeted directly for operating funds. However, receipts do help in reducing the amount of appropriations required.

B. METHODS OF SELLING: This section is a brief of procedures for disposing of surplus products as approved by the Division of Purchase and Contract. The methods are as follows:

1. Transfer to other State Agencies at a price which has been agreed upon.

2. Sell through the Division of Purchase and Contract on sealed bids. This method is to be used for old trucks, tractors, other equipment, and miscellaneous items. When sales of this nature are contemplated, the Research Stations Office should be supplied with a description and other information.

3. Auction markets are acceptable for tobacco, livestock, poultry, vegetables, nd similar commodities for which there is an established market.

4. Negotiated sales are permissible in certain situations. When negotiated sales are made evidence must be retained supporting the sale to the selected purchaser. Transactions of this kind include such items as milk, breeding stock, experimental crops and animals which may require inspection and examination after being sold to fully evaluate the results of the experiment.

When fruits or produce are released by the project leader and declared surplus, if determined by the Superintendent to be in the best interest of the State, prices can be posted on the station bulletin board and offered to the public and employees.

For farm products such as eggs, milk, livestock, and field crops, requests for selling authority are usually made on a six-months basis. Therefore each station is asked to prepare a list showing items, estimated quantity and method of disposition for the different products to be sold. The list for January - June sales should be prepared and forwarded to the Research Stations Office by December 10. The list for July - December is due June 10.

TEXAS

Mike Schubert, Superintendent

Texas A&M University Plant Disease Research Station
Yoakum, TX 77995

The operation of sales funds in the Texas Agricultural Experiment Station, is set by state law. The law states that "proceeds from the sale barter, or exchange of crops raised on any of said experiment stations, shall go to defray the expenses of operating the same." This is interpreted to mean that proceeds can be spent only at the station or unit which generates the income. Budgeting and management of the funds are the responsibility of the unit head of that center or station.

The Texas Agricultural Experiment Station, is a little different from that of Oklahoma that Glenn Taylor discussed earlier. Those of us on branch stations in Texas, with a few exception, are members of a particular department on campus. The department head has responsibility for the disciplinary expertise of our scientists, otherwise, we basically operate free of those departments.

Sales funds are of little importance to the on-campus units. On the average, sales funds make up about 1% of their maintenance budgets. By maintenance budget, I mean that portion of the budget set aside for operations not including salaries, wages, and capital outlay. Many departments on campus have no sales funds whatsoever, except for those involved in diagnostic or analytical services on a fee basis.

All off-campus units except those operated in conjunction with another university have sales funds in their operating budget. These 23 or more off-campus units generate from 4.5% up to 73.7% of their maintenance budget from sales funds. The average is 27% of maintenance budgets for those units that are totally operated by the experiment station. As a general rule, the units that have high sales fund percentages are those with large acreages or with a large amount of livestock involved. There is a large spread in percentage of total maintenance budget contributed by the sales fund. The standard deviation for the 27% average is 19.6%.

Budgeted amounts are based on predictions of income throughout the process. At the agency level, TAES presents its predictions of sales fund levels to the Legislative Budget Board. When agreement is reached on a reasonable estimate income is included as funds appropriated to the TAES. The estimated income is listed as one source of funds for financing the appropriation--a source which is generated internally.

Sales fund projections are part of the annual budgeting process within TAES. There is a base amount with which you work, based on history and your particular unit. Sales funds are handled as a separate category, but basically treated as other general revenue funds. The unit head presents the unit budget to the Director's office based on his estimate of sales funds and it goes through the approval process. The unit head has the initiative and management responsibilities, but the budgeted sales level is the determined by agreement between the unit head and the Director. The unit head has considerable freedom; he also has a lot of responsibility in this area.

At the unit level, the unit head budgets out sales funds. There are instances where sales funds retain some degree of identity with the project that may generate the funds. However, usually they are pooled and used at the unit head's discretion. Often sales funds are used for general unit operations. They are also used as a contingency for unexpected expenses and to supplement particular activities or one time purchases. There is considerable flexibility in utilizing the funds. Fund management, in terms of bid requirements is similar to that of our appropriated funds except that sales fund balances can be carried over into the next fiscal year. If sales funds are used for labor, 15 or 25% benefits must be paid out of the sales funds.

I try to carry over approximately 1/2 of our budgeted sales fund into the next fiscal year. This provides flexibility and a budget cushion. Our sales fund percentage runs about 16% of our maintenance budget. Most unit heads are leery of accumulating a lot of sales funds. It can become a two-edge sword. The funds are great to have to spend when you need them, but resource investment is required to generate those funds. It is also dangerous to depend too heavily on these funds because one bad crop year can severely hamper the budget. You can be in trouble with a late freeze or hail or something like that if you become dependent upon them.

Our unit heads understand that generating a large amount of sales can detract from scientific productivity and quality of research. Most of the unit heads believe the sales funds are important, they really like to have them. However, if they ever start pulling the operations then we have forgotten what we are there for. The key point is that it is a way of recovering some of the costs for your research. Occasionally it is very important.

Texas has a very diverse climate and therefore a large variety of crops are produced. It is 830 miles from El Paso to Beaumont. The rainfall varies from 8 inches at El Paso to 55 inches at Beaumont. Amarillo and Weslaco are 780 miles apart. Weslaco has 327 growing days and Amarillo has 190, but both have 20 to 24 inches of rain. We have every kind of soil in Texas except permafrost and peat bogs.

The basic research at my Center is peanuts. Crop rotation is important to maintain highly productive crop land. Therefore we must grow hay or a related crop on occasion. Basically, the products are sold through normal marketing channels. Occasionally crops are sold by bid or through consignment. We prefer to sell our hay via the bid procedure. We allow the successful bidder to do the cutting because we don't have any hay harvesting equipment. When we have a good peach crop, we usually sell it on consignment through a local individual. We take care not to compete or appear to compete strongly with local producers. Even if we have many rolls of hay for sale somewhere in the back, we don't put any signs on our fences or advertise in papers.

We have a sealed bid auction for used farm equipment, old vehicles, and other items that we can't trade-in. We have utilized a local monthly auction where we can sell items on consignment. I don't generally put those funds in our sales funds. We have another category called designated funds which doesn't figure into our budget so much as it relates to the appropriations process.

The livestock people maintain revolving livestock funds from which people can to purchase livestock and pay back costs when the projects are completed.

LONG RANGE PLANNING IN AGRICULTURAL
The National Perspective

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and

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During the economically unsettling and depressed period of the early 1980's global markets shifted, giving foreign markets a comparative advantage and diminishing the relative importance of U.S. grown commodities. The resulting drop in competitiveness and profitability caused a financial crisis which was further heightened by unfriendly and inappropriate foreign and U.S. agricultural policies and programs.

This shift placed our capability to sustain a productive and profitable agricultural system that would assure national strength, social stability, and financial security for the people of the U.S. at risk. It has raised serious concerns in the executive and congressional branches of government and among agricultural leaders for the effectiveness of planning for agricultural science and education programs which are the basis for our farming system.

These concerns point up the need for a national reassessment of our agricultural programs and policies and the planning process by which they are formulated. The White House Office of Technology Assessment (OTA) and the U.S. Department of Agriculture (USDA) are leading reassessment and planning activities through specific agency initiatives. For example, the USDA originated the Joint Council which in turn initiated projects 2001 and 2005 to assess and evaluate the factors impacting agricultural productivity and competitiveness from education to production and a marketing. The National Association of State Universities and Land Grant Colleges gives national policy planning and assessment assistance to state experiment stations, extension services, and resident instruction through its committees on organization and policy (ECOP, ESCOP, RICOP). But, varying interests and differences in perceived priorities among these and other groups similarly involved have discouraged the development of an effective mechanization that could give national direction to planning and assessment.

Resources that planning must address fall into three major categories. One is physical which includes farms, land, water, and environment, etc. Another is human which includes training, women and minorities, and social development and adjustment associated with changing technology. The third is the knowledge base, our national collective intellect that serves as the basis for our scientific and technological advancement and education. Planning will not be totally effective unless it addresses both the

strengthening of resources in each of these areas and their application to our national well being.

Several factors having a national impact on assessment and planning of programs in these resource areas are discussed in the following review.

Science for Agriculture. In its modern context agriculture draws upon biology, medicine, physics, atmospheric science, engineering, geology, human biology, social science, and others to develop its science and technology. Scientists representing them bring innovative and different perspectives and a multi-discipline approach to the planning process. Their involvement assigns a pivotal role to the agricultural scientist; understanding the non-ag scientist point of view and representing with confidence and clarity the agricultural point of view.

As a result, the knowledge base that serves agriculture assumes a more dynamic role as it is strengthened and broadened by these supporting disciplines. The much broader base of expertise they bring to the resolution of agricultural issues expands the role of the state experiment station and the cooperating federal agencies.

Changing Role of the Experiment Station. Involvement of non-agricultural scientists in planning and conducting agricultural research extends the role for the experiment station beyond traditional boundaries. It also creates questions for the management of and responsibility for planning and funding multi-discipline research. It raises the need for directors of research (experiment station directors) to have the authority to make faculty appointments and establish budgets across divisional lines, suggesting that they report directly to, or in fact be, a vice president.

With its expanded role the experiment station will be better able to address broader and more comprehensive issues such as farm size, with its implications for social structure and family economic strength, the conflict between rural and urban interests, quality of the environment and land and water usage, redirection of research and reprioritizing existing research. It will also bring a stronger, more enlightened influence on woefully inadequate national policy development to its cooperative mission with CSRS.

A more direct involvement in economic development of the state awaits the experiment station of the future as well. The expanded base that the multi-discipline approach creates will enable it to participate more diversely in economic development through research and education. Further, as states face increased global competition experiment stations, with their cadre of faculty having strong insight and understanding of international economies, and supported in many cases by first hand research and study experience in foreign countries, will be in a strong position to participate more directly in the development of international markets than in the past.

Regional Research. Experiment stations will be called upon to adjust long range planning to reflect cooperation with and support of regional research centers whose primary purpose will be to address regional issues and constraints through a multi-discipline approach. The concept for the regional plant science centers now under development, and supported through interagency funding, will no doubt expand to include animal science centers if the plant science model is successful.

Regional research centers are particularly well adapted to address both physical and human resource areas. Issues of farm size, environmental quality, land, water and the impact of advances in technology on changes in life style and family displacement are often regional as well as local or national. Regional centers permit the experiment station to be more selective in planning and developing state research, encourage the development of multi-discipline research teams on campus, leave more time for focusing on national and international issues and most importantly, improve the quality of its science.

Increased Institution Specialization. For various reasons major land grant universities are experiencing increasing difficulty in maintaining the comprehensive programs that propelled them into prominence. Ironically they are being forced to redefine their mission, realign priorities and scale down programs at a time when the need for research is stronger then ever before in our history.

The scaling down process points up the need for institutions to specialize; to do that at which they can excel or for which a state mandate exists. As pointed out in the final report of the Northeast Regional Council's Project 2005 they must collaborate with their neighbors in research and in developing curricula and adult education programs of mutual interest.

Smaller states will be more affected than larger states. The northeast states will move in this direction faster than the larger states to the south and west. The Northeast Regional Council, through its Project 2005, recently assessed the impact of demographic and economic patterns on the economic viability of the agricultural sector and pointed out the need to regionalize curricula, adult education and research programs to develop a sustainable and profitable agriculture. The degree to which such shifts in thinking and action occur will be directly proportional to the degree to which the agricultural science and education programs are threatened by increasingly limiting resources.

Competitive funding: A National Institute or Agricultural Research. The percentage of formula based funds in the federal agricultural research budget has steadily decreased in recent years. To offset this trend the USDA, through the Cooperative State Research Service (CSRS), has instituted competitive funding. The concept currently in use however tends to favor large, comprehensive land grant institutions along with selected public and private ones with a solid history of strong research. Smaller state and private institutions are at a disadvantage under this arrangement and cannot compete effectively even though many have outstanding, albeit limited, institutional competencies in national priority areas.

The long range view clearly indicates a continued proliferation of smaller public and private institutions with strong capabilities to address national and regional priorities in agricultural science and education. It is also clear that the public, through the political process, will demand a larger role in the total U.S. research and education effort in agriculture for these institutions. On the other hand, many of the current major research and education institutions have reached maximum efficient manageable size for program, facilities, staff or all three. These

institutions cannot and should not expect to continue to increase total program size. To the contrary, as they scale down programs their non-landgrant sister institutions will take on expanded roles.

Long range planning to address national priorities becomes a critical issue calling for a mechanism that allows each of the "newcomers" to compete on an equitable basis. A national institute for agricultural research would provide much a mechanism. It would allow concentration of resources to address national issues, assure that our national research and education program is accurately and completely focused, improve access to and increase utilization of our intellectual resource base on a national basis and strengthen national security through enlarged institutional participation and improved institutional competency in science for agriculture.

Women and Minorities in Research and Science. One of the primary human issues in planning agricultural research and education programs is women and minorities. Only 4% of the scientific community is made up of women. Yet, they make up 50% of the population. Minorities are projected to make up 35% of the U.S. population by 2030 with Hispanics being the fastest growing minority group in the country. Blacks and Hispanics still show insignificant enrollment in the agricultural and related sciences and there remains no comprehensive national initiative to address the underutilization of these minority groups.

Nationally, enrollment of women in undergraduate programs in agriculture and related sciences is increasing and is up to or above 50% in some colleges of agriculture. But, somewhere between enrollment at the undergraduate level and graduation with a PhD in an agricultural science field, women disappear from the agricultural science scene. Elizabeth S. Ivey in Issues in Science and Technology, Fall 1982, suggests possible reasons for this dilemma; an inadequate number of role models and lack of a reasonably sized peer group.

The lack of women and minorities in the scientific ranks increases the difficulty of averting the upcoming shortage in scientific expertise. We would probably not be facing such a shortage if female and minority enrollments had advanced in recent years to offset the declining total enrollments.

Affirmative action cannot resolve this problem until the pool is sufficient to supply the demand. Long range planning can be a key factor if it reflects a strong committment to increasing the number of women and minorities in the research force. A determination of the reasons for the absence of these two groups and the identification of the barriers they face in the science world should be reinforced by an assessment of their attitudes and perceived constraints in order to develop a strategy to overcome the barriers.

Rapid Translation of Research to Product. Maximizing the benefit of new knowledge requires that research be translated to product with maximum deliberate speed to offset its decreasing half life. The "product" is defined as anything produced directly by the research or from the knowledge generated by the research (publications, new methods, new germplasm, enzymes, economic gain, etc.).

Satellite relay, electronic data transmission, information transfer systems, video, television and many other technologies provide more rapid information transfer capability than we have the expertise and intellect to effectively apply to the solution of agricultural problems at this time. Shortening the time to translate research to product depends on the efficient exploitation of the potential of these technologies.

The complete spectrum of research planning from the field plot to the laboratory, from the think tank to the field market trial must increasingly incorporate these new technologies into the application of the knowledge base to maximize the benefit produced by the comparative advantage that results. There is a limited time during which the competitive edge gained through a new corn or tomato variety, for example, can be expected to continue.

Tenure and Promotion Issues. Many scientists of today, and all those of tomorrow, face an increasingly complex dilemma with career planning. There is a growing trend toward greater career mobility set against an increasing reluctance to grant tenure except for the most basic research.

Tenure is academic department bound and tends to stifle participation in international agriculture, discourage innovative research and end active careers early. Extension workers are often placed in different tenure systems than their research and teaching counterparts in the same department because the existing guidelines do not accurately reflect the nature and scholarship of their responsibilities.

Tenure as the time honored method of awarding professional recognition, job security and assurance of a suitable retirement in the future seems to be rapidly outliving its intended purpose. In many institutions preoccupation with it is causing low morale, perceived inequities of faculty worth and the diversion of prime intellectual capacity into less useful activities.

In the future tenure will probably be abolished but the professorial ranks will be maintained. In its place will be an administrative management protocol that ensures that individual faculty clearly understand the expectations of the university for satisfactory job performance and the degree of personal responsibility that each has for professional development and personal progress. It will hold department administrators responsible for the execution of this protocol on a formal basis.

PERSONNEL—THE KEY TO LONG RANGE PLANNING

Neal Thompson, Associate Dean for Research

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The people you hire will determine how productive your research program will be. You can be an excellent manager, with lots of good ideas, but if your subordinates aren't productive in their research effort, you are not going to be working at maximum efficiency. We spend about 85% of our resources on people in the Institute of Food and Agricultural Sciences Florida, and fifteen percent on operating dollars. Other institutions may vary up or down from that. Thus, people are very important. In research planning consideration should be given to where would you like to be in 5 years with respect to people. Remember, you usually hire professional people for 20 or 30 years. Don't bring in someone who appears weak in research capability.

You branch station leaders are on the front line of hiring people and your input is extremely important. You best know your area of the state and the commodities that you are working with now. You must also be able to predict which commodities are going to be important in the future. The information in the director's office is not really as good as that which you have at your station. You can observe the changes that are going on in your area with respect to research personnel needs. Your role may be advisory in nature with the experiment station director making the final decision. I consider that to be the most important thing in research planning---getting the right person to join your staff.

The second important aspect of planning is that it should occur at the grass roots level. The planning for research really has to be initiated from the people who know the commodity, discipline and location. You are the people who know that. There maybe some major direction from the director's office, such as has happened in Florida in two cases that I will outline. We decided energy was very important in agricultural research and asked everybody to take energy into consideration in their research planning. Additionally, we reasoned that water was going to be very important to Florida. Everyone was to consider what they could do by way of water conservation and water quality improvement. But, the initiative for this program planning should occur at the level where the research is being done.

The directors of the various experiment stations really want your input. You should not stay out at an off-campus research center and not provide useful input to your experiment station director. He wants to hear from you. He needs to know what you think and he does not necessarily want to be the initiator of everything. You should act and not react from instructions from an experiment station director. Write letters or call and say I have an idea. I would like to meet with you, please come to our station once in a while. Be interactive with the experiment station director in planning.

Another important aspect is the impact if your research succeeds. I have asked people to speculate on what they will do in that case and they stutter around and can't really give a definitive reply. Often, many of the important discoveries are made by chance. You have a good program with good people and you may come out with results different than you had expected. Every scientist needs to be able to describe what his research will mean if it succeeds because we are a mission-oriented organization. We cannot just do research for the sake of doing research. While we don't want to direct the scientist's brain since initiative innovation are crucial, we do have to have direction.

One major weakness of agriculture in general is that when we come out with an answer we're weak in transfer of technology. Believe me, agriculture is being criticized nationally on this issue. We have to be able to demonstrate the impact of our research. How do you as a research center director interact with the extension specialists in your state? Some states coordinate efforts better than others, but you people are on the cutting edge of technology transfer. You must have a good relationship with users so that the information you develop can be readily transferred to them. Researchers should ask themselves, "Is this kind of research going to have an impact and can it be transferred to the people."

Multi-disciplinary research is an often overworked cliche, but in reality it is crucial to the success of a research program. People need to know who will do what when research is planned. You must have a plan so that the individuals in various disciplines have a well-defined role in the implementation of the research. You have to look out for your faculty to see that they get a fair shake when you get into multi disciplinary research--particularly, your young, untenured faculty members. You just can't cut them loose to work with a group of people without a specific role and guidance. Faculty members ability to meet tenure promotion criteria will in large part be your responsibility. You must see that they are treated fairly in regard to such things as senior authorship on some of the papers that come out of the work.

Another important consideration is what kind of research should be done? Many believe that research centers should do only applied work because it may be easier for you to do applied work. In our thinking, we are not concerned whether a person is doing more fundamental work or more applied work as long as the work contributes to the solution of the problem. We are problem solvers. Some problems require more fundamental work, others need more applied work. Now, it is true that we are probably not going to have too many gene splicers at research centers because such work requires major expenditures for equipment and facilities. However, there has to be a good mix at the research centers of more fundamental and applied work. It is not enough for an entomologist to go out and spray and count dead bugs. There should be some effort made to find out where the pesticide is going, what are its breakdown products, and where is it moving in the environment. There should be some efforts on insect physiology to see what effect pesticides are having on the organism and there is no reason why that kind of research cannot be done at a research center. I consider such work to be very fundamental.

In Florida we try to provide at least a minimum level of capital equipment at research centers to enable scientists to do some fundamental research. I think it is important that you look at the scope of the research that can be done at your center. Don't just consider the service oriented, more mundane type of research. If you do, your faculty will have a difficult time getting work accepted in refereed journals which can be key to their tenure and promotion. You really have to look out for your faculty in this regard.

Now, let's talk about facilities. Some of the facilities on branch stations in some of our states really need improvement. They were built maybe 30 or 40 years ago and are in dire need of rennovation and modernization. Station leaders need to make their needs known to the experiment station director. Why do you think your program really needs help? Why it is important for him to put resources into your program?

Another important aspect that you have to determine in this planning process is who are your clientele. Types of clientele are changing as agriculture changes. In Florida, we have very rapidly increasing urban population and the influence of agricultural people on the state legislature is diminishing. If you listened to the news this morning, you heard that one farmer can feed 100 persons. Well, the problem with that is that we fewer and fewer farmers who are being listened to less and less. However, the information we now develop at land grant institutions is there for all the people in this country, not just those classified as farmers. This is a change from one hundred years ago when many state experiment stations were established, when 70% of our population were agriculturally aligned.

Your commodities may also change, and I want to say a word about alternative crops. Many of us are talking about alternative crops but I wonder where we are going to market all that broccoli and cauliflower we are supposed to produce. Commodity changes in your region or state are very important. You at branch stations should have a finger on that situation so you can inform your experiment station director. For example, is the future likely to favor more vegetable crops and less agronomic crops? It could include aquaculture or ornamental horticulture. In Florida, vegetables and ornamental horticulture now equal our citrus industry being worth a little in excess of a billion dollars each. In my view, we don't have the research base in ornamental horticulture that we need to handle this big industry. Where are we going to get the resources? We are going to have to change. You have to define your clientele in the light of changes that are occurring.

The amount of change that has occurred in the past 70 years is amazing. My mother was born in 1899. She can remember a man coming around in New York City to light the gas lights in the streets. She witnessed the development of electricity the automobile and the highways. The railroad system was developed earlier, nevertheless it also has changed. I would say that in our lifetimes we are going to see changes occur twice that fast. Change is going to bring a lot of social problems with it and social change is another area that the experiment station director has to be concerned with.

There is an inertia problem with many scientists with respect change. They want to work on what they did when they got their PhD. If they were trained and raised in Iowa corn country they may want to continue. However, we may have hired them in Florida to work on things other than corn. The point is, we have to change and some people don't want to change. The branch station leader has to pick out that faculty member and say, "Hey pal, we really have higher priorities now than the research you are doing." Try getting faculty a faculty development grant--a sabbatical for more training. A 50 year old person still has another 15 years and you just can't let that person sit there for those 15 years. You have to be the instigator to get people to change.

I would like to end with a comment about biotechnology. This is one of the new buzz words and those of us who have been in traditional disciplines might be a little frightened of that word. Some of us may think we will be left out because our training is not in molecular biology. Don't be turned off by new technology because it is still going to involve you. We have to develop a means of using that new technology. We are still going to have to do different variety testing. We are still going to have to solve the problems of the environment and the impact that these engineered organisms are going to have on the environment.

There is no reason why some tissue culture efforts should not be conducted at the research centers in my judgment. One of our faculty members at the citrus research and education center. He has been able to effect a a protoplast fusion from cells of a wild citrus with the sexually incompatible cultivated variety. Some 300 plants have been developed and have been planted in the field. This did not occur on the University of Florida campus. It occurred at a research center and it may be one of the most significant discoveries in our citrus research. A cold tolerant, wild variety may improve the freeze tolerance of our cultivated citrus by 4 or 5 degrees.

Gentlemen, there is tremendous opportunity in agriculture. You as research leaders must look ahead with a positive outlook. I think your faculty will follow you.

LONG RANGE PLANNING—THE OKLAHOMA EXPERIENCE

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I want to use a different approach than that of the previous speakers. First, I want to discuss the Oklahoma perspective in terms of planning and what I consider to be some of the basic elements of our planning process. Our methods may or may not be adapted to the situation in your state or location.

