FY 2000 Annual Report of Accomplishments and Results
Oklahoma Agricultural Experiment Station
Oklahoma State University
Stillwater, OK 74078

Goal 1. *An agricultural system that is highly competitive in the global economy*

Overview

Oklahoma agriculture competes in a market place that is both national and global. Regional, national, and international markets have long been important for export of the state's forage and grain crops. Applied and fundamental research programs in plant and animal agriculture and natural resources, including an emphasis on value-added industry, are main corner stones of OAES's work. Research programs are comprehensive, spanning fundamental inquiry, production, management, processing, marketing, and policy.

Plant variety and germplasm development programs have been highly successful and have focused on agronomic crops and forages important to Oklahoma, surrounding states, and climatic zones in which new releases may be adapted. Results from formula funds have led to the development of a "new crop" with the OAES release of 'Intrada', which is the first hard white winter wheat variety to emerge from the new breeding program that was established eight years previous. The emergence of white wheat production in Oklahoma has the potential to develop new markets both regionally and internationally and provide an economic boost to selected producers and grain marketers that choose to handle it as a special crop.

Hard red winter wheat germplasm releases with disease and insect resistance complement the variety development program for wheat, both red and white. A new hard red winter wheat variety, 'Ok101' recently approved for release provides producers with superior traits and characteristics compared to currently grown varieties.

'Midland 99", a forage type bermudagrass, has gained statewide and regional acceptance and is now considered the premier variety for new establishment of bermudagrass pastures in the southern region. Alfalfa germplasm releases also have enhanced the genetic diversity available for breeding programs. A new peanut variety, 'Jupiter', which is a Virginia type was released and offers many desirable characteristics over existing varieties currently planted.

The outcomes of the variety and germplasm development programs have been significant in all agronomic crops produced in the state and have greatly benefited the clientele we serve and stakeholders that provided input to the process. The OAES is extremely pleased with the accomplishments in the plant variety and germplasm development programs and expects continued success in the future. It is imperative that plant variety and germplasm development programs progress using conventional and biologically enhanced techniques as rapidly as possible to meet the growing needs of the clientele we serve.

Total federal formula fund expenditures (Hatch) for this effort during the reporting period were $246,475 and the contributions were a result of the input from 4.6 FTE's. State appropriated funds, industry, commodity groups and associations, and grants and contracts have contributed more than 10 fold the federal effort to the total plant variety and germplasm development program.

Key Theme – Plant Germplasm

a. Oklahoma Agricultural Experiment Station researchers are developing new improved plant varieties and germplasms that are adapted to abiotic and biotic stresses that are encountered under Oklahoma climatic and environmental conditions, as well as those existing in surrounding states. Plant germplasms have been gathered from around the world to enhance genetic diversity in the wheat, soybean, peanut, forage, turfgrass, and alfalfa breeding programs. Molecular, physiological, and morphological traits are being identified in developing germplasm of wheat, soybean, peanut, forage, turfgrass, and alfalfa and used in the selection criteria to enhance disease and insect resistance, seedling vigor, cold hardiness, earliness, tolerance to environmental stress, and yield. Cultivar improvement for the varying species encompasses several scientific disciplines in the OAES; where research initiatives are identified and implemented by a group of multidiscipline scientists known as improvement teams. The team approach provides a natural fit to research areas that requires expertise beyond what plant breeders' use in hybridization and selection of superior progeny.

b. Impact – The OAES has had a long history of cultivar and germplasm development of numerous agronomic and horticultural commodity crops to meet state, regional, national, and international needs. During this reporting period, the OAES released its first hard white winter wheat variety, 'Intrada' that has excellent international market opportunities. This new release represents a "new crop" opportunity for wheat producers in western and panhandle counties of Oklahoma and the western high plains of Texas and Kansas. White wheat must be kept identity preserved throughout the entire production and marketing cycle to prevent contamination of the traditionally grown hard red winter wheat in the area. Consequently, new production and marketing opportunities for farmers and grain elevators have been provided with the release of the "new crop". Grain yield of this cultivar is superior to other white wheat varieties that are currently available from other state programs and similar to most hard red winter wheat varieties currently in production. Maturity and dormancy is intermediate while reaction to wheat soil borne mosaic is mixed. It is moderately susceptible to tan spot and leaf rust during the early stages of growth but shows an intermediate reaction in adult plants. Tolerance to soil acidity is moderate, plant height is medium-short, kernel hardness is acceptable, grain protein is adequate, and kernel size is uniform. The cultivar has a medium-short mixing time, good mixing tolerance, and excellent loaf volume and texture. OAES, Kansas Agricultural Experiment Station, and USDA-ARS developed this variety cooperatively. It was jointly released by OAES and USDA-ARS. Additionally during this reporting period, a new improved forage-type bermudagrass, 'Midland-99'; a

new seeded turf bermudagrass, OKS95-1; a virginia peanut, ‘Jupiter’; a new hard red winter wheat variety, ‘Ok101’, six new wheat germplasm lines that carry leaf rust and soil borne mosaic resistance designated as OAES-1 through OAES-6; and five new alfalfa germplasms with plant breeder designations have been released.

c. Source of Federal Funds – Hatch

d. Scope of Impact – Multi-state Research with:

AK, TX, KS, CO, NE, NM, GA, FL, and VA

Stakeholder Input Process

The OAES receives stakeholder input for plant breeding and germplasm development programs from numerous sources. Research scientists, extension personnel, and administrators meet quarterly with representatives from crop commodity groups and more frequently in scheduled meetings with producers to seek their input regarding varietal needs and other management inputs.

