

Initial results indicate a significant interaction between temperature and salt concentration on germination. Highest germination percentages occurred between 25 and 35 C in the salt-free solution (Fig. 1). At 0.0 MPa, germination declined sharply as temperatures moved toward the extremes. Increasing levels of salinity also inhibited seed germination regardless of temperature. The severity of higher salinity levels was greatly increased at the extremes of temperature. At 30 C, germination at -0.9 MPa was 71% of the germination at 0.0 MPa. At both 15 and 45 C, germination at -0.9 MPa was only 3% of that observed in salt-free solutions.

These results stress the importance of considering both soil temperature and salinity levels when planting early in the season.

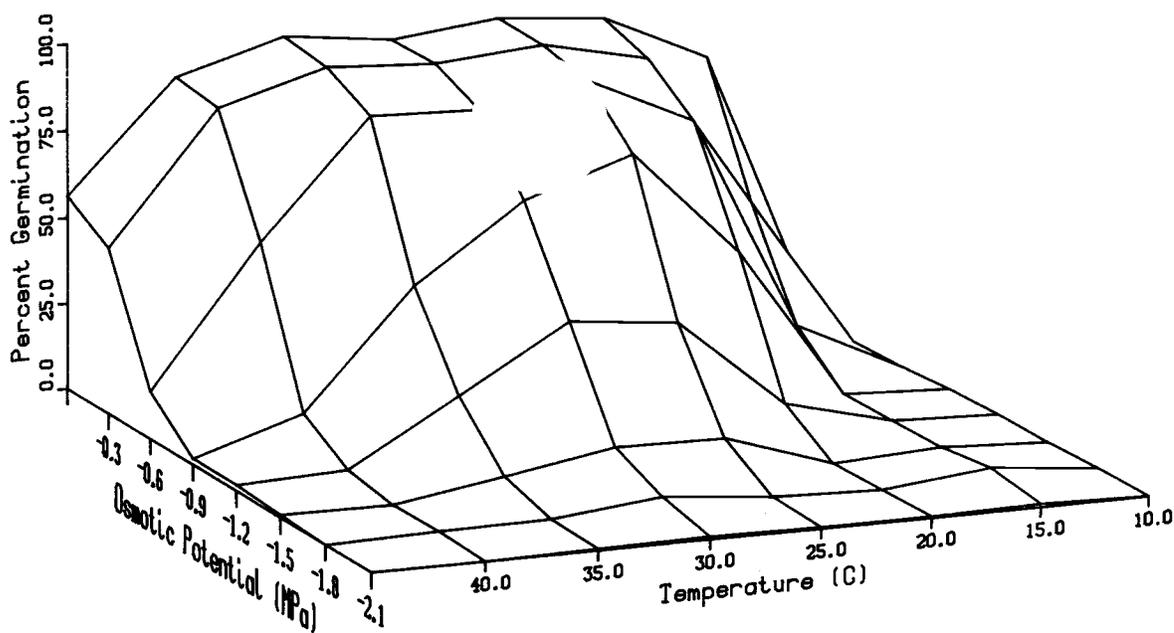


Figure 1. The interaction of salinity (MPa) and temperature (C) on the germination (%) of DP62 planting seed. Seed were germinated at eight salt concentrations ranging from 0 to -2.1 MPa (0 to about 21,000 ppm) at each of eight temperatures ranging from 10 to 45 C (50 to 113 F).

Three Years of Selection for Salt Tolerance in Pima Cotton

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Summary

The third cycle of recurrent selection for germination salt tolerance has been completed on ten Pima cotton lines. All ten lines germinated at 20,000 ppm after the third cycle. At 20,000 ppm, the ten cycle 3 lines had an average 19% germination. This compared favorably to the original population which had only 6% germination at 15,000 ppm.