Secondly, I want you to be aware that our organization has not until very recently vested faculty members at the branch research locations. Dr. Glenn Taylor described one of our off-campus stations in your morning program. That is a relatively recent development in our program. Several other states have a considerable amount of resources vested in faculty at research centers.

Another important question that should be asked prior to the discussion of long range planning is whether this process is of any value. Is it a wasted exercise? All of you have probably asked that question a number of times when you have participated in the process. Every time you have a new dean or director you say, we will go through another long range planning process! I think the value depends on how you participate in the process and how the process is initially set up. What I want to talk about is not what constitutes an ideal process but, rather, what is a workable process in the context of today's level of science? What kinds of problems exist in agriculture today that should be addressed?.

There is one basic reason for long-range planning, namely, to use resources most efficiently to create some kind of comparative advantage for producers. We in administration should not think that we are working as much for the scientific community, the faculty, or students as we are for the agricultural community. Oklahoma is competing with all of the other states in many commodities. What is even more critical, we are competing internationally with a lot of countries which have developed technologies for producing more efficiently than we have. Therefore, we need to look seriously at the comparative advantage that we can generate in terms of our productive capacity within our productive technology.

The Oklahoma Agricultural Experiment Station has gone through a unique experience over the last 8 or 9 years. It has not always been pleasant. We have had unprecedented budget increases followed by unprecedented budget decreases. Presently, we are in a static situation. I know many of you have gone through similar trends. However, ours happened in such a sharp fashion that if we had not had prior planning contingencies in place we would have been in serious trouble. Without appropriate planning I think the impact of these kinds of shifts would have been much more chaotic than they were. My purpose here, rather than detailing past experiences, is to try to help you understand how we addressed the problems.

Our overall program was initially oriented towards applied research. We did not feel that the balance between applied and basic research was acceptable, however, so we used this planning opportunity to make corrections. Having made those adjustments, we had to accommodate the downturn in resources and financial support. We used a system of Russian Roulette which means that as positions became vacant we simply froze the position. I guess that is called management by opportunity rather than by objective. That meant that some departments and units suffered more than others. This also created a very serious imbalance in some programs. It also provided us an opportunity to make some management changes that we might not have had the opportunity to do otherwise.

As financial resources returned to normalcy we were able to direct resources into areas that the planning process suggested were higher priority. We didn't expect everybody to agree with what we did and how we did it. The point is that the planning process was to some extent similar during both the downturn and the upturn of resources. The nature of agriculture is so complex that it is natural that the planning process be complex also. The process must also recognize limitations. One of the subtle, but serious problems of administrators and faculty, whether at the unit or station levels is that they don't want to recognize their limitations.

Our decade of planning started in 1980 with a mass assessment called Oklahoma Agriculture 2000. This was an introspective study that involved virtually every faculty member in our program. It also involved several of the station superintendents and a number of producers. There were 13 interdisciplinary task forces developed, a guarantee that any commodity or resource would have representation from almost every department in the division of agriculture. There were enough people with varied backgrounds to assure that, a thorough thought process took place.

Many of you people have had similar kinds of studies. The reports detailed the relative importance of the resource and commodity up to that time and summarized the historical trends. It looked at the potential and what would be required of the division of agriculture to serve that resource or industry. It also looked at the constraints. The landmark result was not in itself a planning document. However, it was a point of departure for future planning.

You have heard the terms "systems approach" and "interdisciplinary approach" applied to problems which are endemic to all of our research systems. A systems approach was used in almost all planning efforts. Studies were setup in that context and we used the reports in subsequent planning. The degree of complexity of this approach was obviously variable. It recognized the need for interdisciplinary approaches to problem solving or opportunity exploitation. In situations relating to production or commodity issues, we tried to consider all aspects in our planning process. Cultivar release included selection and development of a variety and an evaluation of market strategy. This technique is by no means unique and is probably used in most of your institutions. Our experience permitted us to maximize the benefits of our limited resources and still try to serve the industry.

I would like to illustrate why I think this kind of planning works. In any problem solving activity, you must initially have an overall goal or objective. For example, let's assume the objective is the development of a new crop variety (Figure 1). Let's use wheat since that is the most important agronomic crop in Oklahoma. You must be able to calculate the inputs into the planning process. You must also determine those things that you think are limitations in your program to development of a variety. In the case of wheat, we have a series of inputs. We start with baking and milling quality for example. The baking quality of the product may well be the most important item if we expect to market the material. Then we must consider such things as disease resistance, insect resistance, resistance to growth regulators, drought resistance, straw length, etc. It is important to understand that when going through this process, you have to have input on all of these items. In general terms, that probably represents one or more scientists for each input.

Another example, dealing with soil management can be cited (Figure 2). It is immaterial what the problem is because we have lots of them--particularly with different soils. You have all these inputs with soil management. That means that if you are really going to do a complete job of studying some soil management problem, you probably have to have a complete and diverse list of inputs and you will probably have to assign at least one scientist to each aspect.

To us in Oklahoma, another important example is reproductive efficiency (Figure 3). Reproductive efficiency doesn't just include reproductive physiology. We must include inputs from nutrition, health and disease, breed effects and envlironment, which are all interrelated. That means that different scientists involved with the problem have to be talking to each other. We must have their contribution into the planning process.

Interconnected in the entire planning process must be an awareness of resource limitations. This includes the availability of physical resources such as land or facilities, and consideration of soil, water, and other aspects of the environment. Human resources include the people available to conduct the research and those out in the industry itself. Figure 4 illustrates our thinking before, during and after the planning process. On the need side we have to look at the commodities, environment and potential markets. If we don't do all of these things before hand then we are probably going to make some significant errors in the planning process. A very important aspect is the financial situation. What do you do about the lending institutions? Do they really know how to lend dollars to producers on a particular commodity? What if you want to go into horticulture production, and you never have been in that commodity before? Those states that aren't traditionally horticulture producers realize very quickly that the bankers don't have any idea what you are talking about when it comes to making a loan on a horticultural operation. National priorities also have an impact. That is generally where the big government dollars are. Areas of excellence are more an individual state considerations because we can't be all things to all people. I think we owe it to ourselves to develop excellence in the important areas that we can justify to our constituents.

Next we must consider resources--starting, of course, with the state and federal funds. Commodity support is also important for some industries.

Unfortunately, many people in the commodity groups are beginning to change their minds about what they want to support. You have to consider that when planning. Grantsmanship is also important. If you have people who are capable of bringing outside sources of funds you are fortunate. Perhaps the most important resource considerations are the human resources.

Using this multidimensional approach, however, it is surprisingly easy to identify the missing pieces. The next logical step is to devise methods to provide the missing pieces. Before this can be done, however, priorities must be established. It should be obvious at this point that we are considering several systems and programs at the same time. Rarely would we have the resources to provide the missing pieces to all of them at any one time. So we have to establish priorities.

Up to this point the process has involved faculty, superintendents, administration, and producers. That is great because we have to have all those inputs. However, when it comes down to priority decisions, you seldom can get agreement among all these inputers. Therefore, the administration, quite frankly, has to accept the responsibility and the criticism, as well as the possibility that the decision may be wrong. The decision process isn't over by any means when everyone sits down and agrees. There is a multitude of other considerations such as input and output studies, risk analysis, political realities, economic outlooks, and national funding opportunities. There is a certain element of bias also, we can't deny that. Failure to declare priorities at this stage, however, will essentially negate the value of the rest of the planning process.

I would like to go through an example of a priority process before I close (Figure 5). We are having the experience of trying to develop a horticultural industry in one section of our state. Oklahoma is generally not a horticultural state. For example, we are trying to produce broccoli and cauliflower that Florida or Texas doesn't want us to produce because it may interfere with their markets. We are looking at opportunity windows where we can fill a gap in the market. We know that we cannot out produce Florida, California or the Rio Grande valley of Texas. But we also know that we can serve some windows of market opportunity that some of the rest of you can't serve for obvious reasons.

Here are the kinds of things we looked at. Before we ever thought about production or what or where it should be or what we ought to do with it, we looked at the marketing aspect. I think that not exploring marketing first is a mistake that many people have made. We knew that we couldn't beat other states in production of these crops so we had to look at where our market was and its characteristics. We looked at our location in relation to where the potential market should be--the transportation aspect. We checked the distance from such places as Dallas, Fort Worth, Oklahoma City and Tulsa. We evaluated the type of market--whether it was fresh market, freeze market, or whatever. We checked the existence or potential development of marketing co-ops. We looked at the size of the market and whether it had enough elasticity to accommodate the kind of production we might be capable of having. We also looked at the size of the industry.

Geographically, we were most concerned about the southeastern part of the state where we didn't have any large industry. We had to build a new

one and that was part of the problem. We obviously considered the competition. That whole process created something of a knowledge base as far as market windows were concerned.

Then we had to scrutinize production itself. There were a lot of unanswered questions because in many of those areas we didn't have any idea if we could produce those commodities commercially. We knew we had some of the requirements because we did have climate that was favorable at times, but not nearly as favorable as some other parts of the country. We certainly had desirable soils but we knew nothing about adaptable varieties. We had no idea how they would perform and we were not in the position to develop them ourselves.

The equipment dealers in that part of the state were familiar with two types of equipment. One was used for peanuts, the other for making hay. We had to determine if there was any way we could get farm supply people to support the new producers. Likewise, we obviously had to look at pests because that is a continuous problem. Again, bankers had no idea whether they should make a loan. What were the risks on a loan for broccoli production or sweet corn production? A lot of production technology existed but a lot wasn't necessarily applicable to our situation, so we had to decide what we had to develop. Those requirements are going to affect some of our research planning.

Finally, we looked at our existing human resources. Could we really foster this kind of industry? We made a positive decision in this case, but we are approaching it slowly. Planning is a continuous process. At any rate we identified research needs, training needs as far as our resident instruction program, and technology transfer needs. That has been our way of approaching these problems. Did it work? The jury is still out!

I can't conclude without some mention of the role of branch stations. Other speakers have talked specifically about that and I would like to make a few comments also. Virtually all of our states depend heavily on branch stations for major elements of the applied research program. In some cases, we also depend on them for fundamental or basic research programs. I think it is critical that station superintendents and center directors appreciate the complexity of the planning process. Sometimes I know there is a tendency to look at things from your perspective and say, gee this is pretty simple, why make it complicated!.

I think it is important that you appreciate this planning process and how complex it is. You are very much a part of this interdisciplinary program that everyone has been discussing. Very often you are in a position to act in an administrative role by the fact that you have to deal with a wide variety of people and disciplines. You have to deal with animal and plant scientists, pest scientists, engineers, economists, and other administrators. Your role is absolutely pivotal in the implementation and accomplishment of the objectives which we find emerging from this planning process. You not only deal with a wide range of scientists but with the public as well. That may be your biggest problem. The public usually does not understand the scientific method and many often think you are crazy for some of the things you do on your station. I compliment you for your contributions to this total effort and particularly for including this session on your program.

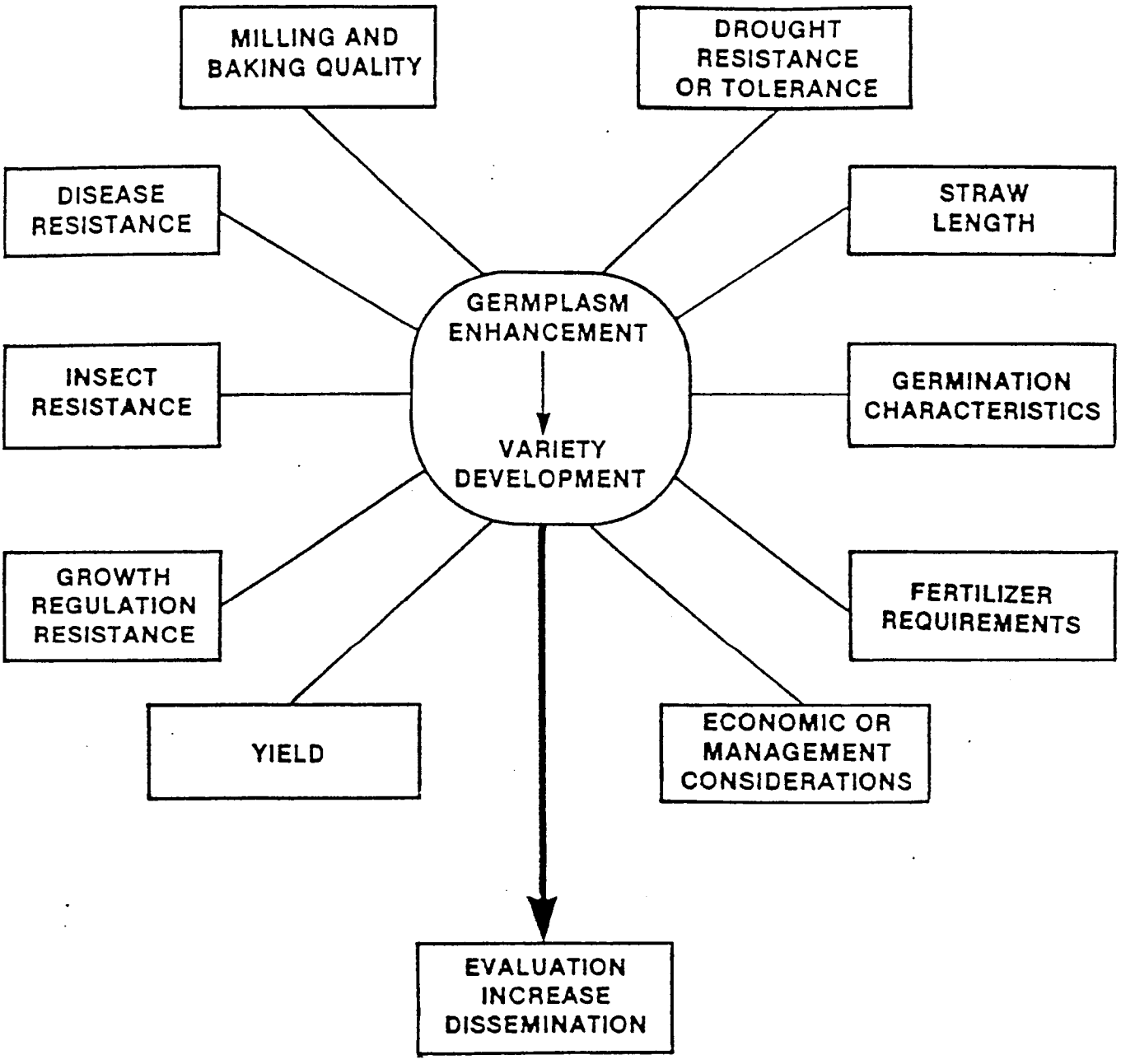
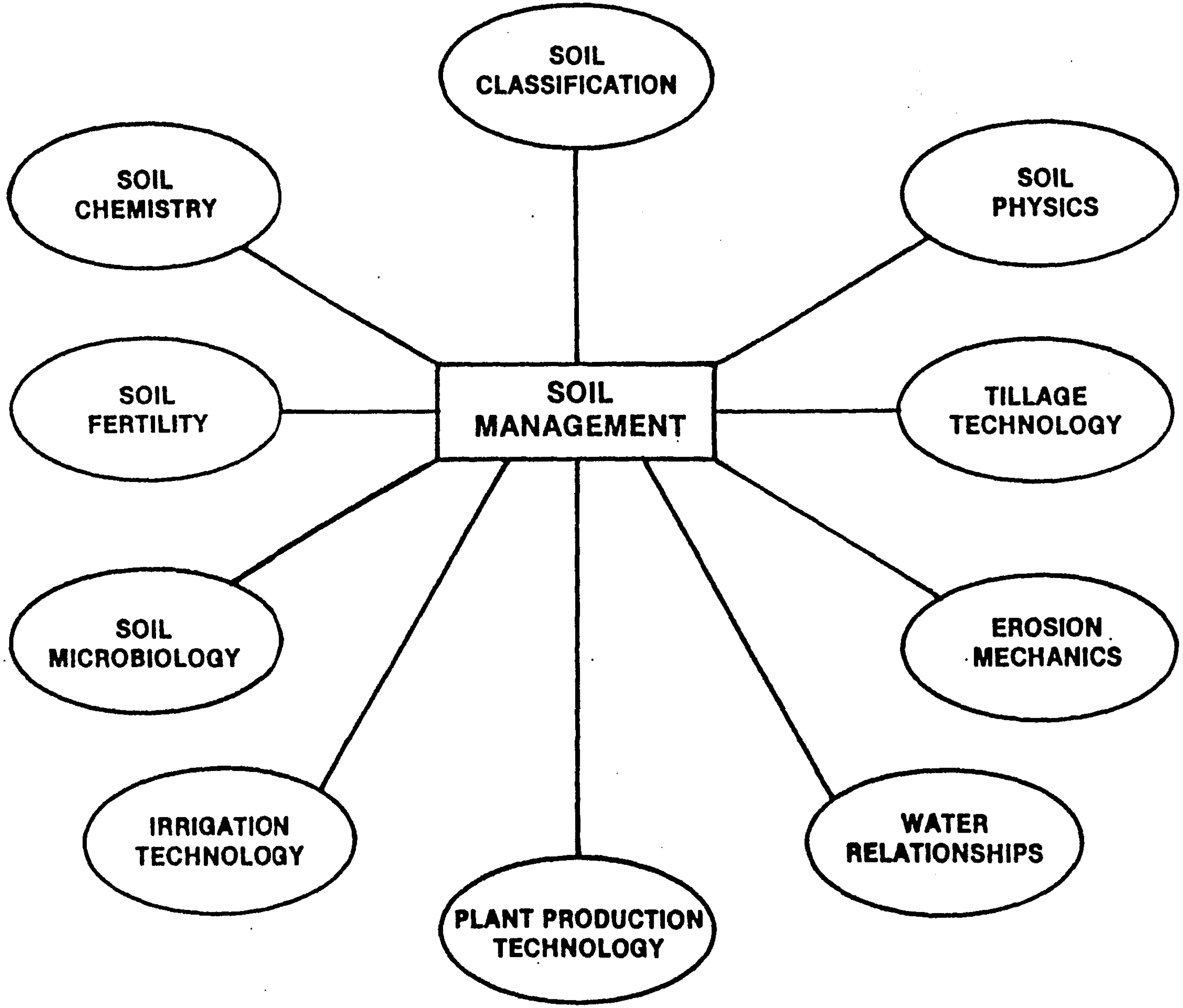


Figure 1. Systems Approach Diagram for Variety Development--Wheat.



MULTIDISCIPLINARY RESEARCH PROGRAMS
-SOIL MANAGEMENT-

Figure 2. Systems Approach Diagram for Soil Management Problem Solving.

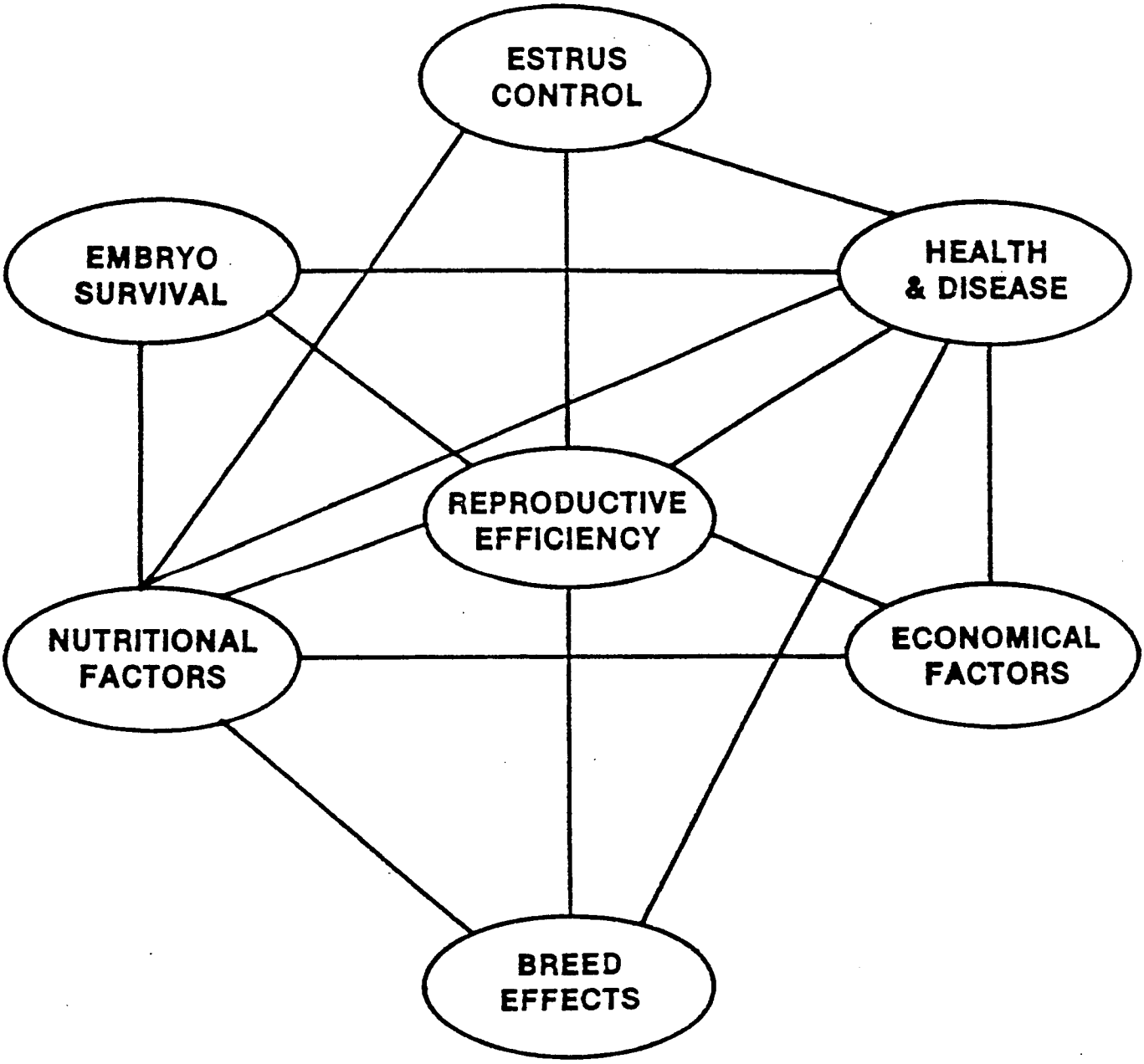


Figure 3. Systems Approach Diagram for Reproductive Efficiency Problem Solving.

