Table 2. The effect of salt concentration and temperature on percent germination and percent transfer of three cotton lines.

		12,000 ppm salt		18,000 ppm salt	
Line	Temperature	% Germ.	% Trans.	% Germ.	% Trans.
Pima S-4	59	80.0	9.07	12.0	2.48
	89.6	90.0	11.73	86.7	7.87
E - 2	59	50.0	7.94	5.0	2.50
	89.6	86.3	12.43	82.7	7.53
P - 23	59	73.3	9.09	14.7	1.80
	89.6	88.7	13.25	85.3	9.46
Average	59	67.8	8.70	10.6	2.26
	89.6	88.3	12.47	84.9	8.29

BIOCHEMICAL STUDIES OF PIMA COTTONSEED QUALITY

R.G. McDaniel

Work to improve cold tolerance of Pima cottonseed during germination has taken a dual approach. Studies of mitochondria of Pima S-4 seedlings have demonstrated a marked superiority of mitochondria of cotton seedlings capable of germination and emergence under low temperature stress. Thus, the ability of seed mitochondria to produce ATP necessary for seedling vigor and emergence at cold temperatures can serve as a selection tool. We began germinating large numbers of Pima S-4 seed in October, 1972 in temperature controlled growth chambers set at 58° F. After screening in excess of 50,000 seedlings, we selected several seedlings which showed vigor and growth rate far superior to commercial Pima S-4 seed. These plants were then transferred to the greenhouse and seed was harvested. This second generation seed was tested against the original S-4 seed and was found to maintain a significant advantage in terms of mitochondrial efficiency as well as superior germination and growth at low temperatures. The better seedlings from this material were transferred to the greenhouse, and seed is presently being harvested to test a third generation. Second generation seed was given to Dr. Carl Feaster for a large-scale greenhouse increase so as to have seed available for an early planting field test in spring, 1974. This "cold-select" Pima S-4 seed easily shows a 50% advantage in germination percent and emergence when compared to commercial, bagged Pima S-4 cottonseed under low temperature conditions.

An alternative approach to improving quality and germinability of Pima cottons under low temperature stress is the use of growth regulators. Although we have tested numerous growth regulators, one in particular looks very promising. Cyclic AMP, a naturally occurring compound, when applied as a seed treatment to Pima S-4 cottonseed resulted in a doubling of germination percent and a marked improvement in growth rate (20% increase) under laboratory controlled low-temperature germination tests.

Following extensive growth chamber and greenhouse tests, this chemical seed treatment was evaluated in field trials in the 1973 growing season. High variability in stand in the tests made accurate evaluation of cyclic AMP seed treatment impossible. However, no deleterious effects of the treatment were noted--this is a major problem with other seed treatments such as gibberellic acid. Further early planting field tests are planned for the 1974 season. In view of ease of seed treatment, and cost of this chemical, we feel if further field testing confirms our greenhouse studies, this will be an economically feasible approach to improve germination and emergence of early planted Pima cotton.