A third cycle of recurrent selection for germination salt tolerance has been completed on ten Pima cotton lines which were obtained from Dr. Carl V. Feaster, USDA, SEA-AR Research Agronomist. Seed harvested from Cycle 2 (1981) plants which had been intercrossed within lines were germinated in a growth chamber in plastic trays. Seed were placed between two paper blotters which were saturated with a salt solution (-18, -20, or -22 bars). The trays were covered with a plastic lid. Black paper was placed over the trays in an illuminated growth chamber to eliminate condensation during the germination period.

Seedlings which germinated at the highest levels of salt were transplanted into individual containers and irrigated with tap water in a greenhouse. The surviving seedlings were transplanted into the field at the Cotton Research Center in Phoenix. Dr. Carl Feaster made crosses within each experimental line and harvested the seed. These seed will go into a fourth cycle of selection for germination salt tolerance.

Lines E14 and P43 continue to show the best progress for germination at high salt concentrations (Table 1). At -22 bars, the two lines had 39 and 25% germination, respectively. All of the ten cycle 3 lines germinated at -20 bars.

Comparing the progress of the four best Pima lines (E14, E17, P43 and P44) over the three years of selection, substantial progress is evident (Fig. 1). The 1982 cycle 3 seed had much higher germination percentages at 18,000 ppm than did the previous cycles at 15,000 ppm salt. The fourth cycle of recurrent selection for germination salt tolerance in Pima cotton will begin in March, 1983.

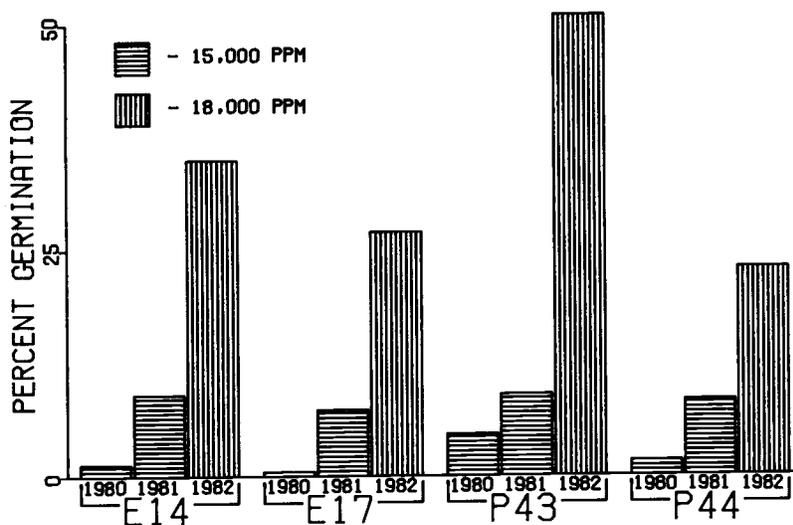


Figure 1. Percent germination at either 15,000 or 18,000 ppm salt for four Pima cotton lines in the first (1980), second (1981), and third (1982) cycle of recurrent selection.

Table 1. Germination percentages for 10 cycle 1 to 3 salt tolerant Pima cotton lines selected in 1980 (cycle 1), 1981 (cycle 2) and 1982 (cycle 3). Seed were germinated in salt solutions at 30°C.

	1980			1981			1982		
	NaCl (bars)			NaCl (bars)			NaCl (bars)		
	-13.0	-15.0	-16.0	-15.5	-16.5	-17.5	-18.0	-20.0	-22.0
E13	2	5	1	4	-	-	37	16	-
E14	12	3	-	9	4	9	35	42	39
E15	4	17	2	4	-	-	23	16	-
E16	11	3	1	2	-	-	27	17	-
E17	4	1	-	7	-	-	27	7	-
P34	8	10	1	1	-	-	40	29	-
P42	2	2	2	1	-	-	53	15	-
P43	11	10	1	9	5	6	51	38	25
P44	7	2	1	8	-	-	23	7	-
PS5	9	9	1	1	-	-	14	2	-