FACTORS INFLUENCING LONG RANGE PLANNING

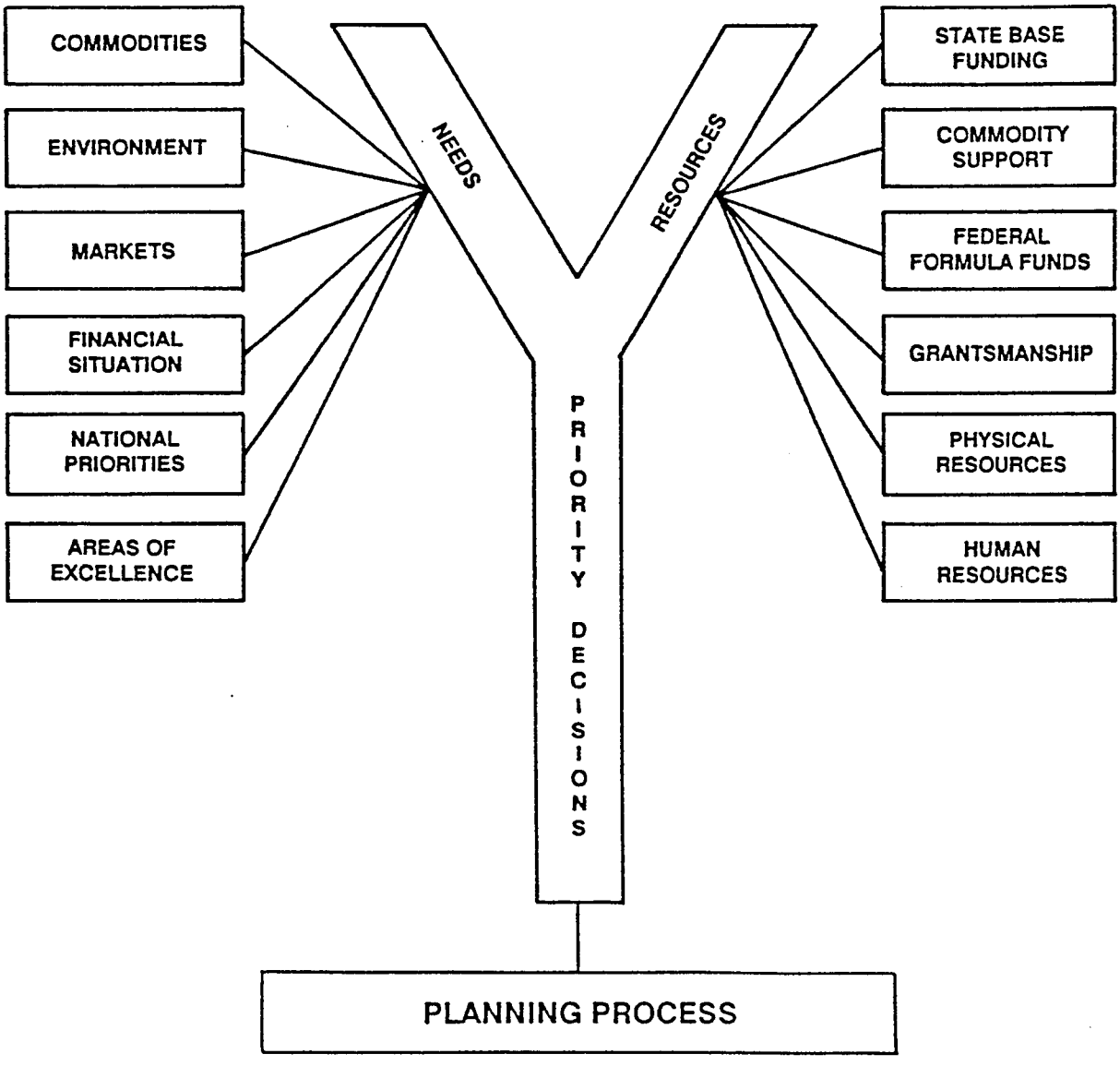


Figure 4. Factors Influencing Long Range Planning in Agricultural Research.

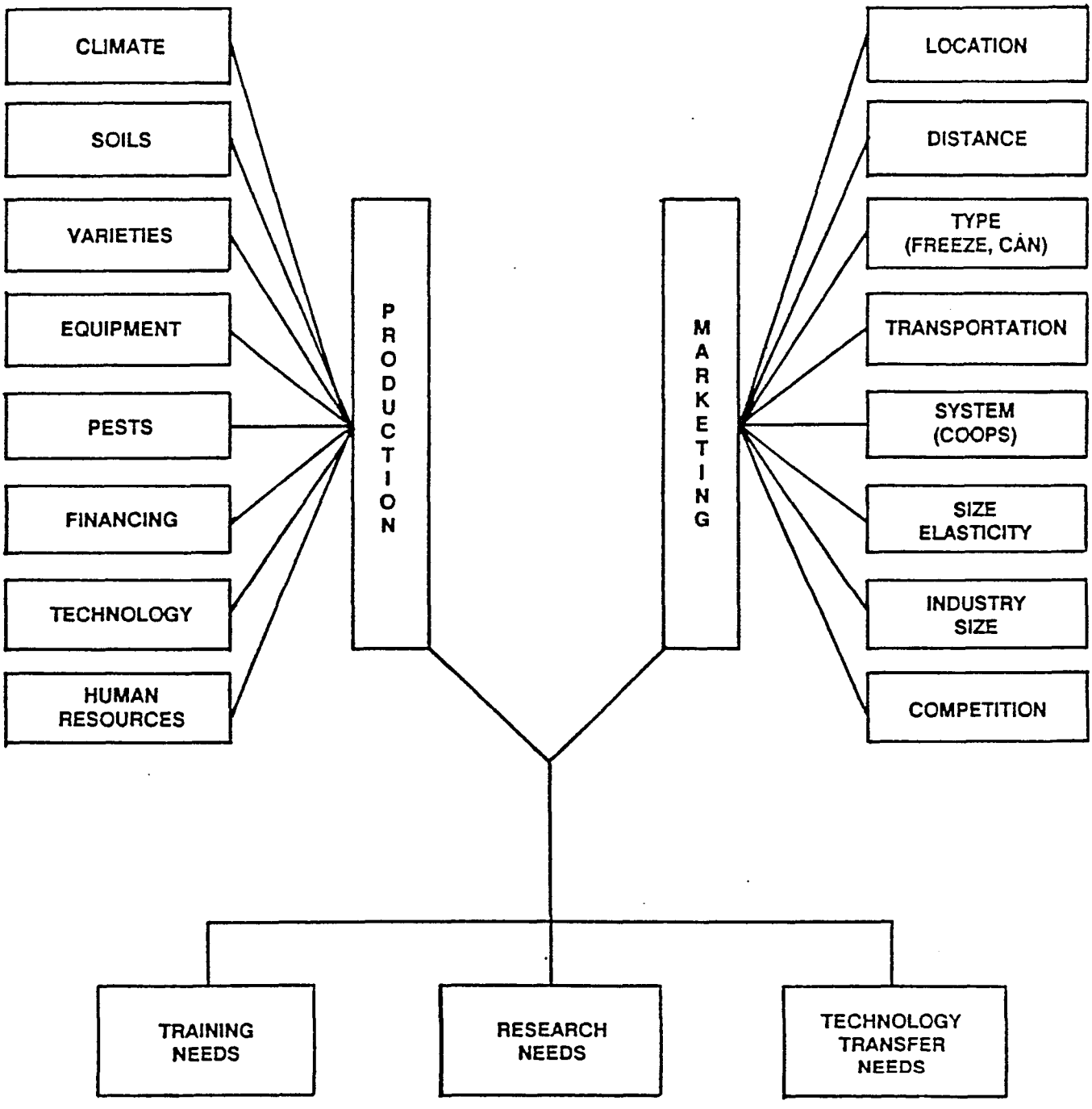


Figure 5. Input Considerations In the Planning Process for a Horticultural Industry.

HANDLING HAZARDOUS CHEMICALS AT RESEARCH AND EDUCATION CENTERS IN FLORIDA

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The state of Florida has a mildly temperate to subtropical climate, high humidity with an average rainfall of over 50 inches and primarily sandy soils with some being well drained but many being poorly drained with shallow water tables. These conditions, coupled with a rapidly expanding urban population and an agricultural industry heavily reliant on pesticides for protection, has lead in recent years to a variety of regulatory agencies and rules which generally apply to agricultural research centers and agricultural enterprises as well as to non-agricultural businesses dealing with hazardous materials.

The Institute of Food and Agricultural Sciences (IFAS) has 20 research and education centers and several other installations located throughout peninsular Florida. The Gulf Coast Research and Education Center, IFAS, located in a heavily populated area just south of Tampa Bay, represents a medium to large-sized center in the Florida system. This center occupies about 200 acres of research farm and has over 50 buildings, including 12 scientific laboratories, 20 scientists, and a 45.5 permanent staff personnel. The Gulf Coast Center is primarily a horticultural unit dealing principally with research activities; however, some extension programs are located at the Center.

The nature of these horticultural crops and programs dictates that many agricultural chemicals, both experimental and labeled, be researched and used in general crop production on the research farm. These chemicals include insecticides, miticides, fungicides, bactericides, herbicides, fumigants, and growth regulating chemicals.

Chemical disposal procedures, methodology, and practices have not generally kept pace with federal and state laws, rules, and regulations in this area. IFAS has established goals to keep all research centers, departments and other units in compliance with laws and regulations governing pesticides. Meanwhile, a few calls from unidentified persons, frequently unhappy employees, have lead to inspections of a number of centers by local and state authorities. One such complaint in northwest Florida about 2 years ago lead to rather intensive inspections of most of the research centers and other units in the Florida system by the Florida Department of Environmental Regulations (FDER) in cooperation with the State University System Board of Regents (BOR) and IFAS. The approximate chain of events for these inspections is outlined below (Table 1).

Table 1. Approximate chain of events for IFAS Research Centers pesticide investigation by FDER, 1986-1988.

1. Complaint
2. FDER inspection of subject research center
3. Inspection of IFAS and all research centers proposed
4. IFAS-FDER Memorandum of Understanding; joint assessment of situation
5. Consent order by FDER lawyers requested
6. FDER-BOR legal consent order developed
7. Expanded by DER to include gasoline stations and septic tanks
8. Wells, soil and water samples collected (independent contractors)
9. Detailed report back to units - limited contamination found
10. Contamination - report sent to units
11. Remedial action plan and report requested
12. Cost for 1986-87, 1987-88 -- $2.0 million + tremendous personnel time

Regulatory agencies have found no major or serious violations on research centers. Following the first legislative appropriation, an independent contractor was hired to collect data on potential pollution sites and develop a remedial action plan and clean-up.

The implications of this investigation to Florida agriculture are significant, even though it appears the entire process has been blown out of proportion to its relative importance.

The central IFAS administrative commitment is to keep all units in compliance with changing pesticide and hazardous waste regulations. An IFAS pesticide "Policies and Procedures" manual has been written and the contents are outlined in Table 2.

Table 2. Outline of University of Florida-IFAS Pesticide Policies and Procedures Manual - 1987.

Chapter	Contents	No. of pages
1	Introduction, policy statements, definitions	4
2	Personnel hiring, reassignment, training, disciplinary, certification	3
3	Acquisition, inventory, records and files	3
4	Storage and handling facilities	2
5	Health maintenance and care	6
6	Re-entry intervals	3
7	Transportation and handling spills	2
8	Handling and disposal of pesticides	3
9	Pesticide research on UF and non-UF property	3
10	Pesticide recommendations	3
	Appendices-Laws, testing policies, records, forms, testing agreements	16

Most aspects on handling and use of pesticides at Centers are covered and all research centers and other IFAS units are requested to follow this manual.

One of the results of monitoring and regulations is that many Florida research centers are having to assign scientists, usually entomologists and plant pathologists, to take leadership in handling pesticide usage and regulations at each center. The center director frequently is unable to keep up with these requirements in addition to the other management responsibilities. Consequently, the Gulf Coast Center virtually needs a full-time person to deal with the issues of personnel safety, pesticide handling, chemical disposal, laboratory reagents, gasoline, and right-to-know rules and regulations.

Pesticide regulations and other agricultural regulatory matters are administered by the Florida Department of Agriculture and Consumer Services Department (FDACS). FDACS is administratively separate from the University of Florida. The Department of Agriculture is headed by the Commissioner of Agriculture. FDACS initially set forth requirements that IFAS pesticide researchers believed were impossible to follow. Acceptable guidelines were finally developed and our situation with experimental chemicals is much more tolerable. Generally, sites less than one acre, per crop, per site, per experimental chemical, are exempt from some of the guidelines (Table 3).

Table 3. Summary of FDACS regulations for use of experimental chemicals

1. Experimental pesticides - numbered, restricted use, or general use compounds covered.

2. Experimental use permit required for non-state or federally registered, or for non-registered use of labeled compounds.

3. Small plot exemptions per Florida Administration Code 5E-2,009(2)(b).
   (a) If area of use per site, per crop, per compound is less than 1 acre.
   (b) Notify FDACS if treated area 1 AC to 10 AC within 60 days.
   (c) Food and feed from plots destroyed or fed to experimental animals.
   (d) Excess experimental compounds used in accordance with label, if any, or returned to manufacturer.

Table 4 contains an outline of suggestions from the IFAS Pesticide Policies and Procedures Manual, 1988, on handling pesticides at research units. Most of these suggestions are in the implementation process at IFAS research centers at present.

Table 4. Summary of guidelines for handling of pesticides and most chemicals - IFAS.

1. Contact Environmental Health and Safety on campus for advice.
2. Keep pesticide and/or lab waste labeled and MSDS sheets.
3. Purchase or accept minimum amount.
4. Return unused experimental pesticides to manufacturer.
5. Keep in original containers.
6. Read and follow the label.
7. Put small amounts in containers with labels for transporting to distant fields.
8. Mix only amount of of spray needed - calculate closely.
9. Schedule and spray compatible pesticide mixes.
10. Apply rinsates and excess mixes on an approved crop according to label.
11. Plant extra replications of experimental materials for spray residues.
12. Containers - triple rinse - glass, metal, plastic to landfills. Paper - landfill or burn.
13. Clean spray clothing and all equipment used.
14. Do not dump in septic tanks.
15. 180 days for disposal of declared waste - must be identifiable.
16. Advertise availability of excess pesticides within IFAS before declaring a hazardous waste.

Table 5 contains a summary of suggestions followed by Florida research centers for disposal of excessive pesticides as well as any hazardous material at the present time. It is recommended that one person be in charge of all disposals for an entire center so all procedures and actions can be tracked accurately.

Table 5. Summary of technique for disposal of hazardous chemicals and waste use by IFAS Research Centers.

1. Determine the center's generator category.
2. Apply for U.S. EPA ID number - categories: 10-100, 100-1000, or 1000 kg/mo generators.
3. Choose a hazardous waste hauler and hazardous waste management facility (they must have U.S. EPA ID number).
4. Pack wastes in barrels in accordance with center's generator category and with information obtained from hazardous waste management facility.
5. Fill out generator waste material profile sheet and list of constituents, ID/container.
6. Drums - Department of Transportation (DOT) approved 17-H open head steel 55 gal with 40% of volume of chemical, 60% packing.
7. Certain materials cannot be shipped as liquids (solidification required).

Training, licensing and certifying of the pesticide applicators is required at all Florida research centers. A research and demonstration license is also available, in addition to the general plant or animal science specialty licenses. Supervisors and faculty responsible for pesticide application, even if they do not actually apply material, also must pass the test and be license. The training and licensing information for research people is outlined in Table 6.

Table 6. Summary for training and licensing of certified applicators at research centers. Chapter 487, Florida Statutes.

1. Classes: private, commercial, public, R & D.
2. Required for each user or supervisor of Category I, Experimental or Restricted-use pesticides.
3. Each employee (faculty and staff) trained for safe and proper handling of pesticides.
4. Each must attend a Florida Dept. Agri. & Consumer Serv. sponsored school on safety and handling.
5. Each must take and pass an examination and receive a FDACS license permitting the purchase, use, or possession of pesticides.
6. The training and licenses updated every 4 years.
7. Requirements placed on job descriptions.

Investigations are usually triggered because of a reported accident, complaints by a disgruntled employee or by a nearby resident, or a routine check.

Some of the local monitoring agencies which may inspect any research center in Florida include: zoning department, county health department, department of building codes, county pollution control, county utilities (water and drainage) departments, fire department and sheriff's department. State monitoring groups include State Fire Marshall, FDER, Industrial Health & Safety section (state OSHS) and State's Attorney's office.

Florida also has a right-to-know law which is outlined in Table 7. All new employees must be trained in the use of pesticides and hazardous chemicals and they must be informed of the nature and danger of any chemical. A book containing the Material Safety Data Sheets (MSDS) on each chemical issued by the chemical manufacturer must be maintained by each unit.

Table 7. Summary of Florida Right-to-Know Law - Chapter 442, Florida Statutes.

1. Post notices, Toxic Substance list, MSDS in each work area. Annually update.
2. Maintain central location MSDS on each substance on toxic list.
3. Instruct each employee on health effects, safe usage, emergency procedures, personal rights for further information the first day and annually. Requires acknowledgement signature.
4. Annually update all MSDS lists.
5. Annually provide fire departments and local emergency rooms with a list and location of toxic substances at the research center.
6. Update and notify fire departments and emergency rooms of any significant changes.

Outlined in Table 8 are some internal management tips which have been found helpful in managing pesticides and hazardous chemicals at the Gulf Coast Research & Education Center.

Table 8. Some Internal Management Tips for Pesticides at Research Centers.

1. Keep close check on inventories. Log in - log out.
2. Buy or accept only needed material - plan ahead.
3. Upgrade storage locations.
4. Consolidate storage locations.
5. Keep all pesticides under lock and doors posted.
6. Train and license faculty and other users.
7. Plant "spray off" crops for over-mixes, rinsates.
8. Post fields & observe entry intervals.
9. Upgrade safety equipment and showers.
10. Provide washers and dryers for cleaning spray clothing.
11. Monitor all activities closely.
12. Appoint center pesticide coordinator.
13. Appoint safety committee and coordinator.
14. Legally dispose of obsolete chemicals and residues every 3 to 6 months.
15. Follow local and state laws and regulations.

In conclusion, those in states who have not experienced what has happened in Florida should not be overly frightened. You will have the advantage of learning from our experiences and our mistakes. We trust that when the regulations and regulators do come to your state, and, ultimately to your location, you will still find the time to smile as you strive to make your center a safer and more ecologically sensitive work area as well as a demonstration unit for agriculture.

PERSPECTIVE WITH HAZARDOUS CHEMICALS IN NORTH CAROLINA

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For the past five years I have been going to meetings where interesting titles have suggested that new ways and methods were available for storage, handling and disposal of pesticides. The great expectations I had have been dashed with the realization that little or no new definitive information exists. Unfortunately, I have no new facts for you today--just some observations and experiences.

I plan to go through the presentation rather quickly and allow time for questions. I want to talk about some of the things we learned as we built the new pesticide storage unit. We certainly learned about eye strain reading all of the publications related to this! We learned that many of them are contradictions. We learned a lot about the legal restrictions and legislative policies, but mostly we learned there is considerable confusion and poor coordination among the responsible agencies. One explanation of this is that regulations generally are established by a committee. Committees by their very nature make it almost impossible to fix responsibility for actions taken. If you ever do get a committee member to write instead of call you on the phone, they will always use disclaimers for their protection. Responsible regulators believe they know the acceptable methods for handling hazardous materials but also will be sure not to commit themselves. Underlying all of this is the hard fact that until we as the owner build the facility, no legal decision has been made. Put another way, you as an individual are the only one who does not have the privilege of a disclaimer. It is also important to remember that under present legal thinking, you may build something that meets all known regulations only to have them change and make you liable again.

We studied the pesticide storage building regulations before we made any attempt to get funds for construction. We tried to answer such questions as how much material would be stored, what were its fire and reactive properties, what were the requirements concerning temperature and ventilation and what are the possibilities of cross contamination. We even considered not storing at all. We have good pesticide suppliers nearby and considered buying as needed. In analyzing this we soon found that companies schedule their production by computer. You must buy on their schedule or face not getting a material when needed. A further consideration was storage of experimental chemicals. It became obvious that a storage facility was necessary.

The building we decided on is certainly better than anything we had. It is on a concrete slab. The floor is recessed 4". This presumably will hold what water is needed to put out a fire. According to handicap regulations, we had to put a ramp down to the recessed floor. The walls are concrete block inside and brick outside with styrofoam insulation between. The ceiling is fire retardant sheetrock. The truss roof and sheeting are fire retardant treated. Overhead insulation is fiberglass. The floor

design is such that it will hold 2400 gallons of water. Incidentally, the fire department has determined that if they cannot extinguish a fire with 1,000 gallons of water, they will let it burn and evacuate the neighborhood. The electrical system is explosion proof. Many pesticides must be stored where they will not freeze. The heating system cannot produce open flames or sparks. We chose a separate area for an oil fired boiler and transferred the heat to the storage units. Ventilation must be positive and continuous. The fan runs 24 hours a day and is explosion proof. It can only be turned off in the main electrical panel. All of these things increased the cost of construction; however, most of them are good.

Up to now I may have sounded somewhat negative but the new facility has affected our operation in some positive ways. We have always prided ourselves in our safety consciousness and record. We have tried to apply chemicals in a safe way and properly dispose of containers as the law required at the time.

Needless to say, we were really pleased when we got a chance to build a new storage building. We tried to incorporate all new requirements into it. The plans were approved at every step by every related agency.

The new storage unit has made our employees even more safety conscious. I would like to emphasize one thing though...when you start to educate your people in safety, be careful and do your homework. The way you approach the subject can frighten your employees so much they might leave your employment.

We were concerned about our impact on the environment. Our station bounds the French Broad River. It flows through all of western North Carolina to the Mississippi River. We developed an emergency plan for fire or major spills that required sand bagging an area near the river. We think this is a good system but will never know until we are forced to use it.

Urbanization is approaching as it is in many locations in the country. We have an evacuation plan for employees should we have a fire. The county fire commission determines evacuation for area residents.

We were forced to develop a full management system. One that would take care of any emergency at any level of management. The pesticide facility made us re-think our system from purchasing thru use and disposal. It gave us some compelling reasons to look again at our safety program. We learned a lot about the thinking of every known agency remotely connected with pesticides and human safety. From this we were impressed with a need for a central clearinghouse to put all these regulations together and keep one agency from opposing another.

FRUSTRATIONS AND DEVELOPMENTS IN PESTICIDE HANDLING

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INTRODUCTION

As we look at pesticides today, we might feel that the situation borders on hopelessness, especially if we pay attention to all the bad press pesticides get. It is important, however, to review the past and present conditions in order to gain a proper perspective as to what might happen.

When pesticides first became available to farmers, they brought an improvement in production of a higher quality product. Side effects of the pesticides were not always strongly considered. Basic label instructions came with product and statements regarding product safety were included (for liability reasons). Initially, these statements were directed more for product/crop liability since early products were often used by applicators who had little experience with pesticides.

An early consideration was the disposition of leftover spray. These were typically placed back on the crop with a second pass at reduced rate or a more dilute volume because pesticides were expensive and should not be wasted. There was, however, an obvious lack of awareness about these products in terms of human safety and side effects. Chlordane for example was used at high rates for crabgrass control. Some also used it on potatoes in storage to assure insect control. There was little concern about side effects.

There has been a gradual evolution of awareness and initiation of efforts to improve the safety of pesticide handling, storage and disposal. These measures have been highly effective. Labelling laws have provided more complete information relative to management and safety practices and toxicological and ecological information. This information would have been of less value without the training through the Pesticide License programs where education and concept forming has taken place. Other laws created restricted use and other categories of pesticides that delineated the relative hazard inherent to particular types.

Additional measures were taken to protect man and the environment. Those included the initial removal of some compounds from use. The often alleged lethargic bureaucracy has proved it is responsive and has pulled compounds off the market within a few days of an incident. Removal of these products met with varied reaction to those who used them. However, it provided renewed incentives for manufacturers to fill the void created by their absence by replacing them with products equally effective but safer for all concerned.

One of the most difficult and controversial processes in establishing a pesticide protocol was to develop definitions that were acceptable and

provided utility. This was an important step, simple as it may sound, that forced all parties to conform to a common mindset in order to answer questions like: When is a container empty? When is a container acceptably rinsed? What is a hazardous waste? Who determines when a pesticide is waste? Defining these and other terms and questions better identified the problems and helped determine responsibility and authority.

CURRENT SITUATION

There is a continued scrutiny of compounds. A history of safe use does not guarantee that a product will be quickly or easily approved nor does it mean it will have an easy process of approval. Extensive retesting may be required for labelling.

Current users have a much greater awareness regarding the potential hazards of pesticides. Material Safety Data Sheets (MSDS) provide the critical information necessary. Brochures often accompany the containers and provide information on crop injury symptoms, weed identification, pointers on determining rates to used as well as toxicological information. Many companies have "800" numbers for consultation should any situation require additional information.

There has been a proliferation of recent legislation intent on protecting the environment from damage caused by the misuse of pesticides. Endangered species are protected by laws that make application of pesticides within their territories inadvisable unless performed under prescribed optimal conditions. The state of California passed 40 pieces of legislation in 1984 from the 100 bills that were introduced. California also passed what has become known as the "Bounty Hunter Law" which provides for citizens to bring suit against careless applicators on behalf of the state and receive part of any settlement. These laws suggest at least that public perception is that pesticides are not always being used wisely, or that there is not complete confidence in the agencies regulating pesticides.

