CHEMICAL CONTROL OF CRABGRASS IN SPRING PLANTED ALFALFA

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INTRODUCTION

Establishment of new plantings of alfalfa, Medicago sativa (L.), is often difficult because of the many hazards encountered during the first season of growth.

In Oklahoma new plantings of alfalfa are attempted primarily in the fall to avoid competition from crabgrass, Digitaria sanguinalis (L.). In the spring when moisture is available for seeding, alfalfa seedlings are eliminated in most cases by the more rapid growing seedlings of this weedy grass. The dry weather in Oklahoma prohibits the use of small grains as companion crops. By planting in the fall the farmer is faced with the possibility of losing the new planting from both drought and winter kill. Because of these hazards, plantings of alfalfa are often maintained long after production has dropped below an economic level. Use of alfalfa in short term rotations is avoided because of these hazards.

With the development of new pre-emergence and pre-plant herbicides, the possibility of keeping alfalfa seedlings free of weeds is highly probable. If crabgrass can be economically eliminated from alfalfa plantings, spring seeding would become a common practice in Oklahoma.

The purpose of this study was to determine if, by the use of herbicides, alfalfa could be established in the spring and survive. Different rates and methods of application were used to determine the tolerance

of alfalfa and crabgrass to these herbicides. Stand counts and forage production of both alfalfa and crabgrass were obtained to assist in this determination.

LITERATURE REVIEW

It is an accepted fact that fall establishment of legume plantings face the combined hazards of winter kill and drought. In an effort to avoid these hazards the practice of spring planting has been attempted, but competition from crabgrass is considerable. In some areas it is a common practice with spring plantings to use oats as a companion crop. In dry weather the companion crop competes with the slower growing legume for moisture and nutrients and does little to control weeds. The legume may also be shaded out by the more rapid growth of its companion crop.

Herbicides show promise of eliminating weeds from spring planted legumes when seeded without a companion crop. Klingman (8)[1] reported the tolerance of legume seedlings to post-emergence applications of herbicides varied with the herbicide used. Weedy grasses which were affected by the herbicides also expressed a varied tolerance. Klingman (9) also showed that plots treated with dalapon and TCA had better stands of alfalfa plants than the untreated plots. Good to excellent weedy grass control was obtained from the post-emergence treatments.

Alfalfa seedlings, in tests conducted by Slife (16), were retarded by dalapon at 4 pounds per acre and TCA at 8 pounds per acre, but later recovered. Complete control of several annual weedy grasses was obtained. Dalapon at 4 pounds per acre was the most effective post-

[1] Figures in parenthesis refer to Literature Cited.

emergence treatment on weedy grasses. In additional studies on seedling alfalfa with post-emergence treatments of 2,4-DB and dalapon, Slife and Gantz (17) found the most effective treatment for control of weedy grasses was a mixture of 1/2 pound 2,4-DB plus 2 pounds dalapon per acre. This application was made on plants two inches tall. Treatments on plants five inches tall were less effective because of the more advanced growth of weeds. Heavier rates of the mixture caused leaf burning of alfalfa and retarded its growth. Good control of broad-leaved weeds was obtained from 2,4-DB at 1 and 2 pounds per acre while dalapon gave control of weedy grasses at 3 pounds per acre.

Santelmann et al. (15) found that TCA and dalapon applied at three stages of growth, pre-emergence, two and four leaf, to new seedlings of alfalfa gave moderate to severe injury to the alfalfa. These chemicals gave fair to good control of wheat and oats seeded with the legumes, but had little effect on the weeds. They indicated that DNBP appeared to be the most promising chemical for weed control in seedling legumes.

Brown (1), in treating alfalfa seedlings two inches and five inches tall, was able to show that the stage of growth made little difference in amount of injury to the alfalfa seedlings. Either MCPB or 2,4-DB at rates of 16 ounces per acre killed weeds satisfactorily and did not unduly injure the alfalfa. MCDA amine slightly reduced the stand of alfalfa at the 5 ounce per acre rate, but gave little or no evidence of injury at the 3 ounce rate.

