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## EC179 Revised 1949 Weed Control in Nebraska

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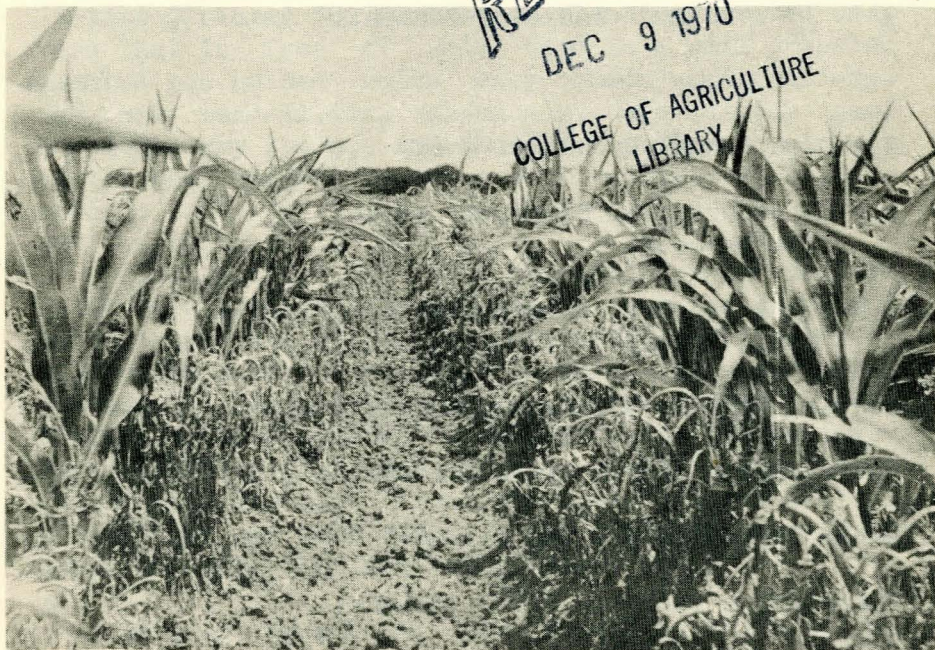
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## Weed Control in Nebraska

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Weeds being controlled in a grain sorghum field by the use of 2,4-D.

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Lincoln.

WEED CONTROL IN NEBRASKA  
N. E. Shafer, D. L. Klingman, J. D. Furrer,  
and Glenn Viehmeyer<sup>1</sup>

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## WEED CONTROL IN NEBRASKA

Since widespread use of 2,4-D (2,4-dichlorophenoxyacetic acid) has focused most weed control work on the use of chemicals as the answer to the weed control problem, too little attention has been given to the old established weed control measures. There is still no good substitute for timely cultivations in connection with a good crop rotation (Experiment Station Circular 50, Revised). Planting treated crop seed that is free of weed seed in a well prepared seedbed has helped solve many common weed problems. The new weed-killing chemicals are simply good supplementary tools, and should be added to already proven weed control measures when additional help is needed.

2,4-D and 2,4,5-T (2,4,5-trichlorophenoxyacetic acid) are available commercially in ester forms and salt forms. The esters will mix with either water or oil. The salt forms should be used with water only. The amount of water or oil applied should be sufficient to give uniform distribution on the foliage. Spray drift or vapor may injure or kill susceptible plants at a distance from the area of application. Ester forms are more volatile and more care should be exercised when they are being used.

Rate of growth of the weeds is the most important factor in obtaining good weed kills. Good growing conditions of sufficient duration to give rapid plant growth at the time of spraying are important for effective use of growth regulators such as 2,4-D. Crops and weeds alike are most easily injured when they are growing rapidly.

2,4-D has no beneficial effect upon crops except weed elimination, which results in the availability of greater amounts of soil moisture and fertility for the growing crop. Treatments of crops with 2,4-D is recommended only where weed infestations are so heavy they will materially reduce the crop yield or will hinder or prevent harvesting.

## 2,4-D ON ANNUAL BROADLEAF WEEDS

Most broad-leaved, annual weeds can be killed when actively growing by the use of  $1/4$  to  $1/2$  pound of any formulation of 2,4-D. Early treatments should be used on such species as Russian thistle, western water hemp, and velvet leaf, which become tolerant rather early, and on all species for greatest economy. The ideal time for application is following emergence of the majority of weeds, but before the weeds have damaged the crop.

A range in rates for the use of 2,4-D is suggested to provide a flexible program to fit variations in growing conditions for the various parts of the state. Use the lower rates only when good growing conditions prevail. The higher rates should be used when conditions for plant growth are unfavorable.

### Corn and sorghum

Apply  $1/4$  to  $1/3$  pound of an ester or  $1/2$  to  $3/4$  pound of an amine or sodium salt of 2,4-D per acre. Nozzle extensions are suggested for use in large corn to insure that the maximum amount of the chemical reaches the weeds. Applications may be made at any time except from early tasseling to the early dough stage.