One of our concerns is that there is too much focus on agriculture in the regulatory arena. For example, chlordane is usually regulated as an agricultural chemical, but much of it's use is in municipal areas. Home sales and loans are often contingent upon treatment for termites even though most circumstances do not warrant treatment. Conversely, with current agricultural overproduction, it is difficult to justify use of pesticides for increased production. However, most pesticides are safeguards to improve product quality.

Some regulations have still not been implemented due to lack of enforcement capabilities. In essence, legislation is ahead of technology in some cases and there is no feasible way to remedy the problem. There are instances where people have been found guilty of pesticide misuse--but are not told how they can legally correct the problem. A major problem with much of this legislation is that it sets tolerance limits which are beyond our abilities to accurately detect in analytical laboratories. If we have levels so low that we cannot detect them, how can we claim that these low levels are carcinogenic?

There is also unequal application of laws designed to control mismanagement of pesticides. When regulations on storage are emphasized, it is easy to overlook poor practices in handling pesticides. Typically, more is known about safe use of products than safely disposing of them. Attention is often concentrated on areas of highest concern, visibility or liability.

Duplicate regulations confuse the resolution of some problems. The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) overlaps in areas of pesticide rinsate disposal with the Resource Conservation Recovery Act (RCRA). These acts provide power for various state and federal regulatory agencies, but the limits for safe levels are set by the Center for Disease Control.

The process is further complicated by a myriad of agencies and regulations that overlap responsibilities for controlling pesticide usage. For instance, the first line of counsel in handling a pesticide situation will likely be someone from within the user organization. They will be guided by their interpretation of a regulation, the accuracy of which is contingent upon the definition of the next higher level of regulatory control. The next higher level may be county government in the form of building codes or a state agency, both of which are subject to the Federal EPA standards. Regulations covering safe storage of pesticides are found in EPA guidelines for storage security, National Fire Protection Association standards for ventilation and building requirements, Occupational Safety and Health Act for ventilation and safety requirements, Building Officials and Code Administrators building code if used in your area, and other regulations. The issue can become more complicated should the definition of the compliance department of an agency vary from that of the enforcement section of the same agency.

The federal EPA has recently empowered state governments with much of the regulatory power in an attempt to simplify the situation. Unfortunately, some state legislatures have made it almost impossible to dispose of hazardous waste. Thus, the EPA has threatened to pull some of the power from state agencies. There are also federally mandated measures such as Community Right to Know laws that are costly operations and have been jeopardized by limited funding. The result has been make-shift compliance efforts from regulatory agencies that cite people for illegal situations, but give no positive action to correct the problem.

This is not to say that regulatory agencies are not doing a good job given the constraints they are faced with and massive number of situations with which they must deal. Regulatory Agencies are caught between public scrutiny and criticism and not having viable solutions to several problems. They must enforce rules as mandated, yet they cannot afford to provide incorrect methods of correction even though they do not have the answers. Therefore, they feel safer in answering inquiries with a "No" which relieves them of liability than a "Yes" which could get them in trouble.

What is the extent of liability for users of pesticides under the current legal framework? One recent incident involved a spill of one teaspoonful of dioxin. No injuries or health risks occurred. There is a punitive fine of 140 million dollars pending in court. Another incident

where a commercial applicator was turned in for contaminating groundwater was resolved by deeding the facility over to the plaintiff. The California Experiment Stations have had some of their facilities declared nonusable despite no evidence of contamination. With this type of jeopardy confronting organizations, progress is often stopped for fear of a lawsuit after installation of an expensive facility. For others, compliance is a very costly part of their business. Given two competitors, one in compliance, the other not in compliance, it is quite likely a premium price will have to be paid by customers of the one in compliance. The economic factor alone is reason for some firms to attempt to get away from compliance. The end result of possible contamination is difficult to ascertain, that is cause and effect are difficult to link. Additionally, end results or damage to health or environment take a long time to accrue. This inexact situation is ripe for an overexposure in the news media. The fear and apprehension created by news media cause overreaction by elected officials in response to either hysteria or a misguided minority group. The public quickly forgets how instrumental some of the pesticides are in our cheap food and high standard of living.

FUTURE DIRECTION OF REGULATIONS AND ENFORCEMENT

Tougher regulation and compliance are a predictable result of the chain of events. Documentation of employee health and protection as well as for the application of a pesticide is quite likely. However, along with these regulations will also come answers to existing problems. These answers may change in time, but the change should be gradual enough to allow for adaptation. Therefore, the regulations will be tougher, but also more meaningful.

The scrutiny of compounds for non-persistence and safety will increase as new ways of determining pesticide function develop. Re-testing for pesticide labelling will be a standard procedure and documentation for product use is quite likely to be required. Because of the problem with empty pesticide containers, many products will be sold with neutralizing and testing kits included to assure and certify the container is empty. Standardization of containers for systems that meter pesticides to avoid having to mix large quantities is already in place. Deposits will also be required in the future to ensure that disposal is done by a defined group of dealers.

Future legislation hopefully will reduce and restructure the methodology for regulating pesticides. We should see a better identification of who to seek for help. A consolidation of efforts through a reorganization of the various compliance and enforcement agencies' responsibilities, making them less inclined to overlap will help. Despite EPA threats to override state power, we will probably see more guidance from EPA, but more enforcement through state agencies. Networking of regulations will provide more effective response to needs of both applicators and citizens.

ROLE OF RESEARCH CENTERS

Regulations will continue to change, but our systems must be able to capitalize on new technology and adapt to the changes. Thus, it is advisable to build modular systems for all aspects of pesticides. Pesticide storage structures should have integral parts that allow for replumbing to accommodate new systems. Any pesticide building should be planned for obsolescence, or at least a mindset to incorporate new innovations as they prove themselves safe and effective.

Likewise, pesticide management programs should have modular parts. A management program should be designed so as to be revitalized without completely starting over. Inventory of pesticide quantities should be the first defense in pesticide management. Those quantities determined to be surplus should be returned to the supplier if possible, and if not returnable should be made available to others within the organization to prevent duplicate purchases.

Personnel training must include education on emergency procedures, selection of personal protective equipment (PPE), standard protocol for pesticide application and hazard awareness training for the products they use. Records on applications of restricted compounds must be kept for three years and should include the following information: active ingredient; rate applied; date and quantity of application; and area identified.

Right-to-Know laws for both the employee and the community require having MSDS sheets on all products. These sheets may be required by your local fire department. They contain information that can prove useful in emergency conditions.

Calibrating of equipment is taken for granted but is an important part of proper pesticide use. Be sure you know the volume your sprayer puts out on a particular tractor in a particular gear. It may be necessary to modify equipment to manage smaller volumes that are common to research. Use smaller tanks on commercial units if needed, or possibly replace one tank with two or three to use rinsate for specific crops. Dedicating a particular sprayer for a specific crop often is an effective method of managing pesticide rinsate.

Research centers have a large hand in determining whether new pesticides are marketed. We should also have a role in demonstrating proper procedures for using them.

This has been an attempt to outline some history, problems and regulator situations in regard to pesticides. Changes are occurring regularly in this arena and you must continually try to stay current with new information or regulations as they come about. Branch stations have historically been a testing ground for experimental or new pesticides. We have an opportunity to identify potential hazards and to demonstrate.

Papers from the 1987 meeting Nashville, TN, February 2 and 3. This is not a complete list of papers presented; those for which summaries were prepared by the authors are published.

FIELD DAYS — PANEL DISCUSSION

Four branch station leaders were asked to summarize the experiences they have had with field days--the planning, execution and effectiveness. Following are reports from stations in four different states.

LOUISIANA

PECAN STATION FIELD DAY

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Background

The Louisiana State University Pecan Research-Extension Station was formally transferred to Louisiana in 1973. The station was begun under the USDA in 1930. Trees had been planted by 1932. The USDA decided by 1973 to close the station but the growers did not wish this to happen. Consequently, they made the necessary contacts with government officials which resulted in the station being transferred to LSU so that it could maintain support of the pecan industry. Louisiana ranks fourth or fifth out of 14 pecan producing states. There are approximately 40,000 acres of pecans in Louisiana with about 80% being natives. Average annual returns are reported to be 12 million dollars.

LSU began staffing of the station in 1974. There are two horticulturists, one entomologist, one plant pathologist, and three research associates. Under the LSU System, the station has been very effective in enlisting greater grower support. This is evidenced by the growing number of growers taking advantage of the leaf analysis program and the greatly increased attendance at field days since we began work in 1974.

As can be seen by the title, the station is supported by both the Louisiana Cooperative Extension Service and the Louisiana Agricultural Experiment Station. The three faculty members have a 25% appointment in the Cooperative Extension Service, the resident director 50%, and the secretary has a 33% appointment. One crew member receives 100% of his support from Extension. All others have 100% support from the Experiment Station. We have 12 full-time employees and one that is half-time. The Station has 99.9 acres with about 85 acres devoted to pecan tree research.

Discussion

Each year an annual field day is held as with other stations. However, our station is somewhat unique in that it is devoted to only one crop and supports homeowners as well as commercial growers. Occasionally, special sessions are held for homeowners in conjunction with the field day.

To determine expected attendance and to plan for the meal we request growers to RSVP on our pre-addressed post cards. Our recent attendance has been approximately 140. We work with growers from East Texas, Arkansas, and Mississippi as well as the entire state of Louisiana.

Early in the morning, coffee and cookies are usually served during registration and before the presentations begin. This provides an opportunity for discussion and a chance for growers to get questions answered before the meeting begins.

For both the commercial growers and the homeowners, slide presentations are given before touring the field or giving grafting demonstrations.

Speakers are invited for the program from the Cooperative Extension Service, and from the Horticulture, Plant Pathology, Ag Engineering, and Ag Economics Departments, or other areas of the university system as the need arises. We have also asked growers to share problems with the audience in the form of a panel presentation. Since the conference room can accommodate only 50 people, it is necessary to meet in the large equipment storage barn. For this portion of the program, we use rented folding chairs. Flat bed trailers, pickups, and autos are used for the tour itself. Seating is facilitated with benches and hay bales.

The following examples will give some idea as to what is seen on the field tour. During one stop, we demonstrated pruning of young trees. At another stop, a Big John tree transplanter was used for a demonstration of large pecan tree transplanting. (The costs for planting by this large size truck and spade can run between $75.00 to $150.00 per tree, depending on how far the tree is to be moved, distance from home base, and number of trees to be moved.) This transplant operation generated a great amount of interest. Twenty-five trees moved at the station in spring of 1986 have all survived. The largest was 10" in diameter and 30-35 feet tall. This tree was heavily pruned while the smaller ones were left unpruned. Variety, insect, and disease treatment plots are also observed and discussed. Nutrition, rootstock, and cover crop plots are also seen on the tour. On one occasion we made an off-station trip to visit a nearby grower cooperator to observe the results of aerial spray tests on pecans.

With tree crops, the field plots change less often than with row crops; however, we try to emphasize a different area each year. For example, we have a propagation area where seedling trees have been grafted. They were planted two years before grafting and have grown two years afterward. These are to be planted into an area this winter where trickle irrigation is being installed. This will be another new research block using five rootstocks with and without irrigation. Also, some older trees have been removed and new trees planted six years ago. These trees provide an opportunity for pruning and grafting demonstrations, insect and disease research, and of course new varieties for observation by the growers. Even so, when working with trees, it is a challenge to keep new information and new plots before the group each year, especially since pecans are our only crop.

We have installed cracking equipment, new pecan drying equipment, and for the past two seasons we've had an automatic weighing machine that reduced the sacking crew from about six to two.

We have a greenhouse with one bay for each of the three disciplines. This has been very useful for year-round research with containerized seedlings for fertility, insect, and disease studies. We have a large walk-in cold room where tree seedlings can be recycled through dormancy after 30 days of chilling. Seeds nuts are also stratified and bare-root trees are held there before planting.

In 1974, not many local growers were retailing, and those that were did not all have a cleaning operation to provide top quality. The Pecan Station led the way with cleaning, cracking, and now drying. Many local growers have joined in and followed our lead. We try to lead the industry in areas such as those just mentioned, but the area needing the biggest improvement is marketing. A marketing order was attempted by the pecan growers across the region, but was killed in committee by political pressure. Marketing is an area that we can do little about. Probably a computer assisted marketing operation established by the Cooperative Extension Service would aid both sellers and buyers. However, there may be some buyer opposition as they would prefer that growers not compare notes.

We emphasize production of a quality product, early harvest, and postharvest handling procedures such as rapid drying to prevent embryo rot, and early marketing with as much retailing as possible to obtain top prices. A large portion of most growers' sales goes to shelling plants and prices are quite uniform from buyer to buyer. Production costs run to 50 cents per pound; prices paid range from 30 cents to $1.20 per pound. Total national production, quality, and time of harvest determine price. The largest pecans demand the highest price, opening prices usually range from 65 cents to 85 cents per pound.

One of the other major factors causing poor quality pecans in Louisiana is the dry season in August and September. Probably no more than half a dozen growers are irrigating after the first two years. Following the drought problem would be low fertility and leaf destruction from insects and diseases. Our research has addressed all of these problems.

The biggest problem we have with our field day is raising money for the meal. Since we are a small station, we have fewer businesses and chemical firms to call upon, and a large percentage of our field day attendance comes from areas outside the Shreveport area, and therefore they do not trade with many firms in the local area. Our local bank has declined to support us this year since they indicate they too are suffering from the bad economy, and they are providing support for another research station.

On one occasion we charged a registration fee of $5.00, but we would rather not do this. Last year support came from a chemical company who passed out caps advertising their firm. Support is currently being sought for the 1987 field day scheduled for March 26, 1987.

Although not a field day as such, our annual pecan sales day generates just as much activity by all station employees. There is a large rush on opening day of sales which requires three cash registers going full speed from 8:00 until around 9:30 AM. After that time, one or two registers can handle the buyers with little waiting in line. On our best day we have sold 12,000 pounds in five and 10 pound mesh bags at an average price of $1.50

per pound. Harvesting and processing of these pecans is a major effort. We use both mechanical harvest and hand harvest. We may employ a maximum of 30 hand harvesters on a given day. The amount harvested would be approximately 3,000 pounds or 100 pounds per person for a seven hour day. Now that we are required to pay minimum wages, we are emphasizing mechanical harvest as much as possible. However, because of research plots and yield tests, hand harvest is frequently the best alternative in these areas. Also around ditches and other obstacles and for scrapping behind the machines, hand harvest is essential. Once harvested, the pecans must be dried and cleaned; but when machine harvested they must be cleaned, dried, and then recleaned to remove pops, other culls, and off-varieties.

We have forced-air dryers now in use. These dryers made all the difference in the last two wet falls by allowing us to hold our sale prior to Thanksgiving. We use a Dickey-John moisture meter to determine that pecan kernels are below six percent moisture to retard molding.

We try to sell only first class pecans at retail and sell the rest to the shelling plant where chipping can utilize the remainder. Shelling plant prices are from 2/3 to usually 1/3 of the retail price. Our different varieties sell from $1.35 per pound to $1.80 per pound. We try not to undersell our growers. There is a good demand for good quality pecans and repeat trade and lack of complaints substantiates this fact.

Thus far, there is no real resistance from local growers to the sale of station pecans, and although two have mentioned in passing that they might prefer that we did not have to sell at retail, they are both still strong supporters of the station. We may go to wholesale only sometime in the future, but we are not yet ready to make the change.

We also have two cracking machines that stay very busy. We charge around 20 cents per pound and by 9:30 or so the lines are usually filled for the rest of the day. We sell boxes for shipping that carry the Pecan Station name and the fact that the contents are a Louisiana grown product. Boxes are sold to the customers as we do not ship.

Normally, we do not request vendors to bring in their pecan equipment for field day demonstrations since this is done at the annual meeting of the Louisiana/Mississippi Pecan Growers. We do have the equipment demonstration at the station when the meeting comes to Shreveport about once every five or six years.

Only one family, our station foreman, lives on the station. This creates a situation that may provide more security than if no one lived here, but we have recently had two break-ins to our equipment storage barns and one to the residence itself. Therefore, stations with more housing may offer more security.

We are not holding the State Pecan Show during the field day. The pecan station originated the idea and effort to begin pecan shows in Louisiana. Currently, there are four regional shows where growers must enter their samples first. Winners of these shows then compete at our state show at the Station. Ribbons and plaques are awarded to growers with winning entries. Supporting funds have been provided by the Louisiana Pecan Growers Association and Louisiana Farm Bureau.

I appreciate the opportunity to bring this information to you concerning our station activities and invite all of you to visit us when you are in the area. We are located on Highway 1, six miles south of Shreveport.

FLORIDA

Gary W. Elmstrom, Assistant Center Director

Agricultural Research & Education Center
Leesburg, FL 32748

The AREC in Leesburg is unique to most other such units in Florida and perhaps in other states. The unit has statewide responsibility for research in cucurbits and grapes. It does not, therefore, have a specific local clientele. Research advisory committees are made up of people from thoughout the state. Cucurbits, including watermelon, cucumbers, squash, and cantaloupe, have a value exceeding $120 million a year in Florida. All are grown throughout the state. Grapes are a small, new commodity in the state but have a small, vocal, and influential following.

There are seven faculty located at Leesburg; 6.1 involved in research, 0.7 involved in extension, and 0.2 in administration. Statewide extension responsibility for grapes rests with the extension specialist located at Leesburg. Cucurbit extension responsibility is divided between faculty on the main campus in Gainesville and at the Gulf Coast Research and Education Center in Bradenton.

Four distinctly different field days are held at Leesburg. The Cucumber/Squash Variety Demonstration Day is held each year one evening sometime during the first week of May. Letters of invitation are mailed to seed company representatives, university personnel, and growers throughout the state. Notices are not sent to local newspapers but some agriculturally related publications in the state do print announcements. Attendance averages about 100 and is pretty evenly divided among the 3 groups. Plant breeders from throughout the U.S. attend regularly. Plots are labeled and participants proceed on their own, spending as much time as desired, evaluating and comparing varieties. A catered dinner is provided free to participants. The $300 to $500 cost is underwritten by five or six seed companies.

A Watermelon Field Day is held in the afternoon during the first week of June in alternate years. This is advertised extensively in local and state publications and by mailings to previous attendees. Attendance ranges from 100 to 300. A very small percentage are actual watermelon growers as they are busy with their crop at this time. A majority of attendees are local citizens. A formal program of about 2 hours in length is followed by a guided tour of research plots. Cold drinks are provided free by a local fertilizer company.

A Bunch Grape Field Day is held every year early in July. Advertising is quite extensive throughout the state in publications and by letters to

former participants. Attendance ranges from 200 to 500 people. The majority are either small growers, having a few vines to a few acres, or persons interested in getting into the business. A guided field tour in the morning is followed by a Dutch-treat luncheon and formal program at the local community building. This has been popular because of the afternoon heat and rain common in Florida during July.

A Muscadine Grape Field Day is held on a morning in August. The format for this is similar to that used for the Watermelon Field Day. Attendance is usually about 300 and is made up of small growers and interested local citizens. This is also advertised quite extensively using the media and mailing lists.

TENNESSEE

Richard Mattas, Assistant Superintendent

University of Missouri Southwest Center
RR 3, Mt. Vernon, MO 65712

The 900-acre University of Missouri Southwest Center is located in Lawrence county half way between Springfield and Joplin and represents 22 counties and 27 different soil types.

We are one of six off-campus centers for College of Agriculture programs with primary emphasis on forages.

Research projects are carried out at the Center by the College of Agriculture departments of: 1) Agronomy 2) Ag Engineering 3) Animal Science 4) Dairy Science 5) Entomology 6) Horticulture and 7) School of Forestry.

A Field Day for some 2200-2500 FFA students from 55 area high schools is routinely held on the Thursday in September prior to our annual field day on Friday.

Our annual field day is held in conjunction with our local electric coop's annual meeting. Field Day is scheduled from 8:00 am - 1:00 pm and the coop's annual meeting commences at 1:00 pm. For the past 2 years, a minimum tillage demonstration has also been conducted during the field day. In addition, approximately 60 commercial, government, and university exhibitors display each year. Attendance at field day has been between 2000 and 2500 with an additional 1000 registering at the electric coop's meeting.

These two events compliment each other very well. The coop rents and erects a large tent the day prior to field day. In case of rain, the tent offers an excellent place for program speakers to make presentations. Both organizations reap the benefit of increased attendance.

A field day sequence of events or a field day check list begins with:

1. Critique Field Day with Staff, Advisory Committee, and Public. This is a continuous process with comments noted, reviewed, and implemented when possible.

2. Dean's Committee Sets Field Day Dates. This committee consists of the dean and all station superintendents. When the dates are set, a billfold size card listing all the field day dates is sent to all extension and research centers in the state.

3. Center's Field Day Committee Appointed. This committee is chaired by the superintendent and consists of area extension directors, area information specialist, ag editors, ag alumni, advisory board representative, and College of Agriculture department representatives.

4. Send Program Survey To Area Extension Offices and Advisory Committee Members. This survey lists 10-12 potential stops per tour and is rated for desirability of stops. The 4 or 5 most desirable stops are implemented for each type tour and each stop is 15 minutes, including travel time.

5. Meet With Field Day Committee and Plan Program. A typical program includes 7 to 9 regular tours which have 4 or 5 stops each and 8 to 10 special tours with only 1 topic each and no time limit.

6. Plan Publicity With Agricultural Editor, Area Extension Information Specialist, Media Representatives, and Agricultural Stabilization and Conservation Service (ASCS). The agricultural editor takes pictures and sends field day releases to all area newspapers. The Area Extension Information Specialist is responsible for all radio and television advertising, as well as hosting news persons during the field day. The media representatives cover radio, TV, magazine, and newspaper advertising. The ASCS offices mail their newsletter on flyers to 40,000 area farmers. These flyers are also sent to area extension offices and displayed in area businesses.

7. Invitations to Speakers, Tour Coordinators, Tour Guides, Exhibitors, Elected Officials and Others. Other station superintendents and extension personnel are asked to be tour coordinators. Tour guides are comprised of representatives from the Soil Conservation Service, Mid-America Dairymen, Inc., and the Lawrence County Cattlemen's Association. Exhibitor letters are sent in July asking for items for the courtesy bags and notifying them of the conditions of exhibiting. All elected officials, including the Governor, US Senators and Congressmen, State Director of Agriculture, and SW Missouri legislators are sent personal invitations.

8. Plan Research Progress Report and Local Newspaper Supplement. A Research in Progress Report is coordinated by a University Agronomy representative, when finances permit. A newspaper supplement is organized and published by the local newspaper.

9. Send Speakers and Tour Guide Confirmation Letters. Confirmation letters listing date, name of stop, times, etc. are sent to all speakers and guides. Speakers are responsible for their own presentation materials, assistants, and lodging arrangements.

10. Prepare speakers' packet. These packets are handed out at a briefing and contain a description of the tour, location of their stop, name of coordinator, and a meal ticket and menu. The menu is completed by the speaker and the meals are delivered to the tour coordinators to be given to the speakers during a break in their schedule.

11. Contract for Meals, Buses, and Wagons. Meals are served by a local extension group for community involvement reasons. Privately-owned school buses and farmer-owned tractors and wagons are contracted to move field day visitors.

12. Check PA and Radio System. A professional electronic repairman is hired to check and repair all public address systems and 2-way radio systems.

13. Set PA Systems and Support Material. The day prior to field day benches, identification and stop number signs are set. The morning of field day chairs, water, cups, and chart stands are set at all stops.

14. Solicit Volunteer Help for Registration, Parking, and Courtesy Bags. The Mt. Vernon Chamber of Commerce registers the visitors and hands out field day courtesy bags. Parking is handled by employees of the Sheriff's office, the city, and the Missouri Rehabilitation Center. Approximately 1,500 courtesy bags are prepared by the local FFA students.

15. Assign Duties to Station Workers. A time-schedule chart listing each employee's name, duties, and responsibilities is posted prior to field day to avoid confusion.

