COTTON PHYSIOLOGY TODAY

Newsletter of the Cotton Physiology Education Program -- NATIONAL COTTON COUNCIL

Vol. 5, No. 3 • April, 1994

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 $^{3}/_{64}$ 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	G
Maturity	Early	Early	Early	Early Med.	Early Med.	Medium - Full	Ful
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] Southeast 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.

	BELTWIDE[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 recommendati

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[1]	34.1	25 - 27[1]	26 - 30[1]	26 - 30[1]	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 S-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
900	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.

The Cotton Physiology Education Program is supported by a grant to The Cotton Foundation from BASF Agricultural Products, and brought to you as a program of the National Cotton Council in cooperation with the State Extension Service.

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