Evidence obtained by Friesen (6) has shown that legumes will tolerate sufficient phenoxy herbicides to suppress if not kill the common annual weeds. This suppression has been great enough to give increased yields of forage in the establishment year, where seeding was

done without a companion crop. This advantage failed to be reflected in the yields of forage the following year. Friesen (5) reported from tests conducted on legumes seeded without a companion crop that post-emergence treatments of 4-(2,4-DB) ester, amine and sodium salts were outstanding as determined by number and vigor of alfalfa plants. Weed control with 4-(2,4-DB), 4-(MCPB) and MCPA was satisfactory although 4-(2,4-DB) enjoyed a distinct advantage at the 8 and 16 ounces per acre rate.

Dalapon at the rate of 2 pounds per acre was shown, by Hollingsworth (7), to eliminate weedy grasses and somewhat reduce the growth of broadleaved weeds. Dalapon, at the rate used, inhibited red clover, but caused little or no damage to alfalfa and birdsfoot trefoil. One pound of 4-(2,4-DB) per acre reduced broadleaved weeds, but permitted an increase in weedy grasses. Plots treated with 4-(2,4-DB) consistently produced higher forage yields than did other plots with the exception of those that were hand weeded.

Nash (11), in post-emergence studies with 4-(2,4-DB), 4-(MCPB) and dalapon, indicated that the ester formulations of the butyric acids were equal to each other in performance and at the 1 pound per acre rate were more effective than either of the amine formulations, although not significantly so. These herbicides at the higher rate of 2 pounds per acre gave better weed control, although, the increase in control was slight with the ester formulations. Observation revealed no difference between the ester and sodium salt formulations of dalapon as affecting alfalfa and all grasses were completely killed in either case.

Post-emergence treatments with dalapon plus 4-(2,4-DB) in both the ester and amine forms were applied by Peters (12) to seedling alfalfa. The addition of 2 pounds of dalapon to the 1 pound rate per acre of either the amine or ester formulation of 4-(2,4-DB) gave good control of both broadleaved weeds and weedy grasses, but reduced the yield of alfalfa appreciable. Optimum yields of alfalfa with good weed control were obtained from 4-(2,4-DB) at 1 pound per acre. When weed infestations were severe, 2 pounds of the amine gave better weed control, but reduced alfalfa yields.

McCarty and Sand (10) found that alfalfa apparently tolerates TCA at 5 to 7 pounds per acre and dalapon at 1 to 2 pounds per acre from time of emergence on. The response of alfalfa seedlings to a reduction of competition is proportionately greater the earlier the growth of the weedy grasses is stopped. Some stunting produced by the higher rates of application resulted in less volume of forage at clipping time. However, the regrowth was apparently normal and no loss of stand was observed. Increased forage yields by the reduction of competition from broadleaved weeds was demonstrated by Sand and McCarty (14), with post-emergence treatments of 4-(2,4-DB) and 4-(MCPB) at the 1/2 or 1 pound per acre rate. The 4-(2,4-DB) was somewhat more effective in weed control than the 4-(MCPB) which also showed some alfalfa injury.

Elder (3) showed that seedling legumes soon recovered from any effect of pre-emergence and post-emergence treatments and were equal to growth in the check plots. TCA and dalapon at the higher rates killed all weedy grasses in seedling legumes. Few broadleaved weeds were controlled except from the pre-emergence treatments. CDAA destroyed

few weedy grasses and no broadleaved weeds. Elder (4) was also able to show that pre-emergence treatments of EPTC at the rate of 8 pounds per acre destroyed very little alfalfa and was more effective than dalapon, TCA and 4-(2,4-DB) at rates of 3, 8 and 2 pounds per acre, respectively.

Dowler and Willard (2) obtained good control of weedy grasses and purslane with a pre-emergence application of 3 pounds EPTC per acre with no harmful effect to seedling alfalfa. Control of broadleaved weeds was unsatisfactory. Neburon in post-emergence treatments of 1, 2 and 4 pounds per acre gave good control of mustard. A mixture of 2 pounds dalapon per acre plus 1 pound 4-(2,4-DB) per acre gave good results and was the most satisfactory mixture tested.

Pre-emergence applications of neburon and EPTC in tests conducted by Wakefield and Hull (19) apparently produced good weed control without seriously damaging or killing seedling legumes. Neburon sprayed on the seedbed after planting at the rate of 2 to 4 pounds per acre produced no damage to alfalfa. Some injury was evident in the birdsfoot trefoil and clover plots, but was not considered serious at the lower rates. EPTC applied prior to emergence, preferably prior to seeding by disking into the seedbed, at 4 to 8 pounds per acre gave weed free forage with no damage to seedlings.