16. Conduct Briefing. A briefing for all field day participants is held one-half hour before the first tour commences. Introductions, instructions, and questions are the topics of discussion and "keeping on schedule" is stressed.

17. Conduct Field Day. Hope for a nice day and be prepared for rain. In addition, be prepared for a few last minute cancellations, or additions.

18. Send "Thank-U-Grams" to Speakers, Tour Coordinators and Guides, Commercial Exhibitors, Advertisers, and Volunteers. "Thank-You-Grams" are sent to help maintain good public relations and as a courtesy to keep participants informed of attendance.

19. Back to Square 1. After this sequence, you are ready to begin organizing for next year' field day.

In summary, a successful field day depends on advanced preparation, publicity, timing, community involvement, and good public relations. The importance of good public relations cannot be over emphasized if yearly community involvement is to be maintained.

GEORGIA

James W. Dobson, Superintendent

Georgia Mountain Branch Station
Blairsville, GA 30512

The successes of field days at the Georgia Mountain Branch Experiment Station are attributed to joint efforts of research, extension, and other agricultural oriented people. Average attendances range from approximately 200 to near 500 people depending on the scope of the particular field day. We consider these attendances acceptable for a small station.

Research project leaders involving horticulture, agronomy, animal science, plant pathology, and entomology are from the main experiment stations at Athens, Experiment, and Tifton. We are fortunate to have two extension specialists headquartered at the Mountain Station to conduct practical research demonstrations in horticulture and animal science. There are presently twenty-five project leaders utilizing the facilities at the Mountain Station.

The following steps are used in the planning and execution of field days at the Mountain Station.

Assessment of Need

Inputs are solicited from research and extension project leaders, county agents, farmers, different agricultural agencies, and the agri-business community. Decisions on whether to have a field day are based on consumer enthusiasm for a subject or subjects, if the Station has sufficient experiments and/or demonstrations to supply good information and if we have something new or different from the last field day to show. Following the inputs of the aforementioned groups, the ultimate decision on whether to hold a field day is made by the superintendent.

Scope of Field Days

We must determine whether a commodity oriented (specific) or a general field day will best fulfill the needs of our clientele at a particular time. Our basic field days are commodity or specific subject matter ones. We normally have two or more specific type field days annually, and these may be all tour or program-tour combination. The program-tour combination is preferred because it gives us the opportunity to provide more information. General field days are held every two or three years depending on interest, new projects, changes in agriculture, etc. For our general field days, we invite a well known person to speak sometime during the day's proceedings.

Date/Time

We attempt to select the appropriate time of the year to show what we wish to present. For example, early to mid-August is the ideal time for

focusing on apple research. The specific date selected is determined by what is best for the intended audience. It is easier to arrange a date for selected speakers and research leaders than it is to attract a 200 plus audience. The day of the week can also be important. Sunday afternoon tours have been highly successful because it is sometimes difficult to get producers out of the fields on a week day. The time of day is important. Most of our field days are morning-afternoon combinations and travel time for the expected audience must be carefully considered when setting beginning and ending hours.

Publicity

Early publicity is important for success. We attempt to get field days scheduled on master calendars, especially the one published by the Georgia Cooperative Extension Service. Then as the field day approaches, personal contact is made with county agents, FFA teachers, other agricultural agencies, producers, community leaders, and the agri-business community. These contacts are followed up by articles in the local newspapers, spot announcements on radio stations, and county agent newsletters. One of our most effective means of announcing field days is in the Georgia Department of Agriculture "Farmers and Consumers Report." Word of mouth has also been an effective means of crowd draw.

Determine Needs

Speakers and project leaders are selected and notified well in advance of the field day. Research and demonstration plots are manicured and properly labeled. Labeling is done by the project leader or Mountain Station as previously agreed. Also, attention is given to having Station grounds and buildings in good condition. Equipment such as P.A., projectors, and screen are available for speakers.

Sponsored meals by the agri-business community are desirable, but because of continually increases in food costs, these are not always possible. As an alternative we have on occasion made arrangements for a local organization to serve lunches at a reasonable price. At other times, we advise the audience of available restaurants in the area. Also well in advance of the field day, information on lodging is made available to extension and other groups.

Because of our terrain and multiple locations we must rely on buses for transportation. Our local school Superintendent and Board of Education are most cooperative in providing school buses for tours.

We invite local organizations to complement our staff in carrying out the activities of field day. As examples, the local garden club helps with registration and serving the meals, the Jaycees supply bus drivers, and the Kiwanis Club helps welcome the guests.

Speakers, Presiders, Tour Guides

We attempt to procure speakers who are known, knowledgeable, respected, effective communicators, stay on time, and adhere to subjects assigned. The presiders and tour guides are requested to keep the speakers on time and keep the events flowing smoothly.

Information

Speakers and project leaders are encouraged to have handouts available, and during the day we try to allow time for the audience to interact with participating scientists.

Follow-up

We follow up our field days with thank you letters to all participants and request their inputs and criticism which may be used to improve future field days and possibly change the format. Articles about field day information are submitted to local newspapers either by the Station or the College of Agriculture Communications Department. The Communications Department will on occasion do interviews for statewide radio and television programs.

Goal for Future

Our goal for subsequent field days is to improve on our reputation for well organized, well managed, and informative field days with the ultimate result of better serving our clientele.

DON'T RUN SCARED ON PERSONNEL PROBLEMS — BE INFORMED

James D. Netherton, Assistant to the Dean for
Personnel and Affirmative Action

Oklahoma State University
Stillwater, OK 74078

I certainly do not mean to appear to be flippant with regard to the topic on personnel problems. Personnel problems to me are very serious business but I do want to make the point that you as administrators, supervisors and directors do have some rights when it comes to managing personnel problems. I'm afraid at times it appears that only the employees have the rights and we have the responsibilities and liability.

You can do most anything that you need to do and is appropriate to do if you are informed about the employees rights and about your rights as the employer.

Personnel problems as you know can be very frustrating and time consuming. We can't eliminate all your personnel problems. We can't eliminate the frustration and the time that is required to deal with them and neither can we give you a recipe on how to keep from getting challenged in case you do make a personnel decision that is questionable or controversial. We would like for you to remember though, as we go through this and discuss these issues that to be accused does not mean that you are guilty.

I would like to share with you some concerns, some preventative measures for avoiding problems and also some experiences that I have had in this area.

I would also like to mention that the comments made will be directed primarily to non-tenure faculty and staff. Faculty tenure an tenure track personnel related problems must consider home institution policies and guidelines.

There are three employment concern categories that we become involved with in our personnel management activities. The first one could be identified as pre-employment; the second could be identified as during employment and the third one would be post-employment activities. All of these categories are very important and are of concern to people who supervise others but in the essence of time I would like to focus on just the during-employment category. This category includes items as; performance appraisals, promotions, demotions, employee discipline and discharge. This seems to be where most of the problems are occurring that we deal with on a day to day basis.

Also, I would like to cover some of the more common problems we have with personnel at this time. The first one that I'd like to mention would be a Violations of an Employees Constitutional or Civil Rights. At one time government supervisors and agencies were immune from being sued by an employee because of infringement on either their constitutional rights or Civil Rights. A government supervisor or administrator can now be sued if

they act in "bad faith" or "knowingly break the law". Government supervisors are no longer immune from a suit brought by an employee. Within the framework of the employees rights there is a concept called "due process". Employees are guaranteed "due process" to their problems and employment rights through the constitution. We will explain more what we mean by "due process" later. If an employees' constitutional rights or civil rights are violated, an individual supervisor could be subject to personal liability suit which would include back pay, court costs, attorney fees and other expenses or they could be subject to paying punitive damages which is basically a warning to other people that you do not violate my privileges or others privileges again. It isn't anything unusual for personal liability suits or punitive damages suits to be in the neighborhood of $500,000, $1,000,000, $1,500,000 or sometimes even more.

The second concept that I'd like to mention that is of concern here is the area called Constructive Discharge. Basically, a constructive discharge is a resignation that is actually an involuntary termination. How many times have you heard people say to an employee that they want to be rid of "If you don't resign, I'm going to fire you". Actually, a constructive discharge is nothing more than a demotion or a transfer to a less desirable position with the employers or supervisors intent to force the employee to quit. If a constructive discharge has actually happened and the case is taken to court and the court rules in favor of the plaintiff, the agency and supervisor will likely be required to reinstate the employee, pay back-pay, attorneys fees or any other cost involved in the transgression. If you do in fact have a problem employee don't use what is called constructive discharge to force them out of the organization.

Another area of concern is Age Discrimination. Age discrimination is one of the fastest growing areas of EEOC concerns. As you know there are now no age requirements for retirement. People are no longer required to retire at 65 or 70. It is the employees option to work as long as they are productive. This idea becomes especially important when you do performance appraisals. Any kind of employment decision regarding an older worker must be based strictly on performance. A word of caution I would make is if you are considering a reduction in force because of certain budget restraints or layoffs a performance appraisal that is accurate and factual can be of real importance and help in reducing staff.

Another very important concern we have in employment matters has to do with Sexual Harassment. The EEOC definition of sexual harassment, includes unwelcome sexual advances, request for sexual favors or other verbal or physical conduct. An important point to make here is that these violations are basically as perceived by the employee. If the employee views something as sexual harassment then that is generally the way it is interpreted and the problem is considered. At the same time, we must be aware that an unwarranted or frivilous charge of sexual harassment has the potential for being professionally devastating to an individual's career. Therefore, all charges of sexual harassment should be investigated and handled as quickly, thoroughly and as discreetly as possible and settled in such a way that the person making the accusation is satisfied as well as protecting the professional rights of the accused. The other dimension of sexual harassment is that the employer and not just the supervisor or the person accused of sexual harassment, is liable for allowing conduct such as this to

either occur or continue. All supervisors should inform their staff of what constitutes sexual harassment and the penalties expected for this kind of conduct and behavior.

Another area of concern that most of you are familiar with would be what we refer to as Wrongful Termination. A wrongful termination is any termination or discharge that has been made arbitrarily and capriciously. Another approach to wrongful termination would be described as separation or discharge that was not for "just or proper cause". We generally think of something arbitrary as being done on the spur of the moment or in a fit of anger. A capricious action could be described as a reason other than a work related reason, such as a personal dislike. Any termination or discharge should be made for just or proper cause and done in such a way that it will stand the test if challenged.

The problems we have just discussed seem to be the most common concerns that we are currently having in the area of "during employment". I would now like to share with you what we consider to be some Preventative Measures to having personnel actions backfire. The first one that we mentioned is to know, understand and Practice "Due Process" in all personnel actions. "Due Process" is the right that is guaranteed by the constitution to all employees regarding their employment. If a problem occurs, the supervisor should confront the employee as soon as possible, and identify the problem or the conduct of the employee that is in question. The supervisor is then required to solicit some kind of response or explanation from the employee as to why the incident occurred. Next the supervisor should respond with a course of preferred conduct, or performance if necessary, and tell the employee what is wrong with his or her performance or conduct and what he expects in the way of correcting the improper conduct or performance. The supervisor also has a responsibility to set a time for a review of the employee's performance or conduct. The situation will be reviewed and a decision will be made at that time regarding the employee's future with the agency or organization.

The second preventative measure is to have Current and Accurate Job Descriptions. A current and accurate job description describes what the employee's responsibilities are, who he or she is accountable to and lists the general qualifications for the job. It also provides an opportunity for the supervisor and the employee to discuss what is expected in the work relationship. Job descriptions should be updated annually because with time job tasks and responsibilities change, employees' qualifications change and should therefore be considered and updated on a periodic basis. The third preventative measure is to Do Periodic Performance Appraisals. Performance appraisals can be done even more often if necessary. The supervisor has a responsibility to be as frank and honest as possible regarding the employees work performance. Also, during the performance appraisal all areas relating to the employees' work whether covered in the performance appraisal form or not should be discussed and comments made on the appraisal form. Remember, the only thing worse than a bad appraisal system is no appraisal at all.

The fourth preventative measure is Written Documentation of problems and actions. The supervisor has the responsibility to investigate all situations thoroughly, document only the facts and try to avoid opinions and hearsay. It is advisable to have both the employee and the supervisor sign

certain documents that describe certain actions and counseling. Both the supervisor and the employee should sign all performance appraisals or any other disciplinary actions or warnings that are appropriate.

The fifth preventative measure is to Practice Progressive Discipline. The concept of progressive discipline, is that the supervisor should apply no more discipline than is necessary to help an employee correct a performance or behavior related problem. An example of this would be, a supervisor would give an oral reprimand to an employee for some work related problem. The second step, if not corrected with an oral warning would be give a written warning to the employee. A written warning should be dated, signed and describe the infraction or the problem relating to the situation. The third step in progressive discipline, if necessary, would be to consider a suspension with pay or without pay. The fourth step, if the others have not corrected the problem at this time would be to consider a demotion or a transfer. The fifth step, could be a termination or dismissal and would be used only in the event that all of the other steps have failed to correct the problem.

Our objective should always be to help the employee to become useful and productive and if punishment or discipline is necessary then we want to make sure that the punishment fits the crime.

The sixth preventative measure is to Provide Supervisory Training to all staff who have responsibility for supervising other employees. Supervisory training should be provided for everyone in terms of the preventative measures we are currently discussing.

The seventh step in preventative measures is to Consult With Others. Consulting with others could be with Directors of Experiment Stations, Deans of the Divisions or Colleges, Departments Heads, Personnel Officers within the university or college system and Legal Counsel. Many Chief Executive Officers such as Deans require a full review of the facts before any discharge of an employee is made. It is not unusual for Deans and Department Heads to be named in lawsuits that challenge the discharge of an employee.

Preventative measure number eight is to Seek Legal Advice prior to taking a personnel action that has the potential for being challenged or on any situation where harsh punishment or discharge is being considered. Most colleges and universities have legal staff who are available to review a personnel situation and give you the benefit of their opinion from a legal standpoint. It is always good to review any questionable personnel decision for the legal implications that it may have.

I cannot guarantee that if you follow the seven steps that you can avoid a challenge or lawsuit but your chances of surviving the test will be greatly improved if you do. Therefore, we would recommend that you always be fair in any kind of decision or recommendation made regarding employees. Be consistent, don't treat one employee different from another. Be accurate in your assessment of the facts and the situation being considered. Above all be objective in your review of the situation and your handling of the employee and last, if possible, be right. Again, if you follow these suggestions your chances of making a personnel decision stand will be greatly improved.

RESEARCH MANAGEMENT AT CENTERS — PANEL DISCUSSION

Selected branch station leaders were asked to provide an overview of methods used in their states and location to organize, manage and evaluate research programs. Following are summaries from several locations.

MISSISSIPPI

Hiram D. Palmertree, Superintendent

Northeast Mississippi Branch Experiment Station
Verona, MS 38879

and

Pontotoc Ridge--Flatwood Station
Pontotoc, MS 38863

Your Chairman asked that in developing this paper, we consider the following four questions: 1) How do we establish the mechanism for research management? 2) How do we and the scientists agree on short and long-term goals? 3) How do we monitor progress? 4) How do we evaluate accomplishments?

To understand fully the research management at our Branch Stations, we need to review some factors relating to organization and management of our system. First, our Branch Experiment Stations in Mississippi are considered Departments or Units. This means that we get our funding directly from the Director's office, not through a traditional department. Most Branches also have a small professional staff, and we rely heavily on and work closely with the scientists at the main campus who are located only 60 miles south of the two Branches where I work. In our organization the Superintendent has broad latitude in developing priorities. This allows more flexibility and the opportunity to respond quickly to relevant needs. We are also interdisciplinary research oriented. Therefore, we are highly structured. We work on objectives under an umbrella project with annual work plans being submitted by each contributor to the project. Our present employees have accepted this system, and the new employees expect a highly structured system. This research management structure, which is a committee, is called a Problem Identification and Program Development Committee (PIPD).

The Mississippi Agricultural and Forestry Experiment Station system has 17 PIPD Committees that are organized either along commodity lines or discipline lines. Each major crop and each major enterprise has a structured PIPD Committee to manage research in that area. Each PIPD Committee is managed by a Steering Committee. This Steering Committee is usually three or four members made up of Department Heads and Superintendents. The Chairmanship of the Steering Committee is rotated annually among the members. Subcommittees are a key component to the PIPD Committee. All scientists who are involved in the commodity or discipline are members of the PIPD Committee and are assigned to one or more subcommittees. These subcommittees are developed along specific crop lines or subject matter lines. These subcommittees will be discussed later in the

paper. The PIPD Committee is also composed of Extension Specialists who are asked to present their views of research needs and to try to predict future trends. Another key component to the PIPD Committee is producer involvement. Usually, one or two innovative producers who are involved in commodity organizations and have shown interest in our research, are invited to represent their groups in presenting research needs.

The functions of the subcommittees include meeting one or more times per year. At the subcommittee meetings, ideas are presented by scientists on which they would like to develop research plans. The details of the research are discussed at this time. It is at the subcommittee meetings that various contributing units agree on research that fits a particular objective in the umbrella project. This is also the level at which components of umbrella projects are usually initiated and submitted.

The PIPD Committee Meetings have broader functions than the subcommittee meetings. The PIPD Committee usually meet annually and include the subcommittee reports. As discussed earlier, Extension and producer input is also received at this time. The PIPD Committee meetings also allow progress reports or result summaries to be submitted to the entire group. This encourages all scientists in the discipline to help monitor the progress of each individual contributor. Each unit is also required to submit annual work plans for the following year. The PIPD Steering Committee also publishes the annual reports of the present year's work and those work plans for the coming year. These reports are usually available within four to six weeks following the PIPD Committee Meetings.

A brief overview of the committee structure has been discussed. There are several strengths to the structure that we call the PIPD Committee. One of the major strengths is that it is a highly organized system. This demands cooperative efforts from all individuals working in that commodity area, thus reducing fragmented research. It allows better utilization of resources, both fiscal and human. It requires better planning by scientists, as input is received at the subcommittee level from all individuals involved in related research. This organization also encourages reporting and accountability which are extremely important to the progress of research.

There are also some weaknesses to the structured system that we have, as I see it. We may have too many committees, and some of the PIPD Committees might have too many members. This is particularly true in commodity areas representing the major crops. Another weakness is the evaluation of results is strictly judgmental. All scientists share in the evaluation of results, but no quantitative mechanism of evaluation of results is in place. Another weakness is the limit to prioritizing resources between or among commodities. The PIPD Committee structure allows good comparison within a commodity, but is extremely weak in comparing among commodities or among PIPD Committees. Also, we do not have a built in stop-mechanism in the structure. With reduced funding, it is extremely important that, each year, we reduce a certain amount of our research by reprioritizing and reallocating resources. This requires a research management system that has the ability to stop doing some research each year. As you would expect, not all committees are as functional as they should be. For various reasons, some areas of research are more successful

than others. It also requires extremely good coordination from the Director's office. The current Steering Committees of the PIPD Committees and the committee structure has to be coordinated extremely closely. If not, the committees are not as functional as they should be.

This system of research management by the Mississippi Agricultural and Forestry Experiment Station seems complicated at first, but it has worked well for us. In the future, we will probably have a revised system. In fact, a member of this group here today, Dr. C. G. Shepherd, has served as Chairman of a study committee to revise the present system. His report has been submitted for approval by the Administration. A few of the revisions include spending more time on the PD part of the committee and less time on the PI part of the committee. It may also help tie performance evaluation to work plans and reporting. This would help increase the accountability of our personnel. We may also reduce the number of PIPD Committees that we have.

It has been a pleasure for me to present an overview of the structured portion of our research management at the Branch Stations on which I work. As with other systems, we also have additional mechanisms for research management. We have the flexibility to respond quickly to urgent demands through local needs projects. The management of the short-term projects is different from the more structured arrangement that has been discussed. However, time did not allow a discussion of our entire management system.

TEXAS

Charles R. Long, Resident Director

Texas A&M University Agricultural
Research and Extension Center
Overton, TX 75684

Research functions of the Texas A&M University Agricultural Research and Extension Center at Overton, Texas are managed according to guidelines and procedures established for all research units of the Texas Agricultural Experiment Station (TAES). These procedures constitute a modified management by objective approach and involve several related documents and associated procedures.

Research Planning. The TAES Strategic Research Plan has a five year time frame and is revised biennially. The revision process involves TAES researchers in all units and assimilates input from Extension personnel, producer groups and others to identify and prioritize research needs for all commodities of interest in Texas. In addition to the commodity dimension, the Plan considers research activities categorized according to area of science; also, research issues which span commodities, science areas and/or units are considered in a third dimension to facilitate planning and implementation of multidisciplinary, multi-commodity, multi-unit research activities. It is intended that research which is best planned and conducted within commodity and discipline be handled so and research activities most effectively accomplished in a multidisciplinary environment be accommodated as well.

Each research unit of TAES prepares a Unit Plan in concert with the overall planning format to address the research needs identified in a commodity context using appropriate areas of science. The aggregation of these Unit Plans forms the TAES Strategic Plan. The planning activity considers current and expanded levels of research support and uses scientist years as a planning quantity.

Research projects are the primary basis for research implementation and funding in TAES. Project proposals are submitted, reviewed, revised and approved on a periodic basis, usually 5 years. All funding, budgets and actual expenditures are handled through approved projects.

The TAES Strategic Plan serves as a basis for advocating programs to the Texas Legislature and others and for allocating research funds to expanded activities as well as redirecting research programs and unit funds. Internal communication fostered by the revision process is of tremendous value to administrators and researchers and is thought to enhance efficiency and effectiveness in accomplishing the TAES mission. Annual unit budgets are prepared and a program guidance conference of the unit head with the Director is held annually to discuss unit programs, objectives, budgets and other matters.

Annual Management Activities. Regarding research unit activities and factoring annual activities of individual scientists into the total TAES program, several documents and associated activities are employed. Much of the information presented here was taken from TAES Handbook Item 136B. These procedures are utilized annually to plan and direct research activities and to evaluate performance of individual scientists and are summarized in Table 1.

A position description is developed by the unit head to establish a new position or to request to fill a vacant position. It describes the duties and responsibilities of the position and is submitted to the Director for approval. The position description is reviewed annually by the unit head and the scientist to ensure that it reflects the current requirements for the position.

The annual plan of work is intended to reflect in detail the objectives and tasks which are to be accomplished during the coming fiscal year (September 1-August 31). This document is prepared by the scientist for consultation with the unit head, is reviewed, revised, approved by the unit head and finally submitted from the unit to the Director for his review. The previous year plan of work is utilized by the unit head in the evaluation process.

To facilitate annual performance evaluation, the scientist prepares an achievement report which documents performance during the past fiscal year. This document includes the customary information regarding research activities, accomplishments, publications, etc. plus a summary of achievement of objectives from the previous year's plan of work. A cumulative achievement report which is the aggregate of all annual achievement reports (career accomplishments of scientist) is maintained for use at time of review for promotion.

The unit head prepares a written documentation of evaluation of annual performance for each scientist in the unit and holds an individual conference to discuss the evaluation. This conference provides a time to discuss strengths and weaknesses of the scientist's performance, approaches for improvement, promotion potential and related considerations. The written documentation is maintained as a permanent confidential record to be used for future evaluation, promotion consideration, etc. Also, the scientist is provided the opportunity to respond in a separate report in cases of significant disagreement about performance.

Upon completion of all performance evaluations at a unit, the unit head reports to the Director the names of those persons evaluated as well as any not evaluated and the reasons. The annual program guidance conference, held in summer or fall, provides a time for discussion of personnel and other program-related matters by the unit head with the Director.

Career Evaluations. Recently established procedures for career performance evaluation of off-campus faculty of TAES involve a committee of peer scientists, the appropriate subject matter department head and the scientist's resident director. New assistant professors are evaluated at two years to provide early feedback and to ensure that young scientists are developing appropriate research programs. Evaluation of assistant professors for promotion occurs first after four years in grade but before the fifth year; this evaluation involves independent evaluations by the three entities above with possible outcome recommendations to a) promote, b) evaluate the following year or c) non-reappoint with adequate time to relocate. The five year evaluation is conducted following outcome b) and has possible outcomes a) and c). Associate professors are evaluated after five years in grade and either promoted or evaluated two years later. Outcomes of the seven year evaluation include a) promote to professor, b) remain at associate professor or c) non-reappoint with adequate time to relocate. In addition to annual performance evaluations, a resident director may require a comprehensive evaluation of a full professor at any time performance is viewed as less than satisfactory.

