Preliminary Field Evaluation Of Some Herbicides Applied To Roots And Foliage Of Alligatorweed

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Current laboratory studies and past research (1) indicate that the absorption of various chemicals with direct herbicidal or synergistic properties is most effective when absorbed by underwater portions of alligatorweed.

Investigations during the 1967 growing season were oriented primarily toward the evaluation of certain acids which have shown varying synergistic effects when combined with commercial herbicides. Some possible reasons for increasd activity of herbicides would be the partial removal of cation interference from the roots and greater activation of herbicides by lowering the pH of cellular components. Research has shown that the activity of 2,4-D may be increased in the presence of other chemicals. Diglycolic acid has been shown to be synergistic with herbicides when used under field conditions. Other acids undoubtedly hold the same possibility.

There is no recognized commercial herbicide, at the present time, which will give consistent control of alligatorweed without undesirable residual effects. Studies of this nature could possibly yield more practical and efficient formulations for producing direct herbicidal action by various herbicides.

Root applications of herbicides, and various acids with possible synergistic properties, comprised the majority of the 1967 trials. There were 33 experimental plots and a total of 26 different treatments applied to undertater portions of alligatorweed. All treatments were included in plots located at Pecan Island, Louisiana and 6 duplicate plots were located at Lottie, Louisiana.

Treated areas at Pecan Island were barrow pits, located along the roadside, with little or no movement of water. Locations at Lottie consisted of a barrow pit adjacent to a flood control levee, in which water movement was more or less constant. However, mats were so dense at Lottie that little circulation of water was actually received within the body of the mat.

The 15 different foliar treatments were made at Pecan Island. The plots were generally 1000 sq. ft. The chemicals were mixed with water and applied in a total volume of 300 gpa.

Initial treatments were applied in late March to areas having vigorous, established, dense mats with new growth approximately eight to ten inches above water level. Vegetative growth of treated areas was about eighteen to twenty inches above water level during April and May.

Final plot treatments included in this report were made in mid-May. These treatments were terminated shortly before June because alligatorweed, in Louisiana, begins a period of senescence or partial dormancy. From June through August, plants lose all leaves with the exception of about twenty to twenty-five per cent on the terminal portions. Older stems lose their characteristics green color and become lignified.

Root treatments were made with 9 acids (acrylic, cyanoacetic, dichloroacetic, diglycolic, humic, lactic, phosphoric, tetraacetic and trichloroacetic), 6 commercial herbicides 2,4-D (2,4-dichlorophenoxyacetic acid), Casoron (2,6-dichlorobenzonitrile) WE, Casoron WP, Dowpon (2,2-dichloropropionic acid), Esteron 99 (a 2 lb/gal formulation of the PGBE ester of 2,4-D) and Silvex (2-[2,4-5-trichlorophenoxy] propionic acid) and molasses which was combined with 3 herbicides (Amine 2,4-D, Silvex and Esteron 99).

Acids involved in root applications included single rate treatments with the exceptions of diglycolic and humic which involved two rates of each. Herbicides used at more than a single rate were Casoron WE, Casoron WP and Esteron 99 (Table 1).

Foliar treatments consisted of four acids (acrylic, diglycolic, lactic and trichloroacetic), five commercial herbicides (Amine 2,4-D, Casoron WE, Esteron 99, Instemul DA-120 and Silvex) and the use of molasses, diesel fuel and an emulsifier or dispersant (Orzan).

Diglycolic was the only acid used at more than one rate and Casoron WE, Esteron 99 and Instemul DA-120 were the herbicides used at more than one rate (Table 1).

Of all treatments employed, the one most promising appears to be a root treatment which consists of a two-phase application of diglycolic acid at 15 lb/A, Esteron 99 at 7.5 lb/A and humic acid at 25 lb/A. Humic acid was applied one hour before Esteron 99 and diglycolic acid. Treatment at Pecan Island resulted in slightly over forty per cent destruction of the established mat. However, regrowth is proceeding but apparently to a lesser extent than for other treatments employed.

At Lottie, the 250 pound rate of humic acid applied prior to diglycolic acid and Esteron 99 was superior to the 25 pound rate of humic acid. Less effective control with higher rates of humic acid may be partially explained by increased water movement at the Lottie location.

In general, all treatments were more or less effective in the initial kill of above water parts of alligatorweed. Regrowth was especially rapid and vigorous in those plots where leaves and stems were most severely damaged. Foliage was so damaged in these plots that little or no translocation is believed to have occurred to the more lignified portions below the water line.

