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TRENDS IN COTTON VARIETIES

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Variety selection is considered one of the linchpins in any cotton management system. If the varieties planted do not complement a producer's management system or style, then agronomic and economic success is less assured. New varieties are constantly being released with a unique assortment of traits that may benefit the producer. This newsletter will list some of the traits of recently released varieties and comment on emerging trends in varietal development.

Trends in New Varieties

Yield

Yield potential of a given variety has and will continue to play a major role in varieties selected by growers. Cotton breeders have been able to increase the yield potential of succeeding varieties about 7 to 10 pounds per year over the last 50 years. Much of this success has been due to apportioning more of the plant's mass to the bolls. The relative portion of the plant dry weight harvested is referred to as the Harvest Index, which has increased from 45% to 60% in the last 50 years.

Further increases in harvest index may not be desirable if the vegetative factory (leaves, roots, stems) of new releases cannot sustain the bolls through stress periods. The bolls' demand may exceed the plant's ability to supply nutrients during times of environmental stress or rapid boll loading. This trait is apparent in extremely early varieties that exhibit a heightened tendency toward premature cutout.

Earliness

Varieties are earlier today than they used to be. Earliness can result from more rapid square production, higher boll retention, shorter boll maturation period and lower yield. Some of this enhancement in maturity is due to breeding and some to management. There are differences between the maturities of varieties, although this is a subject of some discussion and confusion. If you measure maturity by the length of time to 65% open, the difference between early and late varieties, in a given region may amount to only about 7 days. However, this can be significant in terms of pest management and harvest scheduling. On the other hand, as was mentioned above, more rapid boll loading places more demands on the plant and our management capabilities.

Fiber Quality

Breeding efforts continue to improve fiber quality

traits. Recently, much attention has been focused on increased strength. Strength has been improving at a rate that varies from 0.1 to 0.4 g/tex/year. Many of the new varieties (see tables) have HVI strength above 26 grams per tex. This emphasis on increased strength has had some drawbacks. It has been difficult to select simultaneously potential varieties with higher strength, yield and early maturity. This complication has lessened as demonstrated by the number of earlier maturing varieties with high strength. Staple length has also been increasing for the last 30 years, with an improvement of about $\frac{3}{64}$ of an inch in that time.

Current breeding efforts have reduced emphasis on micronaire *per se* for several good reasons. Micronaire itself is actually a measure of two different and independent fiber traits, maturity and fineness. Breeders are interested in improving both of these traits but not necessarily micronaire.

More attention is being paid to increasing fiber elongation which improves yarn strength, and this trait may be easier to increase than fiber strength. Future varieties may be released with greater fiber elongation. Other areas that are becoming more important in breeding programs include length uniformity, short fiber content and various fiber surface features.

Hairiness

Recent attention has been directed at the influence of plant hairiness on fiber quality. The argument is made that hairs on cotton leaves become little hooks that prevent the leaves from falling from the plant. Subsequently, the leaves are ground up during the harvesting and ginning process to increase the trash content in the ginned lint.

Research data supports this conclusion and has helped spur grower preference for decreased leaf hairiness. Breeding efforts have responded to that interest as illustrated by the number of new varieties with decreased hairiness. Research trials and producer experience have also demonstrated that harvest aid selection and plant and environmental conditions can help minimize trash problems in smooth and hairy varieties.

Genetic Engineering

Commercial cotton varieties will be available in the next few years that have been genetically engineered. The union of novel genetic material and conventional breeding has shown particular promise in the