Research Implementation, Expectations and Performance. Several considerations are pertinent to staff interested in initiating and establishing a research program (and a career) in the Texas Agricultural Experiment Station. Targeted research is critical to accomplishing the TAES mission; however, opportunities for originality and individual initiative are abundant within the framework of a targeted program. Scientists are encouraged to understand total program and unit objectives as views by colleagues and the unit head in relation to the mission. Both long- and short-term goals and milestones of progress should be incorporated into research plans and research should be well-designed from a statistical standpoint. Good agricultural research programs contain elements of both applied and basic or fundamental research and written research plans and procedures enhance chances for successful completion. TAES researchers are strongly encouraged to link their annual activities to the unit plan and overall TAES Strategic Research Plan as discussed earlier.

Research support is obtained from various sources including legislative appropriations. Optimum use of grants is encouraged; that is, grants which support research in line with the overall plan and mission rather than those which tend to alter goals. Researchers are encouraged to learn the rules of doing business in TAES for enhanced operational efficiency and budget management; to manage support staff to accomplish goals; to balance long- and short-term research goals; to develop a clear view of their total programs and objectives; and to cooperate with other researchers when this approach is best suited to accomplishing research objectives.

A researcher in TAES may expect the unit head to 1) provide guidance in program orientation; 2) allocate an appropriate share of state funding to the researcher's program; 3) represent that program (with researcher input) as a part of unit programs; and 4) keep the researcher informed of all developments as appropriate to ensure that the researcher can do the best job possible. In turn, TAES administration expects of the researcher 1) competence in area of expertise; 2) cooperativeness with other TAES researchers; 3) responsibility in acceptance of assignments; 4) loyalty in the sense of working in the best interests of TAES and the people of Texas; 5) accountability for resources used; 6) communication, both positive and negative in an appropriate manner; 7) productivity, research which contributes to the TAES mission; and 8) pride and competitive spirit in terms of doing the best job possible.

At Overton, communication and cooperation are encouraged among researchers and with administration so that activities may be more effective in correcting problems and enhancing efficient operation. Diverse subject matter departments are represented in the research program; researchers are encouraged to interface with the appropriate campus departments as well as with researchers at other locations so that their role in the total TAES effort is clear to them and to others. These interactions are facilitated by the planning activities of TAES.

Table 1. Principal Elements of Annual Research Planning and Performance Evaluation in the Texas Agricultural Experiment Station.[a]

ACTIVITY	PREPARED BY	REVIEWED BY OR WITH	TIMING
POSITION DESCRIPTION	UNIT HEAD	SCIENTIST & UNIT HEAD	LATE SUMMER/ EARLY FALL
ANNUAL PLAN OF WORK	SCIENTIST	UNIT HEAD	MID SUMMER
ACHIEVEMENT REPORT	SCIENTIST	UNIT HEAD	EARLY SUMMER
DOCUMENTATION OF EVALUATION	UNIT HEAD	SCIENTIST	LATE SUMMER
EVALUATION CONFERENCE	CONDUCTED BY UNIT HEAD WITH SCIENTIST		LATE SUMMER

FORWARD PLAN OF WORK TO DIRECTOR	UNIT HEAD	DIRECTOR	30 DAYS AFTER PROGRAM GUIDANCE REVIEW
INFORM DIRECTOR WHEN EVALUATIONS ARE COMPLETED	UNIT HEAD	DIRECTOR	NOVEMBER 1

[a]TAES fiscal year is September 1 to August 31.

THE ADMINISTRATIVE SYSTEM, MANAGEMENT AND EVALUATION OF RESEARCH AT THE GULF COAST RESEARCH & EDUCATION CENTER, BRADENTON, FLORIDA

W. E. Waters, Center Director

Gulf Coast Research and Education Center
Bradenton, FL 34203

The Gulf Coast Research and Education Center is Bradenton, with an affiliated Agricultural Research and Education Center at Dover, Florida functions as a research and extension education unit of the University of Florida's Institute of Food and Agricultural Sciences.

The Center in Bradenton is composed of 16 research faculty positions (representing 9 disciplines, 3 state extension specialist positions, 45 career University support personnel, approximately 20 temporary personnel, 47 buildings including 10 laboratories, and 200 acres of land. The Center in Dover employs 3 faculty, 6 support and 2 temporary employees and has 8 buildings with 20 acres of land. Our research programs deal primarily with vegetable crops, ornamental crops and strawberries.

Each research scientist also holds an affiliate appointment with his/her subject matter department at the University of Florida in Gainesville. This interdisciplinary team approach, combining several research disciplines and a wide range of industry and faculty contacts, is more productive than could be accomplished with limited investments in independent programs.

The unit mission is to develop and disseminate new scientific knowledge on vegetable, ornamental and strawberry crops in Florida, so that agriculture remains efficient and economically competitive with other geographic areas of the U.S.A. and the world. Program areas of emphasis include: (1) genetics, breeding and variety development, (2) biological, chemical and mechanical pest management, including insects, diseases, nematodes and weeds, (3) production efficiency, culture, crop management and environmental stress, (4) water quality, quantity and utilization and environmental management, (5) food quality, safety, utilization and post-harvest physiology of horticultural crops, (6) mechanization, harvesting, handling and engineering techniques, (7) advancement of the basic knowledge in disciplines, (8) student advisement and teaching, and (9) support of cooperative extension and public service.

In general, the Bradenton Research Center Director, who reports directly to the Research Dean's office, has primary management responsibilities for faculty, local programming, personnel, business affairs and facilities. Faculty program direction and evaluation are coordinated with the individual commodity or discipline department chairman at the main campus in Gainesville.

Outlined below are some methods or techniques useful in direction and management of research programs:

1. Development of specific Center mission
2. Formal faculty position descriptions
3. Identification of commodities or program areas covered
4. Individual program priorities
5. Formal state and local project system
6. Formal program discussions with research leaders
7. Physical resource allocations
8. Personnel and budget allocations
9. Assistance with grant development
10. Use of advisory committees and upper administration inputs
11. Formal annual program plans by project/faculty
12. Formal annual faculty evaluations
13. Recognition of achievements

Evaluation of research accomplishments and significance is a difficult and arbitrary process at best. Outlined below are some methods and techniques found useful in this endeavor.

1. Industry acceptance and use of findings
2. Professional accomplishments and recognition of individual scientists
3. Discussion of progress with department heads, administrators and peers
4. External program support generated
5. Individual publications and project reviews
6. Formal annual evaluation process including achievement report
7. Other service to the unit or University

In summary, the Florida Research Center system utilizes local direction and program management accompanied with individual campus department coordination of program effort on a statewide basis.

ENHANCING COMMUNICATION, MOTIVATION, AND PRODUCTIVITY

W. Nelson Philpot, Resident Director

Hill Farm Research Station
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COMMUNICATION

It seems appropriate to review briefly some "facts of learning" and how information is communicated. For example, one fact of learning is: "What is hear, I forget; what I see, I remember; what I do, I understand." Another fact of learning is: "Of that which I know, 4% is a result of taste, touch, and smell experiences; 11% is a result of what I have heard; while 85% is a result of what I have seen."

Other research has shown that we communicate in three ways.

1. Nonverbal codes refer to all intentional and unintentional messages that are neither written nor spoken. These messages denote sincerity, attitude, and enthusiasm. Included are facial expressions, gestures, eye contact, appearance, clothing, posture, and distance or personal space between those involved. These nonverbal codes account for 55% of what we communicate.

2. Language codes refer to spoken or written words by which we communicate thoughts and feedings. You may be shocked to learn that language codes account for only 7% of what we communicate.

3. Paralanguage accompanies language and includes qualities of the voice such as tone, pitch, rate, volume, and emphasis. Paralanguage accounts for 38% of what we communicate.

Thus, nonverbal codes and paralanguage account for 93% of what is communicated to others. In view of the above facts, it is apparent that greater emphasis should be given to how we communicate. Words are of little value unless they are packaged and delivered in a matter that permits the audience to see and feel what is being communicated. Have you ever asked yourself why some speakers captivate you while others bore you to tears? The reasons are differences in the usage of nonverbal codes and paralanguage.

Keep in mind that face-to-face communication enables us to use nonverbal language, while written materials emphasize only language codes. All of us telegraph and receive nonverbal codes and paralanguage. We should be keenly aware that how we stand and the expression on our face indicate our degree of interest in what we are doing and our level of self esteem.

MOTIVATION

Motivation may be defined as a stimulus to action, but motivation is more than knowledge of a set of principles. It is a way of life--a philosophy in action--the implementation and pursuance of which should

culminate in high accomplishment and high self esteem on the part of our people.

The most important assets in our individual units are people. Therefore, we are people managers. My own attitude is that I do not do anything. We do, as a team, and every employee is a member of that team regardless of rank or duties. If we are to optimize productivity, we must work together as a team--the work of each person complimenting that of the others.

In the final analysis, the 40 employees at my Research Station do not work for me, the Vice Chancellor for Research, or the Chancellor. Rather, they work for themselves because they are the principal beneficiaries of their achievements through promotions, higher salaries, professional recognition, and higher self esteem. It is a mistake for any of us to feel we work for someone else because, in reality, we work for ourselves.

I learned a long time ago that an administrative position is one of trust and that it has no privileges, only responsibilities. Our positions are service positions to assist, motivate, and encourage our people to high accomplishment. We should receive our greatest satisfaction from seeing our people excel.

If those with whom we work are to achieve high accomplishment, they must feel they are important, and one of our jobs is to see to it that they feel good about themselves and good about what they are doing. This attitude of "feeling good" is contagious and must start at the top. That is, they must see in us an attitude of security, motivation, optimism, and accomplishment. We, as managers, are molding minds and attitudes just as surely as if we were classroom teachers. I might add that I subscribe to the biblical admonition that "as a man thinketh in his heart, so he is." If people feel good about themselves, it will be reflected in the quality and quantity of their work, which are important measures of productivity.

Please do not misinterpret what I am trying to say. People will make mistakes, and we must be ready to bring the ship to port, sometimes abruptly. But, when our people make mistakes we should make it clear that the object of our chastisement is their ACTIONS, not them as persons. We should also be conscious of the fact that we cannot strengthen the weak by weakening the strong, and that we cannot build confidence by taking away the initiative and independence of our employees.

Many years ago, I heard someone say that it is not the responsibility of a manager to compliment someone when that person does something good. Rather, it is his or her job to point out to the person where he or she is falling short of expectations. I do not subscribe to this notion. My experiences over the years have convinced me that a pat on the back from time to time often prevents the need for a swift kick to the seat of the pants. I have also learned that I can always say something nice about everyone. We need to remember "that there is bad in the best of us and good in the worst of us."

I try to approach my job as a manager, motivator, and molder with the attitude that unless my scientists are more productive than I was as a

scientist, then I have failed them, and they have failed me. Moreover, if those who ultimately become managers are not better at it than I am, then I have failed to set the right example and instill in them the right values and methods. You see, they will start from my shoulders just as I started from the shoulders of my predecessors.

To me, management is guiding and directing in an unobtrusive manner. I believe strongly in delegating. In fact, it is one of the most important things I do. My basic attitude toward management of people is to give them the latitude to think, evaluate, prioritize the options, implement, complete, analyze, publish, and benefit thereform. If my project leaders do not know better than I what their priorities should be, then I have a responsibility to either motivate them or replace them. I must prefer to motivate them. My goal is to have only people around me who are more capable than I am. My duty is to manage them and direct their talents in a way that permits us to optimize their productivity. We, as managers, should also be good listeners. Productivity is often diminished because managers are too busy or too self important to listen.

You and I do not need to know how to do everything in our organizations. Instead, we should surround ourselves with capable people who do know how to do all the various jobs at our locations. Our job is to think, lead, motivate, organize, expedite, and run interference so they can do their jobs more efficiently. To optimize productivity, it is important that our people not become dependent upon us, but rather, independent of us so they can actively pursue the goals WE have mutually agreed upon.

We should believe in taking care of the job and then letting the job take care of us, and we should want our associates to approach their jobs in the same way. One word that I thoroughly dislike is the word "average" because I do not choose to be average, and I do not want those who work for me to think they are average. I came across a poem recently that is entitled "It's All In The State of Mind" that seems to be appropriate here. Listen closely to the words of the poem.

If you think you are beaten, you are;
If you think you dare not, you don't;
If you think you'd like to win but you can't,
It's almost a "cinch" you won't;
If you think you'll lose, you've lost,
For out in the world you'll find
Success begins with a fellow's will --
It's all in the state of mind.

Full many a race is lost
Ere even a race is run,
And many a coward fails
Ere even his work's begun.
Think big, and your deeds will grow
Think small and you fall behind
Think that you can, and you will,
It's all in the state of mind.

If you think you are outclassed, you are;
You've got to think high to rise;
You've got to be sure of yourself before
You can ever win a prize.
Life's battle doesn't always go
To the stronger or faster man;
But sooner or later, the man who wins
Is the fellow who thinks he can.

How long has it been since you told someone who works for you that you are proud of his or her accomplishments? Have you taken the time lately to nominate someone for an outstanding award for which they might qualify? During the past 6 years, employees of the Hill Farm Research Station have received 22 signal awards. Frankly, I am amazed at how much these awards do for the moral of our people. A recognition for one of us is a recognition for the entire team.

Now, let's talk about goals. If we believe in anything, it should be said that we believe in setting and pursuing clearly defined goals that are consistent with our mission. If you and your people are not goal-setters, then I can assure you that you are falling short of what you are capable of becoming. Moreover, we, and our people, should strive constantly to be all we can be. In this regard, the words of Emerson seem appropriate, viz., "What lies behind you, and what lies before you, are tiny matters compared to what lies within you."

I do not strive for "yes" people around me who will help me reach my goals. Rather, I want people around me who will think for themselves and who will establish their own goals, consistent with the mission of our organization, because they will pursue their goals with greater fervor than they will pursue my goals. You see, they make me look better when they pursue THEIR goals than when they pursue MY goals.

PRODUCTIVITY

Productivity is defined as the ratio of valuable output to input, i.e., the efficiency and effectiveness with which resources--personnel, machines, facilities, capital, time--are utilized to produce a valuable output. An optimum level of productivity is reached when human skills and other resources are combined in the most complimentary in the language of the hearer. Each of us should use the simplest vocabulary when communicating with others but should use the most complicated vocabulary when communicating with ourselves. Effective communication and good interpersonnel relations account for 50% of our contribution to productivity.

Individual Productivity. The greatest expectation for each of us should be that our greatest accomplishment is still ahead of us. Each of us should strive daily to know ourselves and then grow in the direction of that which comes naturally. We cannot change ourselves unless we first know ourselves. In other words, we should see ourselves as we are and then make ourselves what we choose to be. We should not attempt to compete with others; rather, we should compete with ourselves and should strive constantly to transcend ourselves and become what we have always been (potentially).

Individual productivity does not correlate well with I.Q., the university attended, or whether or not the individual maintains a clean and orderly office. Persons with a 4.0 grade point are often not highly productive because they lack other basic skills, such as good interpersonal relations. What we do with our I.Q. is much more important than what our I.Q. is.

Other Factors Affecting Productivity. Managers should evaluate their personnel and other resources on a frequent basis to identify both strengths and weaknesses because fluctuations in productivity occur during a person's career. Frequent evaluation and feedback has a greater impact on productivity than annual evaluations and feedback. Negative feedback is often required, but a manager should never attack a person's ego.

As managers, we should be aware that we see things not as they are, but as we think they are. We should also recognize that the most important truths are simple. We and our people are often guilty of making them complex, which adversely affects productivity.

As a rule, managers should strive to staff at 90% of apparent needs. This applies a mild pressure, enriches others, and improves productivity. It is also important to have technology exchange between groups and to add new blood on a regular basis to prevent the group from going stale over time.

Productive people recognize opportunity when it is presented. It all boils down to the fact that we make our own luck. Winners know they will win and expect to be lucky. The winner mobilizes personal resources while the loser fragments them. We should encourage high expectancy for ourselves and our people. After all, success is a state of mind. We can alter the world we live in by changing our attitudes. Dr. Norman Borlaug, winner of the Nobel Prize for Peace, recently state that "the greatest pollutants in the world are the negativists and doomsayers." It behooves all of us to be positive and to have positive emotions.

Productive organizations are highly adaptable to change, effectively staffed, people oriented, have high standards, operate in a sound and competitive manner, have a creative and productive atmosphere, a can-do attitude, and a high esprit de corps. Managers lead the way. Organizations, as well as individuals, should always be in a growth environment and should be constantly setting goals and striving for them. It is important to emphasize, however, that the word "mission" is preferred to "goal" because a mission stretches farther than a goal. When goals are set, they should always be consistent with the mission of the organization. It is also important that the mission be well defined and understood by employees.

Each of us must be prepared to challenge the status quo if productivity is to increase. We must be ever looking to the future and must realize that the past is dead, the present is now, and the future is unborn. We should all constantly ask ourselves if we are playing our role in life to the fullest and are we striving with sufficient diligence and imagination to leave this world a little better than we found it. If so, then we as managers will have a positive impact on productivity and will meet our

obligation to those who work with us or depend upon us. To do less is to breach the faith that has been placed in each of us.

MOTIVATIONAL THOUGHTS

1. Our lives should be a gift to be enjoyed -- not a sentence to be served.

2. Success may not be so much doing what we want as it is doing what we cannot prevent from happening.

3. Some people look for an excuse to fail rather than a reason to succeed.

4. A positive, cooperative attitude is our single most powerful possession.

5. We are all born with the equal opportunity to become unequal. This is affected more by mental attitude than mental capacity.

6. Improving actions toward others improves attitudes toward ourselves.

7. To the question of your life, you are the only answer; to the problems of your life, you are the only solution.

8. Of all the people you will ever meet, you are the only one who will never leave.

9. Most people are really better and more capable than they think they are; we are limited only by our imagination.

10. There has never been another you; there is not now another you. You are unique.

11. Wake up each morning thinking of ways things can be done, rather than ways they they cannot be done.

12. Have the courage to look to your power rather than to your weakness.

13. You look good on the outside because you feel good on the inside.

14. Years wrinkle the skin, but to give up your beliefs wrinkles the soul.

15. You are as young as your faith, you are as old as your doubt; you are as young as your self confidence, you are as old as your fear; you are as young as your hope, and you are as old as your despair.

16. Permanent motivation starts with the desire to accept yourself as you are. Believe in yourself--it is the only self you are ever going to have.

CONFRONTING THE HAZARDOUS WASTE ISSUE

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The State of Florida is a peninsula that extends from the mainland USA into the Caribbean. In latitude the peninsula extends from the Temperate Zone into the Tropical Zone. The climate is variable during the winter months, significant freezes are abnormal for the southern half of the peninsula. Generally the climate is warm and humid and average rain fall exceeds 50 inches per year. By far the larger percent of agricultural soils are sands with significant amounts of organic soils in Central and South Florida. Thus most of the soils are low in essential plant nutrients and have very low water holding capacity. Some are well drained deep sands while others are shallow with high water tables and a hard pan or impervious layer within the top 3 feet.

Florida's climate and geographical location are conducive to damaging levels of pests that affect all domestic plants and animals. Major pests include most that affect other portions of the U.S. plus others common to the Caribbean and Latin American countries. Others such as the sting nematode are unique to Florida plus other limited locations. Thus, pest control or management is essential. During the past 40 years. at least until recently, the Florida agricultural industries and general citizens relied heavily upon pesticides for protection of all types of plants and animals. Homeowners have almost routinely used various pesticides in homes and associated plantings.

The plant and animal industries in Florida are complex. It is estimated that over 6,000 species of plants and animals are produced for sale or grown in the state. Thus the pest situation is highly complicated. It has been almost impossible to develop legal pest control measures for the tremendous numbers of species grown.

The Institute of Food and Agricultural Sciences (IFAS), University of Florida, devotes major resources to research on economic pests and is expected to provide recommendations for control or management of all pests. Some 16 departments located in Gainesville and 20 research and education centers use pesticides for routine pest control. Of these, 9 departments and 19 research and education centers conduct field and greenhouse research on pesticides. A very wide variety of pesticides are obtained and used on IFAS lands plus numerous tests are conducted in grower or even homeowner areas. Research applications also involve the use of experimental compounds whose chemical and physical characteristics are not always completely known. Through the years many different chemical pesticides have been brought on IFAS lands, stored. used and disposed of by various means. The development of laws and rules to regulate handling, storage, applications and use of pesticides have recently complicated matters for the IFAS facilities and administrators. To some extent the laws and rules are vague and difficult

to comply with, particularly by researchers. Technology has not kept pace with the laws and rules. For example, proper and legal disposal of surplus pesticides has proven difficult and there is today no fully acceptable method. The situation is further complicated for research organizations by the fact that many laboratory chemicals have been declared hazardous.

For perhaps too long, IFAS left the handling, storage, use and disposal of chemicals to the individual scientist or unit. Requirements were developed for some phases but generally IFAS employees were expected to comply with the laws by following the label. The Environmental Health and Safety unit on the University of Florida campus is understaffed and has not had the authority or capability to develop and enforce appropriate policies and procedures as they relate to pesticides.

Proper disposal of surplus pesticide solutions, rinsates, laboratory chemicals, etc. has been and remains a serious problem. Too often IFAS scientists disposed of surplus spray solutions and rinsates at rinse-wash sites. In other cases, the material was sprayed on non-experimental areas and not always on approved crops. In some cases surplus formulations were simply stored because the scientists had no other suitable means for disposal. Laboratory chemicals and sometimes pesticidal solutions have been flushed into plumbing facilities connected to city systems or septic tanks. Research was initiated by IFAS to evaluate the Iowa State type evaporation tank under Florida conditions. Two units were constructed and placed in use. Each functioned well, but then were declared illegal by the Florida Department of Environmental Regulation. The procedure appeared to be both economical and satisfactory for use by experiment stations and approval of a redesigned model is expected.

During the past few years officials of regulatory agencies have inspected some facilities and operations within IFAS. Most were initiated by phone calls from unidentified persons. To date, the regulatory agencies have found no serious violations for improper use of pesticides although three faculty members have received warning citations for questionable procedures. One case resulted in a rather thorough inspection of the Agricultural Research and Education Center at Jay by the Florida Department of Environmental Regulations (FDER). The FDER dug wells at the rinse-wash site used by this center. Analysis of soil samples revealed the presence of relatively high levels of toxaphene pesticide--no contaminants were found in well water. Since toxaphene is a hazardous chemical the contaminated soil was declared hazardous waste for which the law requires disposal. The only disposal means available was to transport the soil to an approved disposal site. Further discussion revealed that FDER planned to inspect all IFAS sites in the state to determine possible water contamination by pesticides. Later FDER and IFAS agreed to approve a Memorandum of Understanding which called for a joint assessment of all IFAS locations to be followed by procedures to determine if contamination exists. The two agencies agreed that the toxaphene contamination at AREC-Jay posed no threat to ground water and disposal was delayed.

IFAS established a goal to bring all units and activities into complete compliance with all laws and regulations regarding acquisition, handling, storage, use and disposal of all chemicals-pesticides or otherwise. Also there appeared to be research opportunities if the necessary expertise and

funds could be made available. The Department of Soil Science had initiated a major program to research transport an eventual fate of specific pesticides in soils. Scientists from the Department of Agricultural Engineering begin work with FDER to design an evaporation tank for use by IFAS that could be approved by FDER and EPA. These tanks will be installed at all IFAS locations that use pesticides. They will be limited to the disposal of dilute solutions such as rinsates and small quantities of left over spray solutions. A new program was initiated to investigate capabilities of various microbes to enhance the degradation of pesticides.

