Program 11C-2

Cotton Disease Management

Presented by Dr. Craig Rothrock

Plant Pathologist, University of Arkansas

Cotton production can be complicated and yield potential limited by a number of plant diseases. The importance of diseases may shift with changes in the production system, environment, cultivar planted and pathogens present. This talk will focus on changes in the importance of selected diseases and their management. Seedling diseases remain an important constraint to obtaining an adequate and uniform stand of vigorous seedlings. The importance of minimizing seedling diseases has increased as seeding rates have decreased, increasing the importance of each seed planted. Seed treatment chemistries on seed continue to change, with significant improvements in disease control with the use of some of the newer chemistries. In addition, we now have a better understanding of the importance of different seedling pathogens and the role of the environment on seedling diseases and stand establishment. Bacterial blight became a significant problem in localized areas in the mid-South in the past two years. The occurrence of this disease has emphasized the importance of limiting the movement of the pathogen and the survival of the bacterium in residue in the field. Good levels of resistance are available for this pathogen and should be considered in selection of cultivars for these areas. Another area in cotton disease management receiving attention is the use of foliar fungicides to control a number of pathogens which can cause foliar diseases on cotton. The importance of these pathogens and the recommendations for the applications of foliar fungicides will be reviewed. The management of cotton diseases is a dynamic process and needs to be constantly reassessed as production systems change, new disease options become available, and the complex of pathogens present change. If not managed, diseases have the potential to become yield limiting, reducing the profitability of cotton.

Program 7C-2

Texas A&M Cotton Improvement Lab Cotton Breeding Activities

Presented by Dr. Wayne Smith

Professor, TAMU

Public cotton breeding programs in Texas, and many other states, focus predominately on developing unique and improved parental germplasm for private plant breeders to utilize in cultivar development for Texas and U.S. producers. This freedom for public programs to concentrate on trait development combined with long term use of HVI, and now AFIS, for objective fiber quality data has led to the development and release of germplasm with properties beyond the norm for only a decade ago. Availability of AFIS analysis and improvements in genotyping, mapping, and marker availability should accelerate trait improvement and improved cultivars.

The Cotton Improvement Lab has released 124 germplasm lines and four conventional cultivars since 1986. These improved germplasm lines of upland cotton have been distributed to breeders in the private sector for incorporation into adapted cultivars. Germplasm lines have been released expressing resistance to silverleaf whitefly, Bemisia tabaci, Gennadius, cotton fleahopper, Pseudatomoscelis seriatus, Reuter, and root-knot nematode, Meliodogyne incognita. More recent efforts have centered on the development of unique fiber quality types that could help maintain upland cotton as a viable U.S. commodity in global markets.

Fifteen unique germplasm lines have been released since 2008 that represent UHML and Strength exceeding all non-acala upland cultivars currently grown in the United States. The Cotton Improvement Lab collaborated with Dr. Jim Starr in the release in 2011 of two lines combining resistance to both reniform and root-knot nematodes. In 2008, we released the first Extra Long Staple upland germplasm lines developed in the U.S. without introgression of alleles from pima. TAM B182-33 ELS, (2008) and TAM WB-33s (2010) have been spun into

yarns finer and stronger than capable with current non-acala upland cultivars. TAM WB-33s yields well on the High Plains and is under consideration for production under organic certification. Three new high quality strains were released recently within our mutation research efforts. TAM 94L-24-M24, -M25, and -M30 average 1.36 inch UHML and 32.6 g/tex strength, significantly longer and stronger than the non-mutated parent, TAM 94L-25. The program contains genotypes that exhibit UHML above 1.40 inches (1.375 inches is minimal standard for pima) and fiber bundle strength near and sometimes exceeding 40 g/tex. Kendra Gregory, former M.S. graduate student, reported that the TAM 06WE-62 family from our program averaged above 38 g/tex fiber bundle strength and produced 50 count yarn significantly stronger than that produced by DPL 491 or FM 832LL.

Tamcot 73 was released in 2008 as a conventional cultivar with excellent yield potential under both dryland and irrigated conditions. Tamcot 73 yielded equivalent to Deltapine 491, Fibermax 832LL, and Stoneville 5599 BR, when grown under irrigated culture at Weslaco and College Station, averaging 1344 lb/ac while the three control cultivars averaged 1336 lb/ac. When compared with 12 cultivars grown under dryland culture, Tamcot 73 was not different from the highest yielding cultivar at any location or when locations were averaged. All of the comparison cultivars except Phytogen 72 were transgenic. No biologically meaningful differences were observed for microniare or elongation before break in these trials with Tamcot 73. Fiber UHML and strength of Tamcot 73 equaled that of Deltapine 491 and Fibermax 832 LL and exceeded that of Stoneville 5599 BR. The UI of Tamcot 73 averaged higher than either Deltapine 491 or Stoneville 5599 BR.

Most of these Extra Long Staple and Elite Quality lines were developed from crossing only upland parents. However, many in the plant breeding community have concluded that a lack of genetic diversity exists in upland cotton today and that this lack of diversity is implicated in the slowing of progress in developing new cultivars with improved yield and quality potential, as well as stress resistance. One means in which this need for new allelic combinations has been addressed by the Texas A&M Cotton Improvement Lab is through introgression from other Gossypium species and continued modification of unfavorable linkage through breeding. Efforts continue along this line of research using populations and lines derived from crosses with barbadense (sea island), mutation, and crosses with diploid species through collaboration with other scientists.

Twenty-nine M.S. and Ph.D. students have been a part of the Cotton Improvement Lab at Texas A&M. Many of these now hold positions of responsibility in the agricultural world and especially in the area of plant breeding. Graduates from the lab who currently are plant breeders includes one in Pennsylvania (corn), three in Texas (Cotton and sorghum), two in Iowa (corn), one in Missouri (leadership training), one in California (tomato), and two in foreign countries (cotton). Numerous M.S. students have either continued their education through a Ph.D. program or accepted employment in various areas of private industry, including seed companies.