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Tables list by area of adaptation new varieties released in last few years.*

| | MID-SOUTH and SOUTHEAST | | | | | | |
|-----------------------------|-------------------------|-------------|----------------|------------|----------------|----------------------|----------------------|
| VARIETY | H1215 | H1220 | H1244 | H1330 | H1380 | Ga King ¹ | DP 5611 ² |
| Lint % | 37.5 | 37.9 | 37.9 | 36.9 | 37.5 | 39-43 | Gr |
| Maturity | Early | Early | Early | Early Med. | Early Med. | Medium - Full | Full |
| Plant Hgt. | 44-48" | 50-54" | 54-58" | 40-42" | 40-44" | Medium Tall | Medium Tall |
| Strength | 28.1 | 27.6 | 27.4 | 26.9 | 24.8 | 28-31 gpt | Excellent |
| Length | 1.13 | 1.14 | 1.13 | 1.15 | 1.16 | 1.14 - 1.20" | Excellent |
| Micronaire | 4.7 | 4.8 | 4.7 | 4.75 | 4.5 | 4.0-4.8 | 4.4 - 4.8 |
| Fusarium Wilt Tolerance | Good | Good | Good | Good | Good | Excellent | Good |
| Verticillium Wilt Tolerance | Good | Good | Good | Good | Good | Good | Good |
| Storm Resistance | Superior | Superior | Superior | Excellent | Excellent | Excellent | Good |
| Soil Type | All | All | mixed to heavy | All | Sandy to mixed | Clay loam to sandy | All |
| Seeds/Pound | 4,000 | 3,900 | 4,100 | 4,100 | 4,600 | 4,500 avg. | 4,500 - 4,950 |
| Hairiness | Semi-smooth | Semi-smooth | Semi-smooth | Hairy | Hairy | Hairy | Smooth |

¹ Southwest adaptability. ² Alabama adaptability.

| | HIGH PLAINS | | | | | | |
|-----------------------------|-------------|----------------------|----------------------|-------------|----------------------|----------------------|----------------------|
| VARIETY | HY 007 | Holland 850 | All-Tex X-Press | DP 2156 | Lankart 142 | All-Tex Vantage | BS&D Apache |
| Lint % | 36.1 | 23 - 27 ¹ | 27 - 29 ¹ | High | 24 - 25 ¹ | 27 - 29 ¹ | 27 - 29 ¹ |
| Maturity | Very Early | Very Early | Very Early | Early | Early | Early | Early |
| Plant Hgt. | Medium | Medium | Short | Short | 25" | Short | 24" |
| Strength | 26 - 29 | 26 - 28 | 25 - 27 | Medium | 23 - 25 | 25 - 27 | 27 - 30 |
| Length | 1.14 | 1.16 | 1.08 | Short | 32 - 34 | 1.06 | 32 - 33 |
| Micronaire | 4.2 | 3.6 - 4.5 | 3.5 - 4.5 | High | 3.5 - 4.5 | 3.5 - 4.5 | 3.5 - 4.2 |
| Fusarium Wilt Tolerance | Moderate | Very Good | Very Good | Unknown | Excellent | Excellent | Very |
| Verticillium Wilt Tolerance | Moderate | Moderate | Very Good | Good | Poor | Very Good | Very Good |
| Storm Resistance | Very Good | Very Good | Good | Good | Excellent | Good | Moderate |
| Soil Type | All | All | All | All | All | All | All |
| Seeds/Pound | 4,200 | 4,100 | 4,800 | 5,000 | 4,400 | 4,700 | 4,600 |
| Hairiness | Smooth Leaf | Smooth Leaf | Smooth | Semi-Smooth | Moderate | Semi-Smooth | Sparse |

¹ Lint %'s expressed on stripped seed cotton basis.