Peters (13) obtained outstanding results from pre-emergence treatments of 15 pounds EPTC per acre, 2 pounds neburon per acre and preplant treatments of 2 pounds EPTC per acre. All herbicides reduced broadleaved weeds considerably in the first cutting. Neburon was not

effective in controlling grasses, but the higher rate of EPTC in both the pre-emergence and pre-plant treatments eliminated the grasses. These experiments showed that weed competition can be nearly eliminated and successful stands of alfalfa can be established by spring seeding when pre-emergence herbicides are used. Valuable yields of high quality hay can also be obtained the seedling year when weed competition is reduced.

MATERIALS AND METHODS

This study was conducted on the Oklahoma Agronomy Research Station, at Stillwater, on a fairly uniform Norge loam soil with a 3 to 5 percent slope. A good seedbed was prepared by plowing, disking and harrowing, and 300 pounds of 0-20-0 fertilizer were broadcast with a Gandy spreader. Crabgrass seed was also broadcast with a Gandy spreader to insure a uniform stand of grass. A spike tooth harrow was used to incorporate both the fertilizer and crabgrass seed into the soil.

Pre-plant treatments of EPTC, ethyl di-n-propylthiolcarbamate, in the granular and liquid forms, were applied at rates of 2, 4 and 8 pounds per acre on April 23. Buffalo alfalfa was seeded April 24 in the treated plots and also in the plots designated for the pre-emergence treatments and check plots. The pre-emergence treatments of neburon, 1-n-butyl-3-(3,4-dichlorophenyl)-1-methylurea, at 3 pounds per acre, dalapon, 2,2-dichloropropionic acid, at 3 pounds per acre and EPTC at 2, 4 and 8 pounds per acre were applied April 24 just after the alfalfa was seeded. Two check plots were included in the treatments, one where all vegetation was allowed to grow unchecked and one where only alfalfa was allowed to survive. This clean check treatment was accomplished by hand weeding. The check plots were included to determine the variation of forage production caused by the chemical and weed competition.

The field design for this problem was a randomized complete block with four replications for each treatment. The alfalfa was seeded with a Planet Junior in rows one foot apart. Each treated plot included four rows 20 feet long. To reduce border effect on the plot ends alleys six feet wide were included in the design. The center alley was increased to 10 feet to allow for a sprinkler irrigation system which was necessary to provide adequate moisture for germination of the alfalfa seed and any viable crabgrass seed present. It was necessary to use this irrigation system several times between April 24 and May 5. Rainfall from May 1 to September 1 amounted to 23.08 inches, but because of distribution, irrigation was applied when necessary for optimum growing conditions.

A knapsack sprayer equipped with a one foot boom having two Tee-jet nozzels, number 80015E, was used for all liquid herbicides applied. The spray was applied at a rate of 40 gallons of water per acre with an air pressure of 30 pounds per square inch being maintained during the spraying process. The granular herbicide was applied with a hand drop planter. This granular herbicide and the pre-plant liquid were both incorporated into the soil to a depth of one-half to two inches by hand raking.

Observations of all treatments were made on May 15. At this time the alfalfa seedlings were approximately one and one-half inches in height and a stand count was taken to determine the number of alfalfa seedlings present and the number of crabgrass seedlings surviving, if any. This count was obtained from the two center rows of each treatment by using a one foot by four feet quadrat. No other weed counts were taken, but periodic observations were made of the weed and alfalfa growth.

When the alfalfa reached the one-fifth bloom stage the two center rows of each treatment were clipped two inches from the ground with a Jari mower and weighed for determination of total forage production. A moisture sample and a separation sample were taken from each treatment. The moisture sample was used to determine the total forage production on a dry weight basis and the separation sample was used to determine the botanical composition. This botanical composition, which was obtained by the hand separation method, was used to determine that part of the actual production contributed by the alfalfa and crabgrass. The first clipping was taken on June 24, and the second and third clippings were made on July 24 and August 26, respectively. After each clipping the border rows were clipped and the forage removed from the area. Observations were made after each clipping to determine recovery of alfalfa and the presence of crabgrass. The forage production from all three clippings was combined to determine the total seasonal forage yield. A fourth clipping was not made, but observation indicated a normal seed crop was produced.

