

# Canarygrass Control in Wheat

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## Canarygrass Identification and Growth Habits

Canarygrass has become increasingly widespread in wheat and barley grown in the desert southwest. Ten species of canarygrass have been identified in the western states, although only two or three of these are serious weed pests. Littleseed Canarygrass (*Phalaris minor*) is the species that is most widespread and troublesome in southern California and Arizona. Carolina Canarygrass (*Phalaris Caroliniana*) is similar to Littleseed and can only be differentiated by a close examination of the flowers. It is littleseed canarygrass that is the principal weed pest in grain grown in this region. Reed Canarygrass (*Phalaris arundinacea*) is widespread at higher elevations especially in wet areas such as irrigation ditches and canals. Short-spiked Canarygrass (*Phalaris brachystachys*) is found in central California especially in rice fields as is Gnawed Canarygrass (*Phalaris paradoxa*). Three species, *P. angusta*, *P. lemmoni* and *P. californica*, have some forage value but are also weeds. Harding Grass (*Phalaris tuberosa*) is a bunch type perennial canarygrass. It was introduced by the California Agricultural experiment Station for forage but has become locally naturalized in some areas. With the exception of this species, all others are winter annuals.

Littleseed canarygrass typically begins to germinate in October and continues to germinate until spring. It emerges from both shallow depths (top ½ inches) with the crop seed and much deeper depths (1-5 inches) where the soil cracks. It is common for canarygrass to be at variable growth stages, from 1 leaf to tillering, at the same time within a grain crop. These growth habits make control difficult. The season long germination reduces the efficacy of herbicides in which weed growth stage is important and the deep emergence through soil cracks reduces the efficacy of soil active herbicides (Treflan or Prowl).

Canarygrass is a vigorous and prolific weed that can significantly reduce wheat and barley yields. Yield reductions of 30 to 40% are common where infestations are 20 to 40 per square foot while reductions of 50 to 70% have been measured where infestations are 100 per square foot.

Canarygrass has become increasingly widespread in wheat and barley grown in the desert southwest over the past 15 years. Prior to this time, wildoat was the principal grass weed in these crops. The increasing problems with canarygrass and decreasing problems with wildoat are a result of the tools available to control these weeds.

## Control

Cultural practices at planting can be effective in controlling canarygrass. Crop rotation and pre-irrigation followed by mulch planting are practices that can keep canarygrass in check. Mulch planting requires a pre-irrigation before planting. This pre-irrigation will germinate many weeds. As the field starts to dry, the surface couple inches are lightly cultivated. The wheat or barley is planted below the cultivated or mulch layer into moist soil. The grain seed will germinate in this moist layer and emerge while shallow small seeded weeds, such as canarygrass, will not. Fields are not re-irrigated until the wheat is established and more competitive. Mulch planting is not always feasible for a few reasons: 1) fields often do not have uniform texture and will dry out at different rates, in which case a uniform mulch is not possible; 2) rain will wet the surface, germinate the shallow weeds and negate the effects of this practice and; 3) the time required to pre-irrigate is not always available, especially to growers planting grain after a late season crop such as vegetables.

There have never been many herbicides available for the control of canarygrass. Pre-emergent herbicides such as Trifluralin (Treflan) or Prowl do not have good crop safety because of the shallow depth wheat and barley are planted in in the desert southwest or consistent weed control because of deep emergence through soil cracks. Carbyne (Barban) was widely used as a post-emergence treatment for canarygrass control until about 10 years ago when it was no longer manufactured. This herbicide was relatively inexpensive and effective but occasionally caused serious injury if the crop was stressed by cold, drought or other means. Hoelon (Dicofop) has been used for grass weed control in wheat and barley in the southwestern deserts since the early 1980's. This herbicide is very effective on wildoat and some other grasses but inconsistent in controlling littleseed canarygrass. Control commonly ranges from 60 to 90%. This is probably because of the multiple growth stages canarygrass can be at, at one time, in the same field. Hoelon has been the only herbicide available for canarygrass control for more than 10 years. This has caused canarygrass to become increasingly abundant and widespread year after year.

Other herbicides have been evaluated for canarygrass control over the past several years. Three of these have been developed in recent years and have shown good potential in our tests.

