RESEARCH PROJECT IN NUCLEIC ACIDS OF COTTON

Frank R. H. Katterman, Associate Plant Breeder

Although an isolation procedure for the DNA and RNA of cotton embryos has been fairly well established, preliminary work in this laboratory has indicated that no one procedure is adequate for all types of tissue found in the cotton plant. For example, the detergent method which is more than adequate for the dormant mature embryos is not at all suited for root and leaf tissues. Therefore, modifications and/or combinations of extraction procedures in the literature are now being conducted for both RNA and DNA of the cotton plant as a whole.

Upon completion of this phase of the research, three general areas of investigation will be undertaken.

(a) Since previous studies on the effect of anti-metabolites and analogs of nucleic acids upon cotton have shown 2-thiouracil to be most effective in growth and morphological inhibition, experiments will be devised to observe the effect of this compound on the synthesis and turnover of soluble, messenger and ribosomal RNA and DNA.

(b) Attempts to transform characteristics from one line of cotton to another by means of isolated DNA will be conducted by using stocks of cotton with multiple dominant and multiple recessive characteristics.

(c) Preliminary investigations with cotton have shown that colchicine induced doubled haploids of varieties of G. hirsutum consistently exhibited a significantly lower level of 5-methyl-cytosine content of their DNA's than found in corresponding normal lines. If a predictable relationship of such can be shown in stepwise polyploid induction, it may help to elucidate possible mechanisms by which colchicine operates.

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BREEDING RESEARCH WITH LONG-STAPLE COTTON

H. Muramoto, Associate Plant Breeder
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The objectives of the long-staple cotton breeding program has been to develop breeding methodology for the incorporation into one strain, such desirable characteristics as high yields, good agronomic traits and superior spinning quality.

Advanced Strain, Experimental #126-1, has shown considerable promise and potential. Preliminary data show it to be high yielding and an early maturing strain of cotton. The fiber properties as shown by spinning tests are excellent. The average break for 5 samples of combed yarn was 113.6 for 36's and 59.6 for 60's. These are the strongest yarns we have ever tested.

Yield test data for 1966 at Marana are incomplete and are listed for seed cotton harvested on Nov. 15, 1966.

Pima S-2	2020 lbs	of	seed	cotton/acre	
#126-1	1840 "	"	"	"	"
63-17-1-16	1910 "	"	"	"	"

The slightly lower yield of #126-1 was due to the extension of harvest. #126-1 was ready for final picking approximately 2 weeks prior to actual harvest.

Storm proof 63-17-1-16 is a relatively late maturing strain.

Experimental #126-1, planted at the Casa Grande Overpass Farm gave the following yield on 3-1/2 acres.

Total Seed Cotton Harvested

Oct. 6, 1966	4,620 lbs	3 bales
Dec. 1, 1966	3,750 "	2-1/2 bales
Total	8,370 lbs	5-1/2 bales

It is interesting to note that October 6 is an unusually early date to harvest long-staple cotton. This is an indication of an early maturing strain of cotton.

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PIMA PHYSIOLOGY

Leonard L. H. Pinkas, Research Plant Physiologist

Previous work of the Pima improvement program has shown marked differences between varieties S-3 and S-4 in height and yield when grown at different altitudes. S-3 is best adapted to the higher altitudes where it is productive and has a desirable height. At low altitudes, S-3 fruits late in the season, and is rank and unproductive. On the other hand, S-4 yields well and has a desirable plant type at low elevations. At high altitudes, S-4 sets fruit too low for most efficient harvesting.

The objective of the Pima physiology program is to gain basic information about the physiology of the cotton plant and the ways in which the environment influences the internal chemical reactions which control plant height and the many factors which make up yield--namely, squaring, square shed, pollination, seed set, and boll abscission. Knowledge of the relationships between various environmental factors (light, temperature, water, nutrients) and specific chemical reactions in the plant will help the cotton-improvement program by allowing relatively simple, precise, and rapid tests to be used to identify a plant's adaptability to a given environment. This will greatly reduce the time needed to determine the environment to which a plant is best adapted. It will also improve the precision of this determination.