Statistical analysis of the number of alfalfa seedlings in each treatment was conducted as outlined by Snedecor (18). Statistical analysis of the crabgrass seedling counts was not necessary because of the obvious superiority of the EPTC treatments.

RESULTS AND DISCUSSION

Three weeks after application of the herbicides one hundred percent control of crabgrass was found in all treatments except the neburon, dalapon and check no hoe treatments. The neburon, dalapon and check no hoe treated plots had a heavy infestation of crabgrass. Data of alfalfa and crabgrass seedlings present when stand counts were made is presented in Tables I and II. No significant difference among treatments was found in the number of alfalfa plants present. A later germination of crabgrass resulted from above average rainfall during the growing season. Some broadleaved weeds also germinated later, but were not considered in this problem. These broadleaved weeds were of no importance after the first clipping.

Observations indicated all herbicide treatments resulted in some growth retardation of alfalfa seedlings. The amount of retardation in the EPTC treatments varied proportionately with the rate of application. The heavier applications showed less growth with the 8 pound granular EPTC, pre-plant, per acre treatment showing the most injury. The lower pre-plant rates resulted in retardation comparable to the higher pre-emergence EPTC rates. The neburon and dalapon treatments were comparable to the lower pre-emergence EPTC rates. At this time it was also observed that all seedlings showed some leaf damage. As the growing season progressed this leaf damage and retarding effect disappeared.

TABLE I

The effect of various treatments
on survival of young alfalfa seedlings.

Herbicide	Method of Application	Rate Per Acre	Number of Alfalfa Seedlings Per 8 Square Feet Rep I	Rep II	Rep III	Rep IV	Mean
EPTC	Pre-emergence	2 pounds	121	131	109	160	130.25
EPTC	(liquid)	4 pounds	120	168	128	120	134.00
EPTC		8 pounds	122	136	106	146	127.50
EPTC	Pre-plant	2 pounds	118	136	145	106	126.25
EPTC	(liquid)	4 pounds	118	148	122	105	123.25
EPTC		8 pounds	134	135	140	124	133.25
EPTC	Pre-plant	2 pounds	144	164	121	130	139.75
EPTC	(granular)	4 pounds	126	148	116	140	132.50
EPTC		8 pounds	120	123	123	151	129.25
Neburon	Pre-emergence	3 pounds	138	100	104	84	106.50
Dalapon	Pre-emergence	3 pounds	148	138	125	112	130.75
Ck Hoed			96	140	122	125	120.75
Ck No Hoe			160	131	97	100	122.00

TABLE II

The effect of various treatments
on the control of young crabgrass seedlings.

Herbicide	Method of Application	Rate Per Acre	Number of Crabgrass Seedlings Per 8 Square Feet Rep I	Rep II	Rep III	Rep IV	Mean
EPTC	Pre-emergence	2 pounds	0	0	0	0	0
EPTC	(liquid)	4 pounds	0	0	0	0	0
EPTC		8 pounds	0	0	0	0	0
EPTC	Pre-plant	2 pounds	0	0	0	0	0
EPTC	(liquid)	4 pounds	0	0	0	0	0
EPTC		8 pounds	0	0	0	0	0
EPTC	Pre-plant	2 pounds	0	0	0	0	0
EPTC	(granular)	4 pounds	0	0	0	0	0
EPTC		8 pounds	0	0	0	0	0
Neburon	Pre-emergence	3 pounds	141	132	151	215	159.75
Dalapon	Pre-emergence	3 pounds	530	295	269	456	387.50
Ck Hoed			0	0	0	0	0
Ck No Hoe			354	285	373	230	308.25

Data from the results of the first clipping is presented in Table III. These data show extremely high forage production values from the neburon, dalapon and check no hoe treatments, however, the botanical composition of these three treatments showed these yields to be primarily from crabgrass. All EPTC pre-emergence and pre-plant treatments show a decreasing amount of crabgrass production as the rate of herbicide increased.

Observation of the plots after the first clipping revealed all EPTC treatments and the check hoed treatment recovered rapidly with no apparent loss of alfalfa plants. The heavier EPTC treated plots had less competition from crabgrass and appeared to recover more rapidly than the lighter applications. The neburon, dalapon and check no hoe treatments recovered less rapidly and the loss of alfalfa plants appeared to be considerable.