Achieve (Tralkoxydin) is developed by Zeneca as a post-emergent annual grass herbicide for use in cereal crops including spring and winter wheat, durum wheat and barley. Achieve is a lipid biosynthesis inhibitor similar to Poast, Fusilade, Hoelon and Select. Inhibiting fatty acids blocks the production of Phospholipids used in building new membranes required for cell growth. These herbicides effect only grasses and are slow acting, taking 10 to 14 days to achieve complete weed control. Achieve was granted a Federal Section 3 registration in 1998. This is a full registration. Application has been made in Arizona although state officials have required additional information. Zeneca is collecting this information although Arizona registration is not expected for two or three years.

Puma (Fenoxaprop) is developed by AgrEvo as a post-emergence grass herbicide in a variety of crops including wheat, soybeans and turf. It is a lipid biosynthesis inhibitor like Achieve, Hoelon, Poast, Fusilade, Select and others. Fenoxaprop by itself is phytotoxic to wheat but Puma contains a safener. It is also safened when combined with some broadleaf herbicides such as 2,4-D and MCPA. Fenoxaprop is not a new herbicide. It was first developed in the early 1980's and has been in our tests for over 10 years. It has a Federal Section 3 registration on grain although the State of Arizona has indicated that it will require additional information.

MKH6561 (Bayer Experimental) is being developed by Bayer for annual grass and broadleaf weed control in cereals. It has been tested in the desert southwest for about 5 years and is still some way off from registration.

## Recent Tests

Two tests from 1998 and 1999 are summarized here to illustrate the weed control, crop safety and yield effects of four herbicides for canarygrass control in wheat.

### **Test 1** - See Table 1

Location: Roll, AZ

Soil Type: Silty Loam

1<sup>st</sup> Application: 1-26-98

Wheat: 2-3 leaf      Canarygrass: 1-3-3 leaf, 5-10 ft.<sup>2</sup>

2<sup>nd</sup> Application: 2-18-98

Wheat: 6-7 leaf      Canarygrass: 1 leaf to tillering

Plot Size: 13' x 20' - Randomized complete block,  
4 replications

Spray Volume: 20 gpa, 8002 teejet flat fan nozzles,  
CO<sup>2</sup> backpack sprayer

Visual Evaluation: 5-13-98

Harvested: 6-15-98 - 0.0001 A subplots - Vogal  
thrasher

### **Test 2** - See Table 2

Location: Yuma Valley Agriculture Station

Soil Type: Silty clay loam

1<sup>st</sup> Application: 2-02-99

Wheat: 4-6 leaf      Canarygrass: 1-4 leaf - 1-10 ft<sup>2</sup>

Plot Size: 20' x 20' - Randomized complete block,  
4 replications

Spray Volume: 20 gpa, 8002 teejet flat fan nozzles,  
CO<sup>2</sup> backpack sprayer

2<sup>nd</sup> Application: 2-15-99

Wheat: 7-8 leaf    Canarygrass: 1 leaf to tillering

Visual Evaluation: 5-25-99

Harvested: 6-09-99 - 0.0001 A subplots - Vogal  
thrasher

### **Conclusions From These Tests**

- 1) Weed control from all of these herbicides can be variable from year to year, field to field and even within the same field. This is probably the result of the multiple emergence of canarygrass and the fact that this weed can be from 1 leaf to elongating at any one time in the same field. Although some of these herbicides have soil activity, they do little good on weeds that emerge from 3 or 4 inches through cracks in the soil. Weeds that have emerged and are at a susceptible growth stage, will be controlled. The others will not.
- 2) Hoelon produces inconsistent and incomplete control of canarygrass. It was slightly more effective when applied at later stages of the crop probably because more canarygrass had emerged. Hoelon does, however, have soil activity and has controlled canarygrass when applied preplant in past tests. Unacceptable crop injury results, however, from preplant application of Hoelon and weeds continue to emerge from cracks.
- 3) Puma is effective in controlling canarygrass when applied at 0.067 lb.ai/A or higher at later growth stages of the wheat when most of the canarygrass has emerged and good coverage can still be achieved. Puma will control canarygrass up to the tillering stage of growth and maybe later. Puma has good crop safety but will cause temporary leaf burn that has no effect on crop yield.
- 4) Achieve produced excellent control of canarygrass in the 1998 test when applied at the later growth stage of the wheat when most of the canarygrass had emerged. It had good crop safety and controlled canarygrass from 1 leaf to tillering. It was less consistent in the 1999 test and there was much variability from plot to plot. Although more work is required to better define how Achieve can best be used, it appears from these two tests that it can be an effective herbicide for canarygrass control in grain in the desert southwest.
- 5) MKH6561 produced good to excellent control of canarygrass especially when applied at the later stages of crop development when most of the canarygrass had emerged. It controlled canarygrass from 1 leaf to tillering. Crop safety is a concern. Wheat was stunted significantly, especially in the 1998 test when wet conditions at application may have caused it to be more severe. If equal levels of control can be achieved with other herbicides without injury, it may reduce the utility of this herbicide.
- 6) Canarygrass can significantly reduce wheat yields at the infestation levels present in these two tests. Similar results have been measured in several other tests.