Louisiana field testing for alligatorweed control during the 1967 growing season was comparable to results received during 1966. Continued, erratic response of chemicals with direct herbicidal or synergistic properties was received. However, apparent synergistic effects of diglycolic acid and humic acid were demonstrated when humic acid was applied prior to a later treatment with a combination of diglycolic acid and Esteron 99.

TABLE 1. TRIALS FOR CONTROL OF ALLIGATORWEED BY THE UNIVERSITY OF SOUTHWESTERN LOUISIANA.

Herbicidal components	Rate lb/A	Application Date	Location[1]	Method[2]	General
ACRYLIC ACID	25.0				
Amine 2,4-D	4.5	5/17	PI	R	
Diglycolic acid	15.0				
Esteron 99	4.5	3/35	PI	R	
Esteron 99	4.5	3/27	PI	F	
Esteron 99	4.5	4/4	PI	F	
Orzan	.5				
AMINE 2,4-D Amine	4.5				
Acrylic acid	25.0	5/17	PI	R	
Diglycolic acid	15.0				
Cyanoacetic acid	25.0	5/17	PI	R	
Dichloroacetic acid	25.0	5/17	PI	R	
Humic acid	25.0	5/17	PI	R	Delay[3]
Lactic acid	25.0	5/17	PI	R	
Molasses	2.0 gpa[4]	5/17	PI	R	
Molasses	1.0 gpa	3/35	PI	R	
Silvex	2.0				
Molasses	2.0 gpa	3/27	PI	F	
Silvex	2.0				
Tetraacetic acid	25.0	5/17	PI	R	
CASORON WE					
Alone	4.0	3/25	PI	R	
Alone	4.0	3/27	PI	F	
Alone	8.0	3/25	PI	R	
Alone	8.0	3/27	PI	F	
CASORON WP-50					
Alone	4.0	3/30	PI	R	
Alone	8.0	3/30	PI	R	
CYANOACETIC ACID	25.0				
Amine	4.5	5/17	PI	R	
DICHLOROACETIC ACID	25.0				
Amine 2,4-D	4.5	5/17	PI	R	
DIGLYCOLIC ACID	15.0				
Acrylic acid	25.0	5/17	PI	R	
Amine 2,4-D	4.5				
Dowpon	5.0	5/2	PI	R	
Esteron 99	4.5				
Dowpon	5.0	5/8	L	R	
Esteron 99	4.5				
Esteron 99	4.5	3/25	PI	R	
Esteron 99	4.5	3/27	PI	F	
Esteron 99	7.5	5/2	PI	R	
Esteron 99	7.5	5/8	L	R	
Esteron 99	7.5	5/2	PI	R	
Humic acid	25.0				
Esteron 99	7.5	5/8	L	R	
Humic acid	25.0				
Esteron 99	7.5	5/2	PI	R	
Humic acid	25.0				Delay
Esteron 99	7.5	5/8	L	R	
Humic acid	25.0				Delay
Esteron 99	7.5	5/2	PI	R	
Humic acid	250.0				Delay
Esteron 99	7.5	5/8	L	R	
Humic acid	250.0				Delay
DIGLYCOLIC ACID	20.0				
Esteron 99	4.5	3/25	PI	R	
Esteron 99	4.5	3/27	PI	F	
Esteron 99	4.5	4/4	PI	F	
Orzan	.5				
Esteron 99	7.5	3/27	PI	F	
DOWPON					
Alone	5.0	5/2	PI	R	
Alone	5.0	5/8	L	R	
DOWPON	5.0				
Diglycolic acid	15.0	5/2	PI	R	
Esteron 99	4.5				
Diglycolic acid	15.0	5/8	L	R	
Esteron 99	4.5				
Esteron 99	4.5	5/2	PI	R	
Esteron 99	4.5	5/8	L	R	
ESTERON 99	4.5				
Acrylic acid	25.0	3/25	PI	R	
Acrylic acid	25.0	3/27	PI	F	
Acrylic acid	25.0	4/4	PI	F	
Orzan	.5				
Diglycolic acid	15.0	3/25	PI	R	
Diglycolic acid	15.0	3/27	PI	F	
Diglycolic acid	15.0	5/2	PI	R	
Dowpon	5.0				
Diglycolic acid	15.0	5/8	L	R	
Dowpon	5.0				
Diglycolic acid	20.0	3/25	PI	R	
Diglycolic acid	20.0	3/27	PI	F	
Diglycolic acid	20.0	4/4	PI	F	
Orzan	.5				
Dowpon	5.0	5/2	PI	R	
Dowpon	5.0	5/8	PI	R	
Lactic acid	25.0	3/25	PI	R	
Lactic acid	25.0	3/27	PI	F	
Molasses	2.0	3/25	PI	R	
Silvex	2.0				
Molasses	2.0	3/27	PI	F	
Silvex	2.0				
Trichloroacetic acid	25.0	3/25	PI	R	
Trichloroacetic acid	25.0	3/27	PI	F	
ESTERON 99	7.5				
Diglycolic acid	15.0	5/2	PI	R	
Diglycolic acid	15.0	5/8	L	R	
Diglycolic acid	20.0	3/27	PI	F	
Diglycolic acid	15.0	5/2	PI	R	
Humic acid	25.0				
Diglycolic acid	15.0	5/8	L	R	
Humic acid	25.0				
Diglycolic acid	15.0	5/2	PI	R	
Humic acid	25.0				Delay
Diglycolic acid	15.0	5/8	L	R	
Humic acid	25.0				Delay
Diglycolic acid	15.0	5/2	PI	R	
Humic acid	250.0				Delay
Diglycolic acid	15.0	5/8	L	R	
Humic acid	250.0				Delay
ESTERON 99 (350 ml/1000 ft²)					
Phosphoric acid 360 ml/1000 ft²		3/30	PI	R	
HUMIC ACID	25.0				
Diglycolic acid	15.0	5/2	PI	R	
Esteron 99	7.5				
Diglycolic acid	15.0	5/8	L	R	
Esteron 99	7.5				
HUMIC ACID (Delay)	25.0				
Amine 2,4-D	4.5	5/17	PI	R	
Diglycolic acid	15.0	5/2	PI	R	
Esteron 99	7.5				
Diglycolic acid	15.0	5/8	L	R	
Esteron 99	7.5				
HUMIC ACID (Delay)	250.0				
Diglycolic acid	15.0	5/2	PI	R	
Esteron 99	7.5				
Diglycolic acid	15.0	5/8	L	R	
Esteron 99	7.5				

