

Table 2. Testing advanced strains of experimental alfalfas for dry matter production, reaction to destructive insects, diseases, and nematodes under irrigation. Mesa, AZ farm border A-63 planted 21 October, 1980.

Entry	Green weight, total of four reps (pounds) ^{a/}			Entry Total	Yield in % of Mesa Sirsa	Rank out of 12 Entries
	2/27/81	4/24/81	5/24/81			
Hi Nod Lew Cyc I, Syn 2	46.7	156.4	177.3	380.4	104.0	3
Lew PmR Cyc I-43 Syn 2	48.7	162.0	177.8	388.5	106.2	2
AZ Lew Late Flower Cyc II, Syn 1	42.7	162.8	173.6	379.1	103.6	4
AZ Salt Tolerant 1979	47.6	165.2	189.1	401.9	110.0	1
Cert. Mesa-Sirsa (Check)	43.8	151.4	170.6	365.8	100.0	8

^{a/} plot size: 100 ft².

We are continuing with this mass selection program for the development of a salt tolerant cultivar that will germinate and emerge to produce a high yielding alfalfa.

SURVIVAL OF YOUNG PLANTS OF SEVERAL ALFALFA CULTIVARS AND
STRAINS TO HIGH LEVELS OF CHLORIDE-SALTS

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SUMMARY

A small, but significant, difference in chloride (salt)-tolerance was obtained in greenhouse tests among twelve alfalfa cultivars and strains that were derived from breeding programs in Arizona, New Mexico, and California. Salton was highest in survival while Zia and Mesilla were lowest. However, differences in plant survival were small. None of the alfalfa appeared to have a practical degree of salt-tolerance to combat the salt problems encountered under farm conditions.

Salinity is becoming a serious problem in some of the soils of Arizona and other southwestern areas. One of the prevalent phytotoxic ions in these soils and water is chloride (Cl⁻). Alfalfa is an important crop in Arizona, and it is readily damaged by the Cl⁻ ion. The primary objective of this study was to ascertain whether any of the cultivars developed in arid areas were more tolerant to Cl⁻ than others following the application of high rates of KCl.

Potassium chloride was the chloride-salt used in these studies because our previous work has shown that plant survival was not significantly different whether the chloride salt was NaCl or KCl at equal levels of Cl⁻. Also, in small-pot studies, the Na⁺ ion from NaCl caused the soil to deflocculate, especially at the soil surface, and hindered water movement through the soil.

These studies were conducted in the greenhouse between mid-September 1980 and early March 1981, using natural daylengths. Greenhouse temperatures ranged from 90°F for the day's high to 80°F for the night's low. The soil used was Mohave sandy loam that was low in Mg and borderline P and S. Thus, potted soil was fertilized with 134 lbs P/a as KH₂PO₄ and 268 lbs Ma/a as MgSO₄ in solution, calculated on a soil surface-area basis.

One-liter, white, plastic pots with drainage holes in the bottom were filled with sandy loam soil. The potted soil was tamped firmly to 1-inch below the top rim of the pot. Thirty to 40 seeds of alfalfa were scattered on the soil surface and covered with a thin layer of 50-50 mixture of soil and sand. Dry soil weight averaged 2.7 pounds per pot. The evening prior to applying the salt treatment (KCl), the

pots were watered heavily and allowed to drain overnight. In the morning, each pot was placed in a plastic cup and treated with salt solution. The bottom plastic cup collected any drainage of salt and facilitated watering from the top and bottom. Except at time of salt treatment, the alfalfa plants were watered only with distilled water before and after salt treatment.

Thinning of the potted plants was begun two weeks after seeding and they were reduced to 25 plants per pot by three weeks of age. Salt (KCl) was applied when the plants were four to five weeks of age (5 to 7 inches tall). The KCl was applied in solution and the rates were calculated on a surface-area basis. The number of plants that survived the salt treatment were counted four weeks after the KCl was applied.

Twelve cultivars and strains of alfalfa developed in the arid southwest USA were tested in two separate trials. In Trial A, the KCl was applied at the rate of 2022 lbsCl/a (4252 lbs/a of KCl), and in Trial B with 1213 lbsCl/a (2550 lbs/a of KCl). Each trial was set-up in a randomized complete block design with six replications.

Even though these alfalfas were developed in and for the arid, southwestern states, the differences in survival to Cl⁻ were quite small (Table 1). Salton, however, was significantly higher in plant survival than the others, while Zia and Mesilla were lowest in survival.

It is assumed that the plants that survived salt treatment have some Cl⁻ tolerance. Such plants are saved for the plant breeder. Currently, we are in the second generation of selection for Cl⁻ tolerance in the cultivar Lew; a cultivar recommended for farm use in the irrigated, low-valley areas of Arizona.

Table 1. Percentage survival of several alfalfa cultivars and strains to high levels of salt (KCl) applied when plants were four to five weeks old.

Cultivar or strain	Southwest state of origin	Percent plant survival		
		Trial A ¹	Trial B ²	Combined
Salton	CA	5	10	8
El Unico	AZ	5	6	5
Lew	AZ	1	7	5
UC 124B	CA	3	5	4
Hayden	AZ	2	5	4
UC 150	CA	3	5	3
Mesa Sirsa	AZ	1	4	2
Mph-5	NM	0	4	2
Man-5	NM	3	1	2
UC 170	CA	1	2	1
Mesilla	NM	0	1	0
Zia	NM	0	0	0
LSD, 0.05		NS	5	3

¹Seeded September 12, 1980, and completed November 9.

²Seeded January 6, 1981, and completed March 4.