| | BELT WIDE ¹ | | | | | | |
|-----------------------------|------------------------|---------------|---------------|---------------|-------------|-------------|-------------|
| VARIETY | ST 132 | SG 404 | ST 474 | DP 5409 | SG 501 | CB 333 | LA 887 |
| Lint % | 39 - 42 | 36 - 39 | 40 - 44 | Excellent | 38 - 41 | 36.9 | 39 - 42 |
| Maturity | Very Early | Very Early | Early | Early | Early | Early - Mid | Medium |
| Plant Hgt. | Medium | Short | Medium | Medium | Medium | Medium | Medium Tall |
| Strength | 26 - 29 gpt | 28 - 32 | 26 - 28 gpt | Excellent | 28 - 32 | 26.8 | 28 - 31 gpt |
| Length | 1.08-1.14" | 1-3/32 | 1.1 - 1.3" | Excellent | 1-3/32+ | 1.14 | 1.14-1.20" |
| Micronaire | 3.8 - 4.2 | 4.2 - 4.7 | 4.6 - 4.8 | 4.4 - 4.8 | 4.0 - 4.6 | 4.4 | 3.8 - 4.4 |
| Fusarium Wilt Tolerance | Excellent | Good | Good | Good | Good | Moderate | Superior |
| Verticillium Wilt Tolerance | Good | Good | Good | Good | Good | Good | Good |
| Storm Resistance | Superior | Excellent | Good | Good | Good | Good | Good |
| Soil Type | Medium to Heavy | All | All | All | All | All | All |
| Seeds/Pound | 4,300 avg. | 4,450 - 4,750 | 4,300 - 4,700 | 4,550 - 4,950 | 4,850-5,150 | 4,000 | 4,200 |
| Hairiness | Smooth | Smooth | Reduced | Smooth | Semi-Smooth | Semi-Smooth | Semi-Smooth |

¹ Except San Joaquin Valley and High Plains

* Data provided by commercial breeders and co-authors is not all inclusive nor intended as a recommendation

SAN JOAQUIN VALLEY

| Kings Acala Plus | Acala CB 7 | Acala CB 305 | Acala Maxxa | Acala Royale | Acala GC-610 | Acala GC-717 | Acala DP-6100 |
|------------------|-------------|--------------|--------------|--------------|--------------|--------------|---------------|
| 38.1 | 39.4 | 40.0 | 41.8 | 40.5 | 39.1 | 39.2 | 38.8 |
| Full | Full | Full | Full | Full | Full | Full | Full |
| 47 | 43 | 43 | 40 | 40 | 40 | 41 | 48 |
| 30.7 | 30.8 | 31.8 | 30.8 | 32.1 | 31.1 | 32.8 | 31 |
| 1.16 | 1.15 | 1.16 | 1.15 | 1.15 | 1.15 | 1.16 | 1.16 |
| 4.2 | 3.9 | 3.9 | 3.9 | 3.9 | 4.0 | 3.8 | 3.9 |
| Not Tested | Good | Good | Moderate | Moderate | Not Tested | Not Tested | Not Tested |
| Good | Good | Excellent | Excellent | Excellent | Excellent | Excellent | Fair |
| Open | Good | Good | Open | Open | Open | Open | Open |
| Saline/Alkaline | Marginal | All | All | All | All | All | Marginal |
| 4,800 | 4,100 | 4,000 | 4,300 | 4,500 | 4,300 | 4,300 | 4,600 |
| Intermediate | Semi-Smooth | Semi-Smooth | Intermediate | Intermediate | Intermediate | Intermediate | Smooth |

| | | | | | ARIZONA |
|----------------------|-------------|----------------------|----------------------|----------------------|--------------|
| All-Tex Excess | CB 830 | Paymaster HS 200 | BS&D Tejas | BS&D Ute | HS Salcot 10 |
| 27 - 29 ^l | 34.1 | 25 - 27 ^l | 26 - 30 ^l | 26 - 30 ^l | 38.0 |
| Early | Med-Early | Med-Early | Med-Early | Med-Early | Medium |
| Medium | Medium | 24" | 25 - 30" | 25 - 28" | Medium Tall |
| 24 - 26 | 27.5 | 25 - 28 | 26 - 30 | 26 - 30 | 26 - 28 |
| 1.06 | 1.10 | 33 - 36 | 32 - 34 | 33 - 36 | 1.12 |
| 3.5 - 4.5 | 3.9 | 3.5 - 4.5 | 3.8 - 4.5 | 3.5 - 4.2 | 4.5 |
| Good | Good | Very Good | Very Good | Very Good | Excellent |
| Fair | Good | Very Good | Very Good | Very Good | Excellent |
| Very Good | Moderate | Good | Moderate | Moderate | Very Good |
| All | All | All | All | All | All |
| 4,700 | 4,400 | 4,900 | 4,550 | 4,500 | 4,700 |
| High | Semi-Smooth | Smooth Very Sparse | Moderate | Sparse | Moderate |