Table 1. Evaluation of 4 Herbicides for Canarygrass Control in Wheat - 1998 - Roll, AZ

Herbicide	Rate (lbs.ai/A)	Application Time (Canarygrass)	Weed Control (%)	Phytoxicity (%)	Yield (lb./A)
1. Puma	0.044	1 - 3 leaf	56 g	0 g	8216 c
2. Puma	0.067	1 - 3 leaf	64 fg	0 g	8739 b
3. Puma	0.089	1 - 3 leaf	70 ef	0 g	8034 c
4. Puma	0.11	1 - 3 leaf	80 cd	0 g	7379 e
5. Hoelon	1.0	1 - 3 leaf	64 fg	0 g	5380 i
6. MKH6561	0.039 (Product)	1 - 3 leaf	83 bc	20 d	9009 ab
7. MKH6561	0.057 (Product)	1 - 3 leaf	94 a	24 c	9449 a
8. Achieve	0.25	1 - 3 leaf	71 def	0 g	7456 de
9. Untreated	-	-	0 h	0 g	4185 j
10. Puma	0.044	1 leaf to tillering	76 cde	6 f	6718 fg
11. Puma	0.067	1 leaf to tillering	91 ab	6 f	6823 fg
12. Puma	0.089	1 leaf to tillering	93 a	9 ef	6850 ef
13. Puma	0.11	1 leaf to tillering	98 a	11 e	7792 ccl
14. Hoelon	1.0	1 leaf to tillering	79 cde	11 e	6029 h
15. MKH6561	0.039 (Product)	1 leaf to tillering	95 a	33 b	6402 gh
16. MKH6561	0.057 (Product)	1 leaf to tillering	99 a	39 a	6982 ef
17. Achieve	0.25	1 leaf to tillering	97 a	0 g	9284 a
18. Untreated	-	-	0 h	0 g	4257 j

LSD (.05) = 9.37

LSD (.05) = 2.78

LSD (.05) = 485.2

Table 2. Evaluation of 4 Herbicides for Canarygrass Control in Wheat - 1999 - Yuma Valley, AZ

Herbicide	Rate (lbs.ai/A)	Application Time (Canarygrass)	Weed Control (%)	Phytoxicity (%)	Yield (lb./A)
1. Puma	0.089	1 - 4 leaf	84 bc	0 e	6250 ab
2. Puma	0.11	1 - 4 leaf	94 a	0 e	6211 ab
3. Hoelon	1.0	1 - 4 leaf	61 e	0 e	6446 ab
4. MKH6561	0.0382 (Product)	1 - 4 leaf	73 d	2.5 d	5424 abc
5. MKH6561	0.0574 (Product)	1 - 4 leaf	86 abc	7.5 c	6349 ab
6. Achieve	0.25	1 - 4 leaf	83 bc	0 e	6349 ab
7. Untreated	-	-	0 f	0 e	3309 c
8. Puma	0.089	1 leaf to tillering	94 a	0 e	6140 ab
9. Puma	0.11	1 leaf to tillering	94 a	0 e	6206 ab
10. Hoelon	1.0	1 leaf to tillering	71 de	0 e	7153 a
11. MKH6561	0.0382 (Product)	1 leaf to tillering	85 abc	15 b	6531 ab
12. MKH6561	0.0574 (Product)	1 leaf to tillering	92 ab	25 a	4604 cd
13. Achieve	0.25	1 leaf to tillering	77 cd	0 e	6757 ab
14. Untreated	-	-	0 f	0 e	5402 abc

LSD (.05) = 9.94

LSD (.05) = 2.24

LSD (.05) = 2443.5