Plant No.	Phenotype	Cytological Analysis
AZ623 6908-264	Few bolls	26II
AZ624 6908-247	Long fruiting branches	23II s≠ II IV 1s
AZ625 6908-213	Semi-cluster, bolls with small pores	26II
AZ626 6907-268	Small plant with one boll	26II and 25II 2I (iso)
AZ627 AZ64	Low boll set	26II
AZ628 6711-342	Small leaves, small elongated bolls	25II s≠ II
AZ629 6901-290	Top bolls in cluster	25II 1≠ II
AZ630 Stoneville 7A 164	Long fruiting branches	25II I s
AZ631 Stoneville 256	Small late bolls	26II

In addition to the above stumps that Dr. Fisher collected, he also collected seed from two phenotypically aberrant plants which he labeled (a) Mahan plants 6911-349 and (b) Wild plants 6911-32-7. Seed from both of these plants were planted in the nursery and among the 39 Mahan plants that were present in the field, six were classified on bases of morphological characters 2n-1 for chromosome 4. The remaining 33 plants were normal in appearance. All progeny of the Wild plant 6911-32-7 had crinkle-leaf, some more extreme than others, and all flowered very late in the season producing a very few small bolls. This appears to be a genetic mutant. Four of the plants were stumped for seed increase in the greenhouse.

HEXAPLOID COTTON

H. Muramoto

Over an acre of hexaploid cotton plants was grown in 1973. Selections continued with emphasis on fertility and lint quality. Hybridizations were made at the hexaploid level within several selected progenies in the population with hopes of increasing yield, fiber length, and seed size.

The hexaploids have reached a stage of development and stability that much more rapid progress can be realized by releasing it to the public as noncommercial genetic breeding stock. All available data have been collected and compiled in anticipation for release this year. It is hoped that the hexaploid can be released as a composite of hexaploid cotton lines which have been kept in a bulk population for maximum variability and to insure a wide genetic base for making plant selections.

MITOCHONDRIA AS BREEDING TOOLS IN PIMA COTTON

R.G. McDaniel

A significant association between mitochondrial efficiency and lint yields of Pima cotton has been obtained. Our laboratory tests have demonstrated that analyses of function of plant cell "powerhouses," the mitochondria, give valuable information on yield potential of Pima lines and breeding stocks. Assays of mitochondria from seedlings of ten Pima cotton lines used in the Pima regional yield tests showed significant positive associations with lint yield levels. Correlation coefficients of mitochondrial activity with lint yield were 0.82 at Phoenix, 0.91 at Safford

(Pace Farm) and 0.94 over all regional locations. These correlations were significant at the 1% level.

Recent work is designed to evaluate effects of elevation on growth potential of Pima strains presently being developed and evaluated. By assaying mitochondria under high temperature stress we can simulate the effects of low elevation in the laboratory. Our data indicate that seedling mitochondria response in the "test tube" mimics, to an extent, the actual response of Pima strains to high summer night temperatures. For example, we can readily separate Pima S-4 from Pima S-3 on the basis of the superior efficiency of Pima S-4 mitochondria to high temperature stress. Studies are now under way to evaluate heat tolerance of advanced Pima strains using high temperature mitochondria assays.

Initial studies on a chemical analysis of Pima cotton fiber are nearly completed. This work involved breaking down cotton lint and finished Pima cotton apparel items into component sugars and analyzing the composition of these sugars using gas-liquid chromatography. Using less than a gram of cotton fiber, or a one centimeter square of finished cotton clothing, we have been able to identify the genetic source of the cotton fiber. We can separate short staple from long staple fibers in this manner, and can calculate the percentage of polyester in cotton-polyester blends, as well as the origin of cotton in the blend. As finished cotton clothing articles are subject to treatment during manufacture which makes fiber identification impossible by regular means, our technique should fill an important gap by providing means for rapid identification of cotton fiber sources. Work on cotton fibers from an array of genetic sources furnished by Dr. Carl Feaster, is presently being completed. These data should tell us if the sensitivity of sugar chromatography is sufficient to detect differences within Pima sources. We have also observed a relation between ease of hydrolysis of cotton fibers and fiber strength which may prove valuable as a "molecular" assay of fiber strength in addition to present mechanical measures of this parameter.