Meanwhile all IFAS units adopted improved measures for storing, handling, applying and disposal of pesticides and laboratory. Minimal quantities are being acquired, storage facilities have been upgraded and personnel are being more fully instructed. Additional crops are being planted for use of left over spray solutions and rinsates. Storage facilities have been cleaned out and all old or otherwise excessive materials have been disposed of through legal means.

Soon after the Memorandum of Understanding became effective, FDER lawyers ruled that because of contamination possibilities and some potential illegal practices, a more legally binding document was needed. After several discussions IFAS and the Florida Board of Regents agreed to enter into a Consent Order. The Consent Order provides that designated IFAS units undergo a Preliminary Assessment conducted jointly by IFAS and FDER personnel. A formal report to FDER was required. IFAS named Dr. W. B. Ennis, Jr. as a full time representative to conduct the assessment. Following receipt and review of the Preliminary Assessment report, FDER determined which units would be required to undergo a Site Investigation. Some 19 sites are required to undergo Site Investigations and these are currently underway. The Site Investigations include digging of wells to obtain ground water samples at pertinent sites. Soil and water samples are taken and sent to a contract source for analysis as specified by FDER. At present several Site Investigations have been completed and reports sent to FDER by IFAS and the contracted company. For the most part, little significant contamination has been found to date.

FDER will now rule which sites may need Contamination Assessment after approval of a Contamination Assessment plan. The Contamination Assessment reports will then be used to determine which sites will require remedial action. At that time the types of remedial actions will be elucidated and disposal procedures identified.

Interestingly the Consent Order led the Florida State Legislature to appropriate funds designated for this purpose.

IFAS continues to take steps to bring all operations into compliance with all State and Federal laws and regulations. Research is underway to elucidate the fate and transport of chemicals in soil and water. Methods to clean up contamination and aid disposal are being researched, especially through the use of microbial agents. A faculty committee has developed with administrative guidance and approval a manual entitled "Pesticide Policies and Procedures." This manual is being reproduced and placed in the hands of all IFAS faculty and administration and others responsible for handling and using pesticides.

STORAGE FACILITIES OF PESTICIDES AND HAZARDOUS WASTES

Floyd Wiggins, Agricultural Engineer

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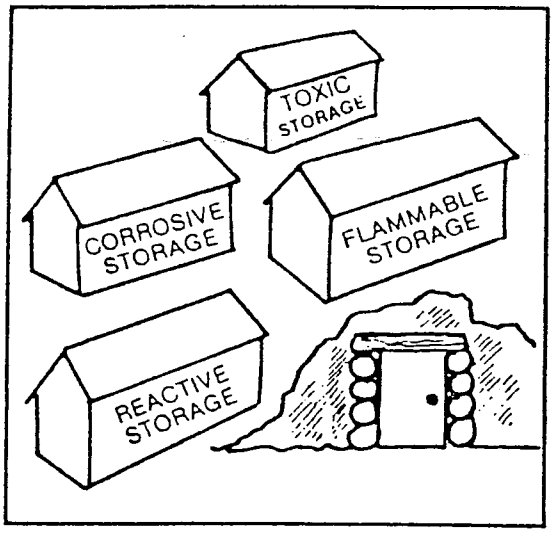
The North Carolina State University recently helped with the construction of a storage facility at the Mountain Horticultural Crops Research Station at Fletcher, NC. There were many factors to consider in the design of such a facility. The J. T. Baker Chemical Company has published an impressive series of safety and other factors information sheets in relation to the storage of toxic or hazardous chemicals. We believe that publishing these management safety sheets will provide a useful reference of the considerations we had to exercise in the construction of our storage facility.

Storage Facilities of Pesticides and Hazardous Wastes.
Floyd Wiggins
Agricultural Engineer
North Carolina State University
Raleigh, North Carolina

16. Storage

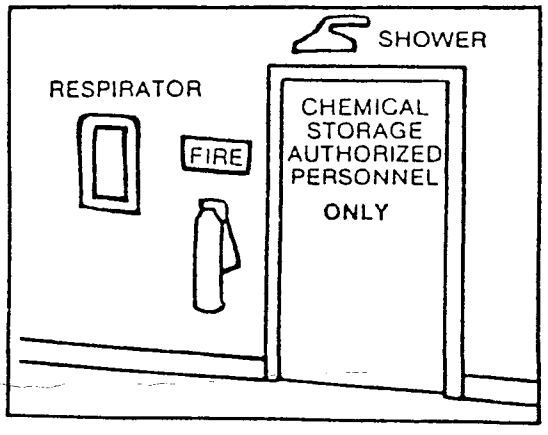


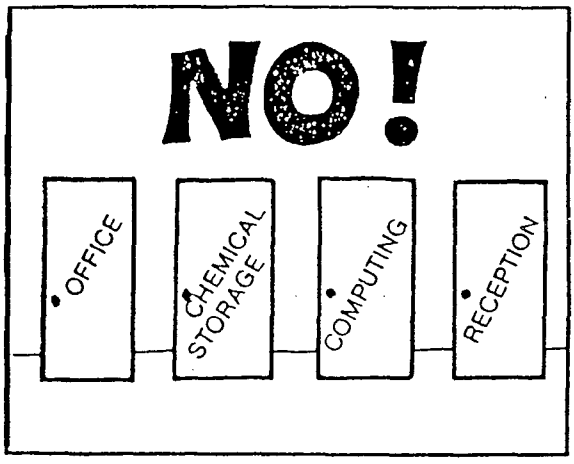
Surveying current accident case histories, it appears that, next to cuts from glassware, etc., storage-related accidents are the major source of accidents in the chemical industry. Certainly storage-related accidents are more damaging and more costly. Correct chemical storage has become increasingly important for maintaining a safe working environment as more and more chemicals are used.

Problems related to chemical storage will be severely alleviated by following the principles of limiting and segregating.

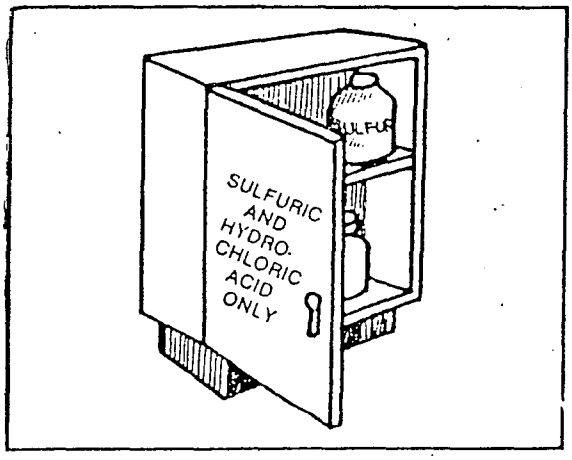
1. Limit the amount of materials you have on hand. Purchase only the quantity you can use in a reasonably short time. Do not stockpile! Excess chemicals tend to become "lost" in the plant.

2. Limit access to chemicals. A single individual should have responsibility for storage and purchasing input. Never allow anyone not in this position of responsibility to enter and withdraw materials from storage, or return things to storage.

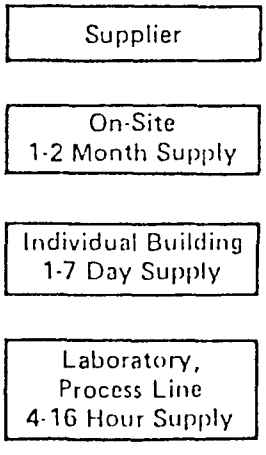




3. Segregate storage areas from populated work areas. In case of an accident, damage to personnel and equipment can be much more extensive if such segregation is not practiced.



4. Segregate chemicals from other chemicals which might react with them. Reactions which are destructive to personnel and property can result from non-segregated storage. For instance, acid stored in the presence of any cyanide salt would produce lethal hydrogen cyanide if they were inadvertently mixed.

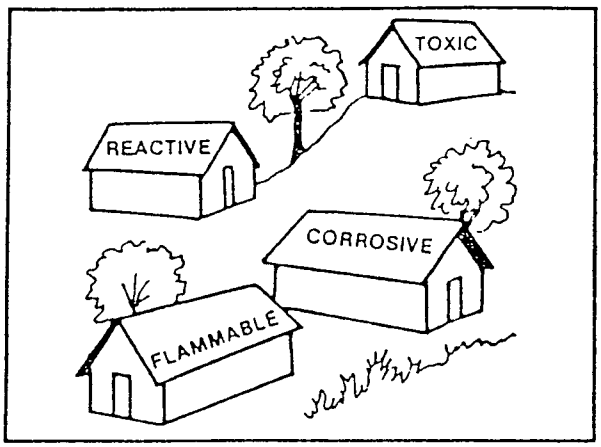


Many schemes exist for limiting the amount of material and access to that material. One such scheme is shown to the left. Modifications of it can fit your particular need. The important consideration is to avoid having too much material on hand which is in the actual work area. If it is not used in the process-line, laboratory, or other work area within several shifts, it is being stored there.

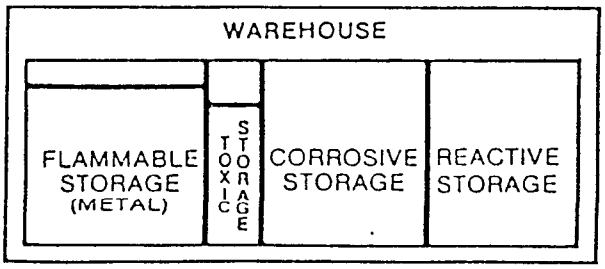
A Classified Storage Example[2]

1. Inorganic oxidizing agents
2. Inorganic corrosive oxidizing agents
3. Inorganic unstable-explosive oxidizing agents
4. Inorganic corrosive acids and bases
5. Metals
6. Flammable and combustible metals
7. General inorganics
8. Perchloric acid and perchlorates
9. Organic flammables I
10. Organic flammables II
11. Organic explosives
12. Organic corrosives
13. General organics
14. Flammable compressed gases
15. Non-inflammable compressed gases
16. Chlorine

Just as limiting quantities of and access to chemicals must be adapted to each facility, the segregation of chemicals by class must also be carefully considered. Large facilities may need 10 to 16 separate, individually designed storage areas for the classes of chemicals stored. In fact, the United States Coast Guard has 24 distinct classes in its CHRIS chart.[1]



Smaller facilities and those using fewer chemicals might find four isolated storage areas feasible.



Often such isolation is not feasible in terms of expense and quantity of chemicals. Segregation within a single storage area can then be practiced.

1. *Chemical Hazard Response Information System*, No. 050-012-00104-9, Superintendent of Documents, Washington, DC 20402, 1974.

2. S. H. Pouliot, *A Program for Compatible Storage of Chemicals*, Thesis, University of North Carolina, 1973.

Flammable/Combustible Liquid Classification System	
Flammable Liquids	
Class I A	Flash point less than 73°F Boiling point less than 100°F
Class I B	Flash point less than 73°F Boiling point greater than 100°F
Class I C	Flash point between 73 and 100°F
Combustible Liquids	
Class II	Flash point between 100 and 140°F
Class III A	Flash point between 140 and 200°F
Class III B	Flash point above 200°

Flammable Liquid Storage

OSHA classifies flammable and combustible liquids in six categories as shown to the left. Since regulations do not specifically apply to Class IIIB, the following will assume that materials being stored have flash points lower than 200°C.

Container types and sizes are limited for each class as shown below:

CONTAINER SIZE LIMITATIONS—FLAMMABLE AND COMBUSTIBLE LIQUIDS

	FLAMMABLE LIQUIDS			COMBUSTIBLE LIQUIDS	
Container Type	Class IA Liters (Gallons)	Class IB Liters (Gallons)	Class IC Liters (Gallons)	Class II Liters (Gallons)	Class IIIA Liters (Gallons)
Glass or approved plastic (1)	0.5 (0.12)	1 (0.25)	4 (1)	4 (1)	4 (1)
Metal (other than DOT drums)	4 (1)	20 (5)	20 (5)	20 (5)	20 (5)
Safety cans	7.5 (2)	20 (5)	20 (5)	20 (5)	20 (5)
Metal drums (DOT spec)(2)	225 (60)	225 (60)	225 (60)	225 (60)	225 (60)
Approved portable tanks (3)	2500 (660)	2500 (660)	2500 (660)	2500 (660)	2500 (660)

(1) 4 liters (1 gallon) allowed for Class 1A and 1B when liquid purity is required.

(2) Maximum size permitted in a laboratory room for Class I materials is 20 liters (5 gallons). Drum size permitted only when located in an inside storage room (OSHA, 1910.106; NFPA 30).

(3) Permitted only outside of buildings.

Quantities of flammables in laboratories and other work areas are limited by OSHA.

TABLE 14–QUANTITY LIMITATIONS–FLAMMABLE AND COMBUSTIBLE LIQUIDS(1)

	Class A Lab(2)				Class B Lab(3)			
	Class I Liquids		Class II & IIIA Liquids		Class I Liquids		Class II & IIIA Liquids	
Container Type	Liters	(Gallons)	Liters	(Gallons)	Liters	(Gallons)	Liters	(Gallons)
Glass or approved plastic (4)	7.5	(2)	20	(5)	20	(5)	40	(10)
Metal (includes glass in metal container) (4)	30	(8)	225	(60)	80	(20)	300	(75)
Safety can(4)	100	(25)	225	(60)	200	(50)	400	(100)
Maximum quantity by liquid class	130	(35)	225	(60)	200	(50)	400	(100)
Maximum overall quantity	225 (60)				400 (100)			

(1) Excluded from limitations are quantities of liquid flammables in process and in compressed gas cylinders.

(2) A usual or typical laboratory. Open flames, and heated surface temperatures above 204°C (400°F) permitted, except when Class I liquids being used outside of hood.

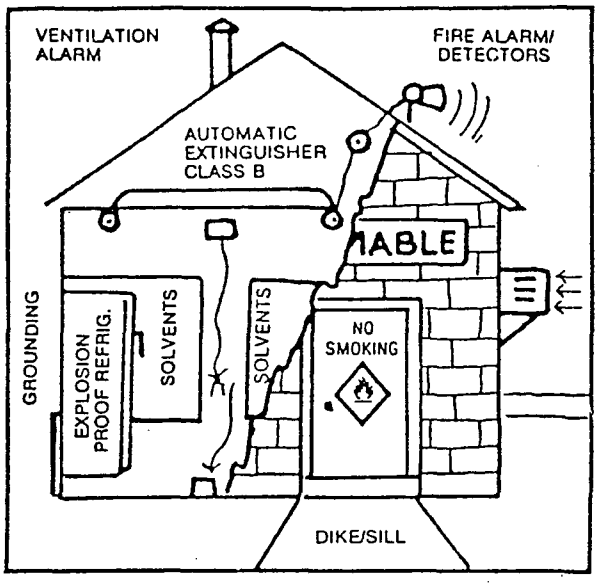
(3) A laboratory requiring unusual amounts of Class I, II and/or IIIA liquids; therefore, a RESTRICTED lab. Smoking, open flames, and heated surface temperatures above 204°C (400°F) prohibited, and signs stating same required at entrance(s).

(4) For container size limitation, see page 16-5.

Quantities stored in inside storerooms are also restricted. Outside storage building limitations do not exist, but specific stacking and piling regulations do limit actual amounts in each building.

Example Storage Building Regulations

Class I A	(ground floor)	50 50-gallon drums unstacked in a single pile is the maximum density for protected areas.
Class I A	(ground floor)	100 50-gallon drums stacked two high is the maximum in a single pile for protected areas.
Class I C	(ground floor)	300 50-gallon drums stacked two high is the maximum per pile in a protected area.



SOLVENT SHED

A. Structural design considerations for flammable storage buildings/rooms:

1. A separate building is preferred, but at least one outside wall is necessary for connected flammable storage rooms.

2. Blow out panels are recommended.

3. Ground floor, i.e., street level, storage is preferred. Top floor storage is acceptable in some localities.

4. One-hour fire resistance rating for areas less than 150 square feet. Two-hour fire resistance rating for areas 150-500 square feet for connected storage areas.

5. Wall and floor joints must be liquid tight.

6. A drain and a diking system which is at least four inches high in front of all openings is necessary.

7. Drain leads to a safe outside location for collection.

8. Self-closing fire doors are provided.

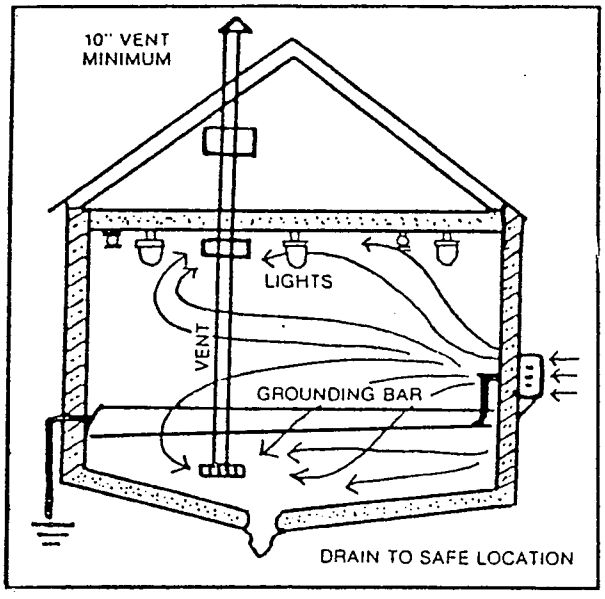
9. At least one exterior door is preferable.

10. Unobstructed three-foot wide aisles must be provided for an easy means of egress.

11. Storage area must be removed from heavily used areas and must be secure to prevent theft and trespass.

12. Structural elements should be protected from corrosion. (Many flammables are corrosive.)

13. Secure shelving and racks must be built. Wood at least one inch thick is acceptable.

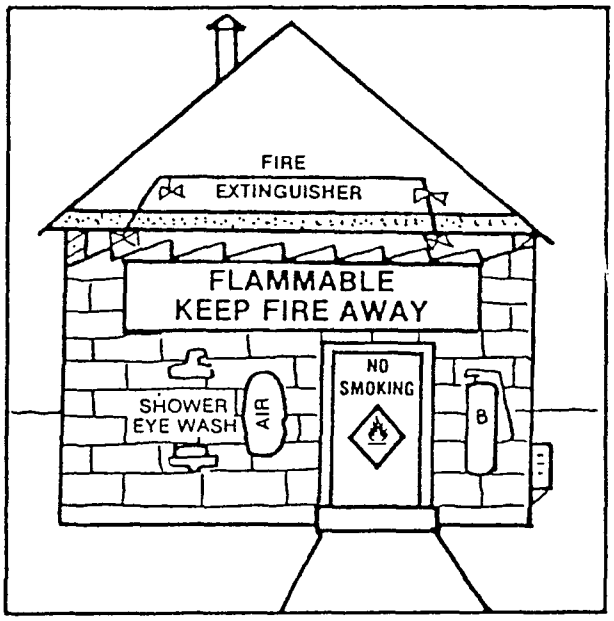


B. Mechanical design considerations for flammable storage buildings/rooms:

1. Ventilation with at least a ten times per hour air turnover must be provided.
2. Area must be exhausted from the floor, ceiling, and all possible dead-air spaces.
3. Air intake should come directly from the outside within one foot of the floor level. With proper dampers it may come from inside a connected building.
4. Exhaust must be separate from other exhaust and air handling systems.
5. Fans must be direct drive and nonsparking.
6. Temperature and humidity control must be provided.

C. Electrical design considerations for flammable storage buildings/rooms:

1. At a minimum, the room and five feet from all openings must be considered a Class I, Division 2 area according to the National Electrical Code.
2. Adequate and conforming lighting must be provided.
3. Adequate grounding of all racks, scuppers and other conducting elements must be provided.
4. A grounding cable along the room's perimeter should be installed.
5. Bonding cables for pouring should be provided.
6. A grounding cable should be at least eight feet in the ground or connected to a cold water main.
7. A means of periodically checking the grounding should be provided.
8. Light switches should be outside the room or building.



D. Alarms, extinguishers, and other safety equipment for flammable storage buildings/rooms:

1. Adequate automatic fire protection equipment should be provided. Halon, dry chemical, and carbon dioxide systems are common, but larger areas use water foam, or sometimes sprinklers.

2. Oxygen escape and emergency entry equipment should be provided. A self-contained breathing apparatus is preferred.

3. Extinguishers of the proper type must be outside the doors.

4. Spill control kits should be available.

5. Flammable vapor alarms are wise.

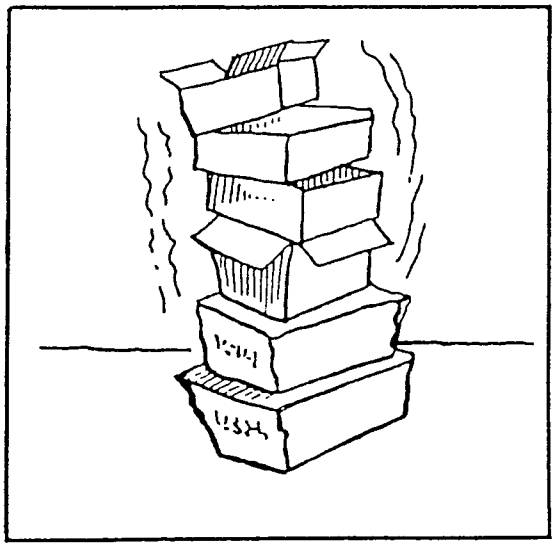
6. Ventilation alarms on mechanical systems are wise.

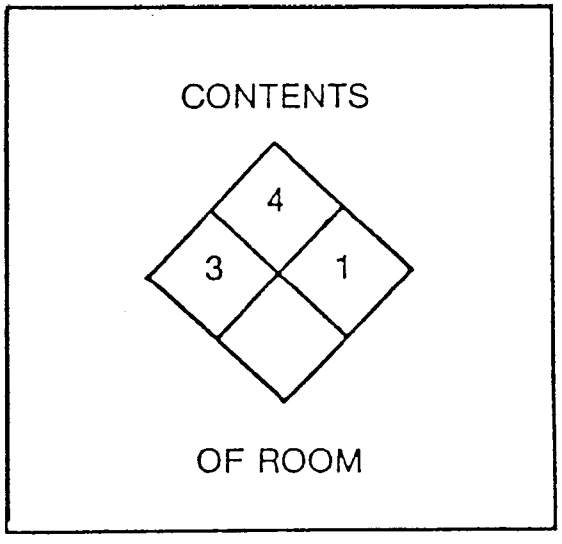
7. Flame arrestors should be installed in vents when needed.

8. Conveniently located showers, eye-wash stations, and fire blankets are needed.

9. Escape lines are needed if materials would obstruct view when they are spilled.

10. Periodically inventory and inspect materials.





E. Storage limitations for flammable storage buildings/rooms:

1. No more than ten gallons per square foot of flammable liquid may be stored in areas having a two-hour fire rated construction and an automatic fire extinguishing system. Five gallons per square foot are allowed in similar facilities with one-hour fire rated construction.

2. In storage areas without automatic fire extinguishing systems, the maximum quantities are four and two gallons, respectively.

3. Combustible material such as weeds, rags, paper, boxes, and cardboard must be removed from within and around the area.

4. Containers larger than 30 gallons may not be stacked.

5. Smaller containers are limited in stacking height by the integrity of the carton and class of solvent.

F. Warnings posted on flammable storage buildings/rooms:

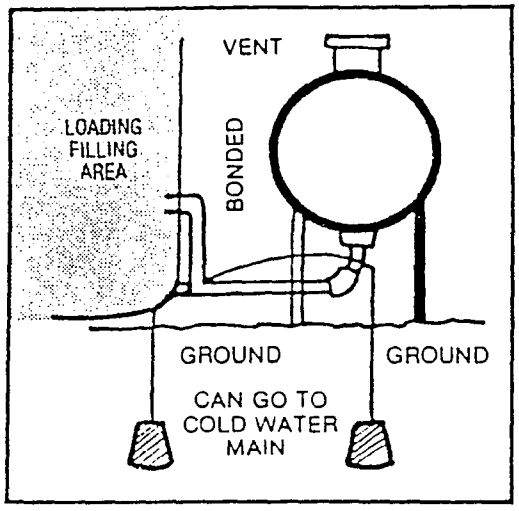
1. The area must be visibly posted with a sign stating, "FLAMMABLE—KEEP FIRE AWAY."