TABLE 1. TRIALS FOR CONTROL OF ALLIGATORWEED BY THE UNIVERSITY OF SOUTHWESTERN LOUISIANA. (Continued)

Herbicidal components	Rate lb/A	Application: Date	Location[1]	Method[2]	General
INSTEMUL DA-120 (189 ml INSTEMUL DA-120 + 757 ml DIESEL FUEL)					
Mixture I	½ pt.[5]	4/4	PI	F	
Mixture II	¾ pt.	4/4	PI	F	
Mixture III	1 pt.	4/4	PI	F	
LACTIC ACID	25.0				
Amine 2,4-D	4.5	5/17	PI	R	
Esteron 99	4.5	3/25	PI	R	
Esteron 99	4.5	3/27	PI	F	
PHOSPHORIC ACID (360 ml/100 ft²)					
Esteron 99	350 ml/1000 ft²	3/30	PI	R	
SILVEX	2.0				
Amine 2,4-D	4.5	3/25	PI	R	
Molasses	2.0 gpa				
Amine 2,4-D	4.5	3/27	PI	F	
Molasses					
Esteron 99	4.5	3/25	PI	R	
Molasses	2.0 gpa				
Esteron 99	4.5	3/27	PI	F	
Molasses	2.0 gpa				
TETRAACETIC ACID	25.0				
Amine 2,4-D	4.5	5/17	PI	R	
TRICHLOROACETIC ACID	25.0				
Esteron 99	4.5	3/25	PI	R	
Esteron 99	4.5	3/27	PI	R	

[1]Location: PI is Pecan Island, Louisiana and L is Lottie, Louisiana.
[2]Method: R is root application and F is foliar application.
[3]Delay = Humic acid applied one hour before other components.
[4]gpa = gallons per acre
[5]pt. = pint of mixture applied

LITERATURE CITED

1. zur Burg, F. W., J. A. Foret, S. L. Solymosy and S. A. Hayes. 1966. An Annual Report of the Control of Alligatorweed and other Aquatic Plants. A cooperative investigation between the University of Southwestern Louisiana and the Corps of Engineers, Department of the Army. Lafayette, Louisiana.