

germinating seed in a NaCl solution of -18 bars. Following two cycles of selection, the seed germinated 33% better than seed from the original source at -13.5 bars and 77°F.

Tolerance to Cl⁻ during seed germination and during the young plant stage may be two completely different phenomena, as was found to be the case in soybeans (*Glycine max* (L.) Merr.). However, this needs to be studied for alfalfa. Therefore, alfalfa is now being screened at Arizona during seed germination and during the juvenile-plant stage.

In the seedling plant screening procedure, alfalfa is seeded in fertile, sandy-loam soil in wooden flats lined with black plastic or in solid, polyethylene flats (a soil depth of about 3 to 4 inches). The plants are grown to about 6 inches in height (4 to 5 weeks of age). All watering is with distilled water throughout the seedling establishment process to avoid adaptation due to exposure to noninjurious levels of Cl⁻. This problem of plant adaptation can be readily encountered in the field. Very high levels of Cl⁻ may be needed in the irrigation water to eliminate a high percentage of the plants because of increased tolerance due to exposure to sub-lethal levels of Cl⁻ in the soil and/or water during early growth and/or their increase of foliage with advanced age. Thus, screening in the greenhouse and watering only with distilled water free or low in Cl⁻ seems to expedite the selection procedure.

When the seedling plants reach approximately 6 inches in height, they are treated with an application of about 3400 lbs/a of KCl (1620 lbsCl/a and 1780 lbsK/a) in solution calculated on the soil surface-area basis. The soil should be wet when the KCl is applied or the amount of KCl needed can be mixed in a large volume of water, which also will allow uniform application. Susceptible seedlings usually collapse within one or two days and most are dead within a week. The surviving plants usually are not transplanted to new soil until 3 to 4 weeks after exposure to Cl⁻. Screening in small pots is also possible and will eliminate a transplanting. The potted plants or plants that survive Cl⁻ treatment can be removed from the drainage-cup, and the excess Cl⁻ flushed from the soil during subsequent watering.

Some adjustments may have to be made in the amount of KCl applied, depending on greenhouse temperatures and age of plants at time of salt treatment. The KCl rate may have to be increased in a cool greenhouse or with plants of advanced age (size), or decreased in a hot greenhouse or with very young (small) plants. Less than 1% survival is desired in the first cycle of selection in order to adequately identify Cl⁻-tolerant plants in the heterozygous population. (The full text of these studies with the data will be published in the Journal of Plant Nutrition 4(2), 1981).

REFERENCES

- Dobrenz, A. K., J. E. Stone, and M. H. Schonhorst. Salt tolerance in alfalfa. p. 87-93. In, R. H. Delaney (ed.), *Physiological and Morphological Criteria for Alfalfa Plant Breeding*. Wyoming Agric. Exp. Sta. Res. J. 164 (1981).
- Dobrenz, A. K., J. E. Stone, M. H. Schonhorst, and S. Riggins. Arizona Coop. Ext. Serv. and Agric. Exp. Sta. Forage and Grain Report Series P-50: 12 (1980).
- Khatib, K. H., and M. A. Massengale. Prog. Agric. Ariz. 18:21 (1966).
- Smith, Dale, and B. E. Struckmeyer. Can. J. Plant Sci. 57:293 (1977).
- Stone, J. E., D. B. Marx, and A. K. Dobrenz. Agron. J. 71:425 (1979).

Small Grain Weed Control in Arizona - 1981

Stanley Heathman

During the 1981 wheat growing season growers often found it necessary to combat weeds. Wild oat and canarygrass remain the most difficult weeds to control. Some growers discovered again that using wheat seed contaminated with wild oat was a very expensive decision. Fields in Graham County which were previously free of wild oat have now reached levels of wild oat infestation where crop rotation or the use of herbicides will be necessary to achieve normal wheat yields.

The best advice to wheat growers we can make is to prevent new weed infestations from occurring. Some other important points are:

1. Inspect wheat fields early in the season for weeds. Wild oat and canarygrass must be treated from the 2 leaf stage to no later than the 5 leaf stage.
2. If wild oat and canarygrass are sighted later in the season remove by hand roguing before they mature.
3. If a small infestation is left unchecked and wheat is grown consecutively for 3 years, yield of wheat will be reduced.

Hoelon (diclofop)

This was the first year Hoelon was used commercially in Arizona. Control of wild oat was often excellent. However, some less desirable results occurred. Some of the problems we saw were:

1. Wild oat was too large and application rate was too low. Use 2 2/3 pt/A for 2 to 3 leaf wild oat. Use 3 1/3 pt/A for wild oat in 4 leaf stage. Hoelon is not effective when wild oat is larger than 4 leaf stage.
2. Improper application. The aerial applicator was not able to apply the herbicide uniformly. Wide swathing resulted in poor weed control. You need very accurate application of herbicide to achieve control.

Hoelon will give only partial control of canarygrass. It will not control rabbitsfoot grass. Do not tank mix with a broadleaf herbicide.

Carbyne (barban)

Good control of canarygrass can be achieved with Carbyne. Heavy infestations may require a split application. Control of wild oat should be commercially successful but 80 to 90% control is about all you receive. The field may still look weedy at harvest but yield of wheat is normal.

Avenge (difenzoquat)

The use of Avenge for wild oat control in durum wheat is not suggested. Many cultivars of durum wheat are much too sensitive to Avenge.

Prowl (pendimethalin)

This herbicide has been tested by American Cyanamid Co. for preemergence control of canarygrass and some annual broadleaf weeds. It has worked reasonably well on some soil types, particularly the lighter soils which do not tend to crack when dry. Some selectivity problems can occur where the wheat seed is not covered with soil during planting and the subsequent application of Prowl comes into contact with the seed.

Weed Control in Wheat I

Stanley Heathman and Sam Stedman

Herbicides applied January 27, 1981 in 40 gpa water, full coverage to the foliage of the plants. The Produra wheat was planted over 38 in. beds. The soil was a silty loam, temperature 75° F, and winds were calm. Plot size was 6 beds wide and 25 ft. long, replicated 3 times. Seed species were well distributed in the test area.

Growth stage at time of application

Wheat - tillering - 6 to 10 in.
 Silversheath knotweed - 3 in. tall
 Black mustard - 2 to 6 in. tall
 London rocket - 2 in. tall
 Annual yellow sweetclover - cotyledon to 1 trifoliate leaf
 Redstem filaree - 6 in. rosette
 Mediterraneangrass and wild barley - seedling to 2 in. tall