The Oklahoma Wheat Commission, Oklahoma Wheat Research Foundation, Oklahoma Wheat Growers Association, Oklahoma Grain and Feed Association, Oklahoma Seedmen’s Association, and Oklahoma Grain & Stocker Producers’ Association regularly provide input regarding desirable characteristics to include in both the hard white winter wheat and hard red winter wheat breeding programs.

Members of the Oklahoma Soybean Board, Oklahoma Soybean Growers Association, Oklahoma Peanut Commission, and Oklahoma Peanut Growers Association are providing stakeholder input for the soybean and peanut breeding programs. The Oklahoma Alfalfa Hay & Seed Association provides input for the alfalfa-breeding program and for forages. Representatives from the Oklahoma Golf Course Superintendents Associations and the U.S. Golf Association provide input for the development of turf bermudagrasses.

A Dean’s Advisory Group for the Division of Agricultural Sciences and Natural Resources that consists of 40 key agricultural leaders throughout the state meets biannually with scientists and administrators and discusses needs and provide suggestions for improvement of cultivars that are adapted to the state.

Extension Specialists, Area Agronomists, and County Educators meet with area producers and commodity groups and relay information to OAES researchers regarding desirable characteristics and phenotypic traits to be included for the varieties of the wheat, soybean, peanut, alfalfa, and forage and turf bermudagrassess developed.

Program Review Process

There have been no significant changes in program review.

Evaluation of the Success of Multi and Joint Activities

The planned variety and germplasm development programs addressed the critical issues of strategic importance, including those identified by the stakeholders. The needs of the under-served and under-represented populations were included within the critical issues of strategic importance. Planned variety and germplasm development programs described the expected outcomes and impacts and resulted in improved program effectiveness and/or efficiency.

The effectiveness and efficiency of the plant variety and germplasm development program has been greatly enhanced due to multidisciplinary activities of plant breeding, molecular genetics, soil and crop specialists, entomology, plant pathology, plant physiology, and biochemistry within the Division of Agricultural Sciences and Natural Resources. Much of the progress can be attributed to joint research and extension activities and multistate cooperative efforts. Scientists in other states have evaluated OAES plant materials considered for variety release. This information has been extremely helpful in determining the climatic zone of adaptation of the varying species that are forthcoming in variety and germplasm release programs.

The Southwest Wheat Research and Extension Center is a classic example of multi-state/multi-institutional/multi-agency/multi-disciplinary activities that consists of scientists from Oklahoma, Texas, and Kansas as well as individuals representing commercial seed companies and independent foundations. This group represents Land-grant Universities, USDA/ARS, industrial research scientists, independent foundation agronomists and State Cooperative Extension personnel that are working together toward a common goal of variety and germplasm improvement of wheat. Other similar groups represent improvement in variety and germplasm development of soybean, peanut, forage and turf bermudagrasses, and alfalfa. The OAES is extremely pleased with outcomes and impacts of our multi and joint activity programs.

Integrated Research and Extension Activities

Name of Planned Program/Activity: Promotion of the Use of Improved Alfalfa Varieties

Brief Progress Report: As part of the alfalfa breeding program, an extensive variety testing program is conducted throughout the state. Test results are published on the Internet at www.agr.okstate.edu/alfalfa/var-test/alf-var.html. The best varieties for Oklahoma in these tests are promoted in articles in the Oklahoma Alfalfa Hay & Seed Association NEWS and in oral presentations organized by County Extension Educators. This activity is responsible for the high level of acceptance of improved alfalfa varieties in the state.

Name of Planned Program/Activity: Promotion of Forage Legumes in Oklahoma Pastures

Brief Progress Report: As part of our pasture management and legume breeding programs, we plant trials and demonstrations of forage legumes adapted to Oklahoma. The best species are promoted as part of tours and demonstrations at research stations and in commercial pastures. The plantings also serve as a source of material for images on our Oklahoma Forages web page at www.agr.okstate.edu/forage/. This activity assists County Extension Educators and Area Extension Specialists promote improved pasture management.

Name of Planned Program/Activity: Integrated Management of Peanut Diseases

Brief Progress Report: Field research trials were completed in 2000 that management of Sclerotinia blight of peanut. Biological, chemical, and cultural management strategies were evaluated. The cultivars Tamspan 90, Tamrun 98, and Tamrun 96 have been identified as moderately resistant to Sclerotinia blight. Despite the improved performance of these varieties in infested fields, yields of all varieties were increased by the experimental fungicide fluazinam. Therefore, the effects of deploying the resistant cultivars and using an effective fungicide are additive. Results were transferred to clientele through extension publications, popular articles, and mass media. Greater than 90% of the peanut acreage infested with Sclerotinia blight was planted with a moderately resistant variety in 2000. In addition, data from the applied research was used to support an emergency exemption request for use of fluazinam on peanuts was approved for the first time 2000.

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Multistate Extension Activities and Integrated Activities
(Attach Brief Summaries)

Institution: Oklahoma Agricultural Experiment Station

State: Oklahoma

Check one:
_____ Multistate Extension Activities
X Integrated Activities (Hatch Act Funds)
_____ Integrated Activities (Smith-Lever Act Funds)

Title of Planned Program/Activity	Actual Expenditures FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
An agricultural system that is highly competitive in the global economy					
(Plant Germplasm - Wheat)	27,223				
(Plant Germplasm - Alfalfa)	39,416				
Total	66,639	0	0	0	0

Robert L. Westerman
Assistant Director

3/30/2001
Date

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