No new broadleaved weeds were present on July 24 when the second clipping was made. Data presented in Table IV shows the forage production from this clipping. The low yields in the neburon, dalapon and check no hoe treatments probably is the result of poor recovery following the first cutting or actual loss of the alfalfa plants. Production from these three treatments is considerably less than from the first clipping. The check hoed and all EPTC treatments show a marked increase in alfalfa production and in some cases a slight increase in crabgrass. The recovery following this clipping was consistant with the recovery from the first clipping. Plots receiving the higher rates of EPTC, which had less competition from crabgrass, showed the most rapid recovery.

TABLE III

The effect of various treatments on the forage production of alfalfa and crabgrass at the first harvest, June 24, 1959.

Herbicide	Method of Application	Rate Per Acre	Pounds of Dry Weight Per Acre		
			Grass	Alfalfa	Total
EPTC	Pre-emergence (liquid)	2 pounds	223.25	789.53	1,012.77
EPTC		4 pounds	119.79	1,113.50	1,233.29
EPTC		8 pounds	40.84	1,086.28	1,127.12
EPTC	Pre-plant (liquid)	2 pounds	405.65	724.19	1,129.84
EPTC		4 pounds	13.61	1,056.33	1,069.94
EPTC		8 pounds	8.17	729.63	737.80
EPTC	Pre-plant (granular)	2 pounds	345.76	811.31	1,157.06
EPTC		4 pounds	334.87	759.58	1,094.45
EPTC		8 pounds	13.61	460.10	473.72
Neburon	Pre-emergence	3 pounds	2,409.41	228.69	2,638.10
Dalapon	Pre-emergence	3 pounds	3,544.70	315.81	3,860.51
Ck Hoed			2.72	729.63	732.35
Ck No Hoe			2,714.33	392.04	3,106.37

TABLE IV

The effect of various treatments on the forage production of alfalfa and crabgrass at the second harvest, July 24, 1959.

Herbicide	Method Application	Rate Per Acre	Pounds of Dry Weight Per Acre		
			Grass	Alfalfa	Total
EPTC	Pre-emergence (liquid)	2 pounds	206.91	941.99	1,148.90
EPTC		4 pounds	127.96	1,091.72	1,219.68
EPTC		8 pounds	87.12	1,219.68	1,306.80
EPTC	Pre-plant (liquid)	2 pounds	174.24	952.88	1,127.12
EPTC		4 pounds	130.68	1,167.95	1,298.63
EPTC		8 pounds	166.07	1,203.35	1,369.42
EPTC	Pre-plant (granular)	2 pounds	166.07	1,108.06	1,274.13
EPTC		4 pounds	250.47	827.64	1,078.11
EPTC		8 pounds	100.73	879.37	980.10
Neburon	Pre-emergence	3 pounds	239.58	370.26	609.84
Dalapon	Pre-emergence	3 pounds	187.85	351.20	539.06
Ck Hoed			0	1,105.34	1,105.34
Ck No Hoe			223.25	348.48	571.73

Forage production data from the third clipping is shown in Table V. The yield of alfalfa compared to the second cutting increased in all treatments except that which received 8 pounds of the granular EPTC herbicide per acre. No explanation can be offered for the decline in alfalfa yield. The neburon, dalapon and the check no hoe treatments also showed some increase but did not approach the production from the above mentioned treatments. The recovery from the third clipping was consistant with the two earlier clippings.

Total forage production data and the yield contributed by alfalfa and crabgrass for the growing season is presented in Table VI. The neburon, dalapon and check no hoe treatments show a higher total forage production than the other treatments, but an analysis of the botanical composition showed this to be primarily crabgrass. The alfalfa forage production from these treatments was considerably less than the check hoed treatment. The total forage production from all except one of the EPTC treatments, 8 pounds granular EPTC per acre, was greater than the the check hoed treatment. Alfalfa forage production from the 4 and 8 pounds liquid EPTC per acre pre-emergence treatments, 4 and 8 pounds liquid EPTC per acre pre-plant treatments and the 2 pounds granular EPTC per acre pre-plant treatment was greater than the check hoed treatment.

TABLE V

The effect of various treatments on the forage production of alfalfa and crabgrass at the third harvest, August 26, 1959.