| | | | NEW MEXICO | | | PIMA | |
|-------------|-------------|--------------|---------------|---------------|---------------|--------------|----------------------|
| HS 44 | HY 39 | CB 1233 | Acala CB 1210 | Acala 1517-91 | Acala 1517-95 | Pima 5-7 | Oro Blanco |
| 38.5 | 39.0 | 38.0 | 38.2 | 40.5 | 39.4 | 37-40 | 39.7 |
| Medium | Medium | Mid - Full | Full | Full | Full | Medium | Medium |
| Medium Tall | Medium Tall | Medium -Tall | Tall | Medium-Tall | Medium-Tall | 36" | 43" |
| 28 - 31 | 28 - 30 | 28.5 | 30.9 | 35.5 | 35.2 | 38 | 38 |
| 1.15 | 1.16 | 1.13 | 1.15 | 1.14 | 1.16 | 1.38 | 1.38 |
| 4.4 | 4.5 | 4.6 | 4.0 | 4.3 | 4.0 | 3.8 | 3.8 |
| Good | Good | Good | Good | N/A | N/A | Susceptible | Not Tested |
| Good | Good | Good | Very Good | Very Good | Good | Very Good | Moderately Resistant |
| Good | Very Good | Good | Good | Open | Open | Fair | Open |
| All | All | All | All | All | All | Medium-Heavy | All |
| 300 | 4,400 | 4,400 | 4,400 | 4,500 | 4,000 | 3,600 | 3,800 |
| Smooth Leaf | Semi-Smooth | Semi-Smooth | Semi-Smooth | Semi-Smooth | Semi-Smooth | Smooth | Sparse |

introduction of insect and herbicide resistance. These releases will pave the way for a potentially wide array of varieties with engineered agronomic characters, pest resistance and fiber property attributes.

It is difficult to predict the immediate future of this line of work, although the initial field trials with transgenic cotton are extremely exciting. Herbicide resistance to some broadleaf herbicides has been incorporated into cotton. Engineered resistance to the pink bollworm, tobacco budworm and cotton bollworm with the incorporation of *Bacillus thuringiensis* (*Bt*) genes promises to enhance our ability to manage insects in cotton. In the long run, advancements in biotechnology will only be limited by our ability to find and isolate genes that we need.

Plant Structure

Plant structure is an important consideration in varietal development. In narrow row (30") production systems, shorter fruiting branches and less vegetative branching are desirable but may increase the risk of premature cutout. In stripper harvested areas, this "stovepipe" or columnar-type growth habit also is being evaluated as a means to reduce lint contaminants, primarily bark.

Early Season Vigor

This is an area that is considered important by producers and breeders. Hybrid cotton may increase early season grow-off through what is referred to as "hybrid vigor" by breeders. Other breeding efforts have developed lines with increased tolerance to seedling disease complex and wet weather blight. These lines will continue to be evaluated for possible inclusion in varieties in the future.

Pest Resistance

Modern varieties also have greater resistance to root knot nematodes and disease such as verticillium and fusarium wilt. Resistance to specific insect pests has been incorporated into new varieties but general resistance to all insect pests is less likely due to their vast array and ability to adapt.

Wrap-up

Cotton breeding requires forethought, patience and deliberation to deliver a well-adapted variety. It takes about 7 to 10 years to bring a new variety to the marketplace. Each year new lines enter the development stream to ultimately replace the varieties we currently plant. This process insures that growers will have the tools they need to maintain their competitive edge.

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