2. Signs saying "NO SMOKING" are required in some localities.

3. The NFPA warning label noting the maximum hazard rating in each class can be posted on the outside of the building or room.

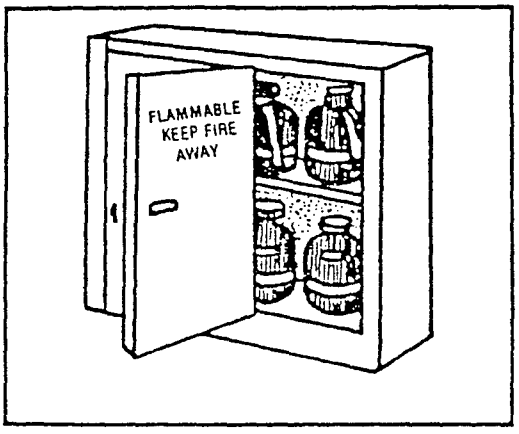
4. The pictorial DOT red flammable diamond on the door(s) is recommended.

5. Warnings in languages other than English may be necessary in some facilities.



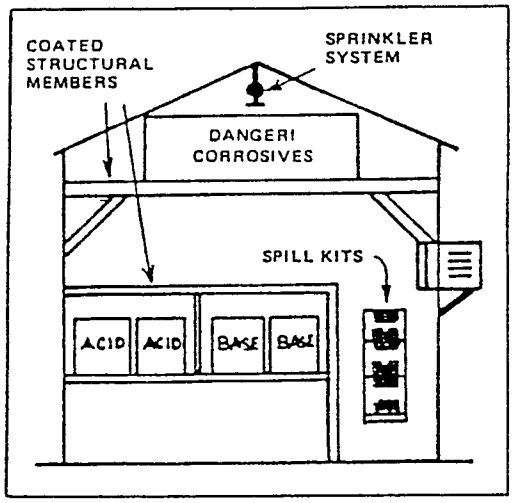
Flammable solvent storage systems in above ground tanks should be:

1. Properly grounded
2. In a diked area
3. Serviced with pipes to transfer solvent to a safe dispensing area
4. Spaced as outlined in the NFPA Flammable and Combustible Liquids Code
5. Located in nonflooding areas
6. Bonded to the receiving vessel
7. Provided with relief venting
8. Labeled "FLAMMABLE—KEEP FIRE AWAY" in lettering at least two inches high
9. Posted with "NO SMOKING" signs
10. Free of debris
11. Properly spaced from each other, buildings, and property lines.
12. Accessible by properly trained fire-fighting teams



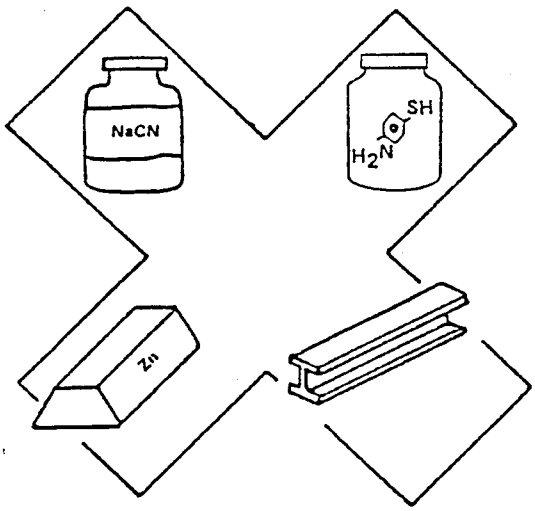
No more than three flammable storage cabinets may be located within a single work area unless they can be grouped 100 feet apart.

Each cabinet may contain no more than 60 gallons of Class I and Class II liquids.



Corrosive Chemicals

Storage Conditions—Store in cool, dry, well-ventilated areas away from sunlight. Store only in approved containers, under approved conditions. An automatic water-spray device should be immediately available. Segregate acids from bases. Fire-fighting equipment should be on hand. Treatment agents for the neutralization of spills should be available. Storage area should not be subject to rapid temperature changes. Structural materials should be noncorroding, or metal covered with acid-fume resistant paint. Inspect periodically for deficiencies.



The following details adapted from the flammable storage section, pages 16-7 to 16-10, are applicable: A-1, 3, 5, 6, 7, 9, 10, 11, 12, 13; B-1 (six times per hour), 2, 4, 5 (corrosion resistant), 6; C-2 (corrosion resistant); D-1 (usually water), 2, 3, 4, 6, 8, 9, 10; E (maintain integrity of containers); F (DANGER CORROSIVE).

Isolate Corrosives From:

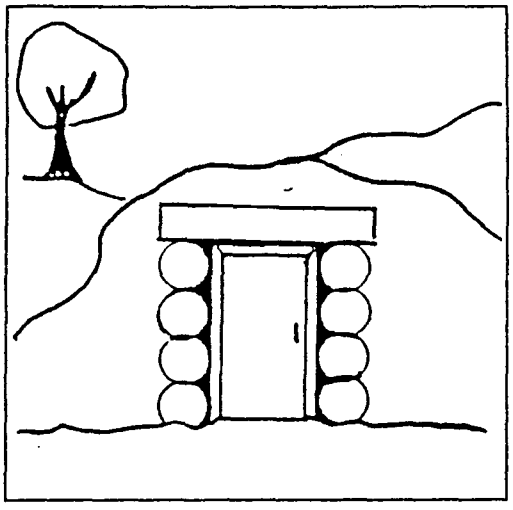
Toxic materials

Substance that may release corrosive, toxic, or flammable fumes on reaction

Organic materials

Flammable substances

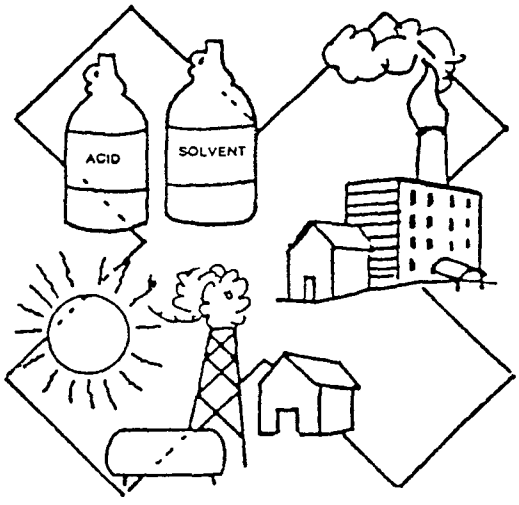
Uncoated structural materials



Reactive Chemicals

(Explosives)

Storage Conditions—Store in cool, dry areas protected from shock, elevated temperatures, or rapid temperature changes. Storage sites should be remote from all other storage, industrial or residential areas. Magazines should be heavily constructed, taking advantage of natural barriers. DO NOT STORE UNNECESSARY QUANTITIES OF EXPLOSIVES.



Isolate Reactive Chemicals From:

Corrosives

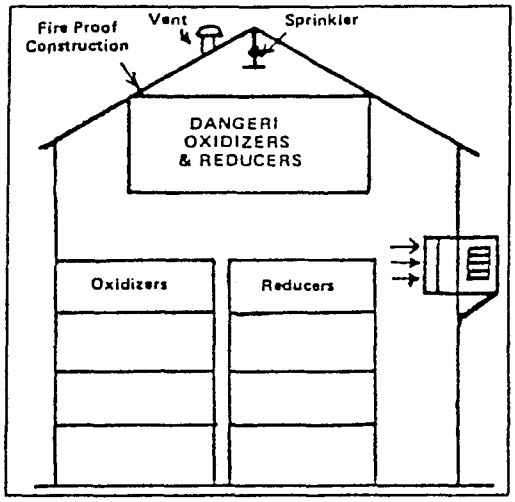
Reactive chemicals

Fire hazards

Heat

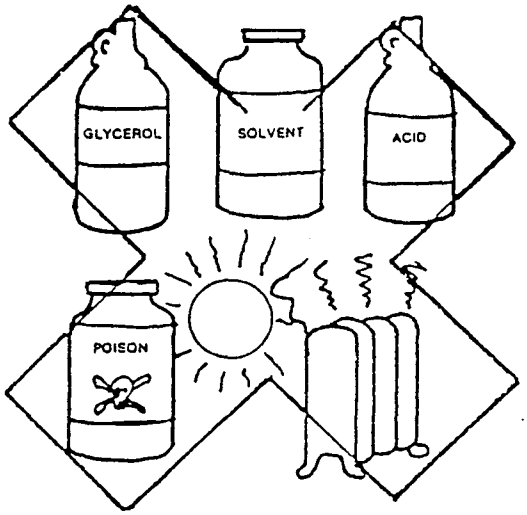
Temperature changes

All storage, industrial and residential, areas



(Oxidizing and Reducing Substances) Reactive Chemicals

Storage Conditions—Store in a cool, dry, well-ventilated area out of direct sunlight. Buildings should be fireproof and provided with an automatic sprinkler system (except where materials are water-sensitive). Protect from extremes of temperature and rapid temperature changes. Containers should be tightly sealed and good ventilation provided.



Isolate Reactive Chemicals From:

- Organic materials
- Flammable solvents
- Corrosives
- Toxicants
- Heat
- Strong sunlight

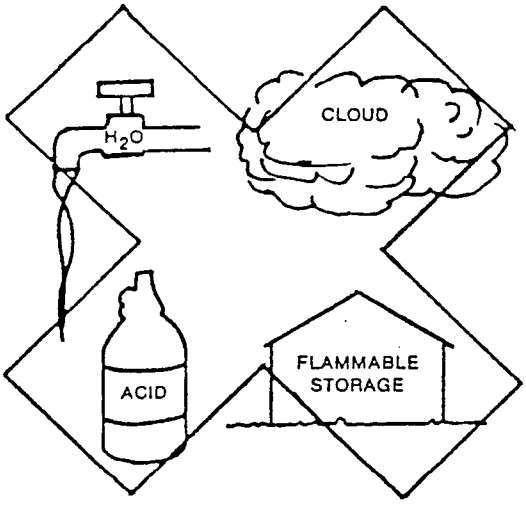
Many normal fire-fighting procedures are not particularly effective with oxidizers, as they provide their own oxygen for combustion.

Special Precautions

1. Keep containers well sealed.
2. Store under inert, nonflammable solvent, where possible.
3. ALWAYS store pyrophors under nonflammable, inert solvents.

(Water and Air-Sensitive Materials) Reactive Chemicals

Storage Conditions—Store in cool, dry area, conforming to requirements for storing hydrogen. Building should be waterproof. No sprinkler system should be in building. It is advisable that no water should service the building. The building should be located on high ground and remote from other storage areas. Inspect periodically for deficiencies. Automatic detectors for flammable gases and smoke should be provided. Ventilate well to protect from flammable gas buildup. Eliminate all ignition sources.



Isolate Reactive Chemicals From:

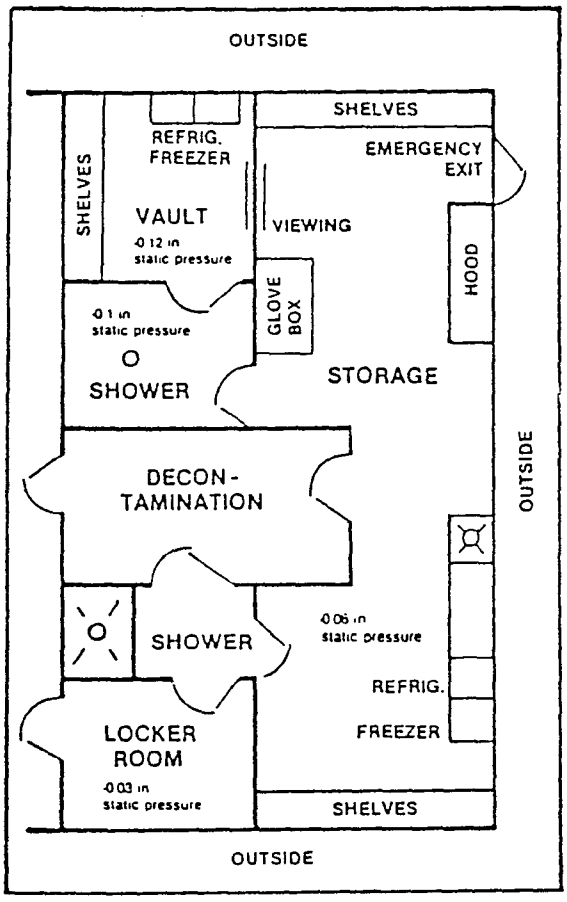
Water and water solutions

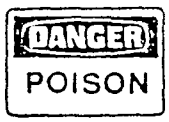
Moist air

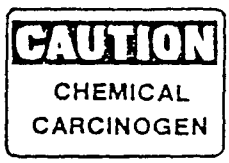
Aqueous acids, and bases

Flammable storage areas

Reactive chemicals



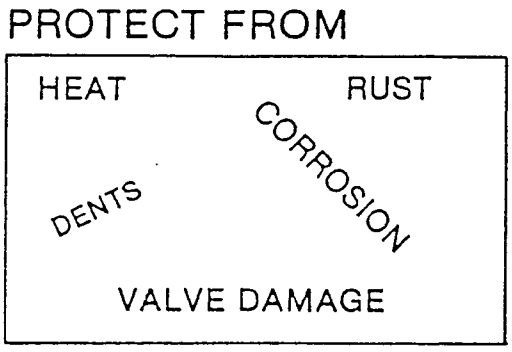


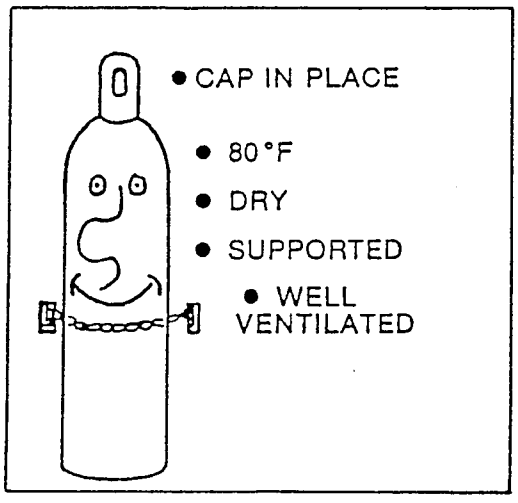


Toxic Materials

Storage considerations include:

1. Minimizing quantities
2. Having a locked vault
3. Minimizing access
4. Including no drains to the outside
5. Storing cool and at constant humidity
6. Isolating from populated areas
7. Having protective clothing available
8. Designing and using a decontamination and shower area
9. Posting poison control, first-aid, and other safety information
10. Inventorying stocks frequently
11. Packaging material securely
12. Operating an independent and filtered ventilation system
13. Making sure any airflow is into rather than out of the room
14. Installing glove boxes as needed
15. Making sure walls, floors, and work surfaces are seamless and sealed
16. Posting the area as shown to the left if needed





Compressed Gases

Rules for the storage of compressed gases are given below. Strict adherence to these rules is the only safe way to store such potentially hazardous materials. Violations should be brought to the attention of the safety manager and upper management.

1. Store in a fireproof, dry, well-ventilated area.
2. The storage area should not contain any sources of ignition.
3. Storage area temperature should be regulated, so as not to exceed 100°F.
4. Floor should be level and cylinders should be protected from dampness.
5. Cylinders should be protected from weather extremes and direct sunlight.
6. Cylinders should be stored in an upright position, chained to a wall to prevent falling.
7. Do not store in heavy traffic areas.
8. Store gases supporting combustion (O_2, Cl_2, etc.) at least 25 feet from fuel gases, preferably in another gas storage area.

CHECK THE INDEX

Additonal storage information is located elsewhere in this manual. Check the index under "Storage" for specifics.

Some examples of commonly encountered incompatible chemicals are given below. An asterisk "*" indicates an especially dangerous combination because they are sometimes placed in the same class.

Chemical	Incompatible With
Acetaldehyde	*Acetic Anhydride, *Ethanol, *Acetone, *Acetic Acid, Sulfuric Acid
Acetic Acid	*Acetaldehyde, Peroxides, *Chromic Acid, *Nitric Acid, *Perchloric Acid, Glycols
Acetone	Nitric/Sulfuric Acids Mixed
Acetonitrile	Nitric Acid, Perchloric Acid
Aniline	Nitric Acid, Chromic Acid, Peroxides
Bromine	Acetone, Acrylonitrile, Ethyl Ether, Hydrogen, Rubber
Carbon Tetrachloride	Diborane, Fluorine
Carbon Monoxide	*Oxygen, *Fluorine
Chlorine	*Ammonia, *Acetylene, *Propane, *Hydrogen, Benzene
Dimethyl Sulfoxide	Perchloric Acid, *Acetyl Chloride, *Benzenesulfonyl Chloride, *Acetic Anhydride.
Flammable Liquids	Chromic Acid, Peroxide, Nitric Acid, Bromine, Fluorine, Chlorine
Perchloric Acid	Acetic Anhydride, Ethanol, *Sulfuric Acid, Paper
Sodium Cyanide	All Acids
Sulfuric Acid	Any Perchlorate, Permanganate, Cyanide, or Chlorate Salts

RESEARCH MANAGEMENT — PANEL
LOUISIANA

Joe Musick, Resident Director

Rice Research Station
Crawley, LA 70526

The Rice Research Station is one of 17 branch stations and 21 departments of the Louisiana Agricultural Experiment Station. The station was established in 1909 and is the oldest Rice Research Station in the United States. Rice research stations were established in 1912 at Beaumont, Texas and Biggs, California and in 1927 at Stuttgart, Arkansas.

The Rice Research Station has a state-wide mission for rice research in Louisiana. This mission, coupled with the fact that rice is produced in two distinctly different geographic areas in the state and that producers in the two areas represent different cultural backgrounds, provides a challenge to researchers and the resident directors, to develop meaningful applied research projects and to develop a successful means of communicating research results.

The station, not only has a state-wide rice research program it also has the responsibility to conduct research for crops used in rotation with rice and other agricultural commodities which are produced in the southwest Louisiana rice growing area. Consequently, scientists at the Rice Research Station, not only conduct a comprehensive rice research program, but also conduct research involving soybeans, grain sorghum, wheat, beef cattle, forage crops and crawfish.

Research projects are both basic and applied in nature. Basic research is conducted in rice genetics, cereal and forage crops biotechnology, as well as in other more traditional areas of agricultural research.

Research projects at the Rice Research Station are funded from four general sources; (1) State appropriations; (2) Self-generated revenue; (3) grants; and (4) the Agricultural Research Service, U.S.D.A.

State appropriations include salaries, wages, equipment and operating expenses. Sales revenue is largely used for operating expenses and to some extent, for transient labor wages. Grant funds are used for salaries, wages, equipment and operating expenses. Funds from the A.R.S., U.S.D.A. are to support the work of an Agricultural Research Service scientist and technician located at the station.

The research management philosophy of the Louisiana Agricultural Experiment Station and the Rice Research Station, is that the scientist is responsible for generating research project proposals. Scientists are encouraged to develop cooperative multi-disciplinary research projects when such efforts are applicable. Cooperative multi-disciplinary projects primarily are based on voluntary cooperation among scientists of various disciplines. Consequently, (depending on the nature of the project), projects are developed after informal discussions between the resident

director and the scientist. Relative to the Louisiana Agricultural Experiment Station, the term resident director is used to refer to the research manager. In other systems, different titles may be appropriate. Basically, I am referring to the unit administrator. The research manager's or resident director's role is to provide suggestions and guidance, as well as serve as a sounding board for the scientist. I would say that resident directors in the system refrain from the use of directives in developing research projects. Once the research manager and faculty have determined the position description and the area of research responsibility, it is the responsibility of the scientist in that position to develop appropriate research projects.

Project proposals may originate as the result of formal or informal discussions with and suggestions of other faculty, the research manager, extension personnel or farmers. Once the project proposal is developed, it is forwarded to the resident director for approval and after internal review and revision, the proposal is forwarded to the Experiment Station director's office for approval. In addition, each research scientist submits an annual plan of work including research objectives to be achieved during the year. The plan of work is reviewed by the resident director and discussed with the scientist. This plan of work is reviewed at the end of the year and accomplishments are noted. This review becomes a part of the annual evaluation. The policy and procedures thus far, are probably not much different from those which exist within other states. However, research projects funded from specific grants may represent a uniquely different approach to research management.

In the early 1970's, a group of farmers and personnel of the Louisiana Agricultural Experiment Station, developed legislation which authorized the establishment of the Louisiana Rice Research Board. This board was to be made up of producer representatives selected by various rice producer organizations in the state. Each organization nominated two or more individuals for each position allocated to the respective organization (ie. Farm Bureau, American Rice Growers and local rice producer organizations). From this list, the Governor appoints one person to each position, subject to approval by the legislature. Thus, the Louisiana Rice Research Board is a producer board and has the status of a state agency. The board was authorized by an act of the legislature, to conduct a referendum for the purpose of collecting 1.5 cents per hundred weight of rice produced, from each producer. These funds were designated for research. Six years ago, the Board conducted a successful referendum to increase the check off to 3 cents per hundred weight. Collection of these monies is mandatory, but producers may request and will receive full refund if they so choose. The most recent referendum was conducted in 1986 and received a 92% favorable vote. Refund requests have generally averaged about 10% per year since 1972.

The Louisiana Rice Research Board administers these funds and contracts with the Louisiana Agricultural Experiment Station to conduct approved research projects on a calendar year basis.

Scientists develop projects to be submitted for the Board's consideration in the fall preceding the calendar year. At this fall meeting, the Board determines the budget for the next calendar year and

reviews and selects projects to be funded. During the year, usually following field day, the board reviews and critiques, research funded by the board, other research activities at the station and field day events. In late January or early February, the Louisiana Rice Research Board meets to hear research reports and review projects funded in the previous calendar year. The Board may raise questions and suggest changes in on-going research funded by the Board at this or any other time. Consequently, projects funded by the Rice Research Board are developed and evolved after considerable input from producers and are primarily applied in nature. The Board also has a strong appreciation for basic research as evidenced by it's support of Biotechnology and Genetic Engineering projects conducted by station scientists.

The Rice Research Station and the Louisiana Agricultural Experiment Station is fortunate to have the financial support of the Louisiana Rice Research Board. However, more importantly, the Rice Research Station is able to gain producer input from the Rice Research Board serving in an advisory capacity.

Suggestions from this Board often are incorporated into projects which may be funded from state or other grant funds or by the Board if monies are available. This input enables the research scientist to address at least part of his research to problems identified by producers. Furthermore, this input provides guidance to the overall research program of the Rice Research Station assuring that research efforts are timely and addressed to problems of interest to a broad group of producers. Consequently, the Rice Research Station and the Louisiana Agricultural Experiment Station, maintain strong support from producers. This support is not only manifested by producer funding of research projects but also by producer support with the legislature. Such support is very valuable in periods of decreasing state budgets. For example, funding for equipment and operational expenses at the Rice Research Station by source as a percent of total funding for these items are as follows:

Self generated revenue	24.2%
State appropriation	41.2%
Rice Research Board	34.5%

In terms of the total budget, salary and wages, the breakdown percentage wise is:

State appropriation	84%
Rice Research Board	16%

Wages and salary funding by the Rice Research Board is primarily for Research Associates and Ag. Lab. Assistants.

Another example of support from the Board, is that board members become very active when called upon to rally support from the legislature for funding of he Louisiana Agricultural Experiment Station. This support has been most helpful in recent years.

In summary, I would say that the relationship between the Experiment Station and the Rice Research Board has resulted in open communications

between research managers, research scientists and farmers. Furthermore, this relationship has been very beneficial to all parties, particularly the research scientist. I would also summarize by saying, this relationship typifies the 100 year formula for success in Agriculture which is, farmers, extension and research working together to develop solutions to problems in Agriculture.

I thank you.