Herbicide	Method of Application	Rate Per Acre	Pounds of Dry Weight Per Acre		
			Grass	Alfalfa	Total
EPTC	Pre-emergence (liquid)	2 pounds	242.30	1,151.62	1,393.92
EPTC		4 pounds	198.74	1,151.62	1,350.36
EPTC		8 pounds	166.07	1,279.58	1,445.65
EPTC	Pre-plant (liquid)	2 pounds	258.64	1,187.01	1,445.65
EPTC		4 pounds	182.41	1,274.13	1,456.54
EPTC		8 pounds	92.57	1,323.14	1,415.70
EPTC	Pre-plant (granular)	2 pounds	204.19	1,211.51	1,415.70
EPTC		4 pounds	264.08	1,102.62	1,366.70
EPTC		8 pounds	242.30	833.09	1,075.39
Neburon	Pre-emergence	3 pounds	449.21	413.82	863.03
Dalapon	Pre-emergence	3 pounds	378.43	533.61	912.04
Ck Hoed			0	1,211.51	1,211.51
Ck No Hoe			424.71	375.71	800.42

TABLE VI

The effect of various treatments on the total forage production of alfalfa and crabgrass for the season in 1959.

Herbicide	Method of Application	Rate Per Acre	Pounds of Dry Weight Per Acre		
			Grass	Alfalfa	Total
EPTC	Pre-emergence (liquid)	2 pounds	672.46	2,883.13	3,555.59
EPTC		4 pounds	446.49	3,356.84	3,803.33
EPTC		8 pounds	294.03	3,585.53	3,879.56
EPTC	Pre-plant (liquid)	2 pounds	838.53	2,864.07	3,702.60
EPTC		4 pounds	326.70	3,498.41	3,825.11
EPTC		8 pounds	266.81	3,256.11	3,522.92
EPTC	Pre-plant (granular)	2 pounds	716.02	3,130.88	3,846.89
EPTC		4 pounds	849.42	2,689.83	3,539.25
EPTC		8 pounds	356.65	2,172.56	2,529.20
Neburon	Pre-emergence	3 pounds	3,098.21	1,012.77	4,110.96
Dalapon	Pre-emergence	3 pounds	4,110.98	1,200.62	5,311.60
Ck Hoed			2.72	3,046.48	3,049.20
Ck N Hoe			3,362.29	1,116.23	4,478.51

SUMMARY AND CONCLUSIONS

The effect of herbicides on crabgrass in spring planted alfalfa was studied on the Oklahoma Agronomy Research Station, at Stillwater, in 1959. Herbicide treatments used were: liquid EPTC, applied pre-emergence and pre-plant, at rates of 2, 4 and 8 pounds per acre; granular EPTC, pre-plant, at the above rates; and both neburon and dalapon, pre-emergence, at the rate of 3 pounds per acre.

Statistical analysis indicated no significant difference among treatments in number of alfalfa plants present. All herbicide treatments retarded growth somewhat in the seedling alfalfa with the higher EPTC rates expressing the most effect. The most pronounced effect occurred in the 8 pounds granular EPTC per acre treatment. This effect was not evident in the forage yields except at the 8 pounds granular EPTC per acre rate and did not carry over after the first harvest. Excellent control of crabgrass was obtained in all EPTC treatments while the control with neburon and dalapon was unsatisfactory. Broadleaved weeds were no problem after the first harvest.

Total forage yield from all herbicide treatments, except the 8 pounds granular EPTC per acre, was higher than the check hoed treatment. The liquid EPTC at the 4 and 8 pounds per acre treatments, both as pre-emergence and pre-plant, and the 2 pounds granular EPTC per acre treatment showed a distinct advantage. The alfalfa forage production from the neburon and dalapon treatments was unsatisfactory when compared with the check hoed treatment.

Results obtained in this experiment indicate that both liquid and granular EPTC in per-emergence or pre-plant treatments could be used to eliminate competition from crabgrass without injury to alfalfa seedlings established in the spring. Based on the amount of early crabgrass control and the alfalfa forage produced liquid EPTC, pre-emergence and pre-plant, at rates of 2-4 pounds per acre and granular EPTC, pre-plant, at the rate of 2 pounds per acre appear to be the most satisfactory. Granular EPTC, pre-plant, at the 8 pounds per acre rate gave excellent early crabgrass control, but reduced the amount of alfalfa forage produced. Results also indicate that the use of neburon and dalapon in pre-emergence treatments on spring planted alfalfa would be ineffective for crabgrass control.

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