### Small grain

Use  $1/4$  to  $1/3$  pound of an ester or  $1/2$  to  $3/4$  pound of an amine or sodium salt of 2,4-D per acre. Application should be made in the spring after the grain is fully tillered (stooled). If possible, avoid applications during the boot and early heading stages since applications during these two stages result in greatest crop injury.

### Established perennial grasses

Rates recommended for use in small grains are suggested for use in grasses. Established perennial



grasses can tolerate the higher rates of 1/2 pound ester or 1 pound amine or sodium salt of 2,4-D without serious injury if poor weed growth makes increased dosages necessary. In cases of serious weed infestations, seedbed preparation and reseeding operations may be more practical.

#### Non-cropped areas

Two treatments a year of 1/2 to 1 pound of any type formulation of 2,4-D can be used effectively in controlling annual broad-leaved weeds where crops are not grown. Establishment of perennial grasses usually greatly reduces the weed problems in such areas.

#### Strawberry beds

Preliminary tests indicate that 1/2 pound of an ester or 1 pound of an amine or sodium salt may be used on strawberries the same season they are set out. Use of 2,4-D on established beds is not recommended at the present time.

#### Pre-emergence

Pre-emergence cannot be recommended for use in Nebraska in 1949.

### 2,4-D ON PERENNIAL BROADLEAF WEEDS (HERBACEOUS)

Perennial weeds are difficult to eradicate with 2,4-D alone. Best results may be obtained from treatments during periods of rapid top growth at any time during the season, but generally at the pre-bud to early bloom stage. Eradication is seldom attained with one treatment and should not be expected from rates recommended for control in growing crops. The use of a closely drilled small grain or sorghum crop provides serious competition for the perennial weeds and should be used as often as possible with 2,4-D treatments.

### Field bindweed

In growing grain crops (corn and small grain), bindweed can be controlled using 1/4 to 1/2 pound of an ester or 1/2 to 3/4 pound of an amine or sodium salt of 2,4-D per acre. For infestations in grassed waterways, roadsides, irrigation ditchbanks, golf courses, and other noncultivated areas, use 1 to 1 1/4 pounds of any formulation of 2,4-D. The lower limits apply only to treatments which can be made when the plants are making rapid top growth. The upper limits are suggested for use in the drier parts of the state or any part of the state when top growth is slow.

### Canada thistle and hoary cress

For control in growing grain crops use 1/2 or 1 pound of ester or amine salt, respectively. Treatment prior to early bud stage of the thistles, or at early bloom or before for the hoary cress, is needed to prevent serious competition with the grain crop. Rates of 1 to 1 1/2 pounds of either an ester or an amine salt of 2,4-D should be used where the infestations occur on noncultivated land. Seeding the infested area to a sod-forming, adapted grass followed by repeated applications of 2,4-D aids in reducing the stand.

### Leafy spurge, tanweed, and Russian knapweed

For control in growing grain crops use 1/2 to 3/4 pound of an ester or an amine salt at the early bud stage. Top kill can be expected but root kill should not be expected.

### 2,4-D AND 2,4,5-T ON PERENNIAL BROADLEAF WEEDS (WOODY)

On species sensitive to 2,4-D foliage sprays, where drift and volatility are not problems, use 2000 parts per million of an ester of 2,4-D as a wetting spray when the plants are growing rapidly. Salts of 2,4-D may be used under humid conditions.



Treatment of stump surfaces immediately after cutting has given good results. On some species tolerant of 2,4-D foliage sprays, application of at least a five per cent solution of an ester formulation in oil is suggested. The practice is especially adapted for use during the winter slack season on farms, but may be used any time of the year. A five per cent solution is obtained by adding 13 pints of a 32 per cent, or 10 pints of a 37 per cent ester to 10 gallons of diesel or heating oil or kerosene.

#### Sand sage brush

Good results have been obtained using 1 pound of an ester per acre when the plants were growing rapidly. The use of an oil carrier for the 2,4-D appears to give increased effectiveness through better wetting of the foliage.

#### Osage orange

Wetting foliage sprays of 2,4,5-T at a rate of 2000 parts per million has given effective top kill of Osage orange (hedge) ranging up to 20 feet in height. 2,4-D has been ineffective.

#### Briers

Blackberry, gooseberry, and currant have shown greater susceptibility to 2,4,5-T sprays than to 2,4-D sprays.

#### Poison ivy and locust species

2,4,5-T also shows promise on poison ivy, black locust, and honey locust. Even though 2,4,5-T looks better on the above species than does 2,4-D, complete kills should not be expected with one application.

#### CONTACT TYPE HERBICIDES ON ANNUAL GRASSES

Contact herbicides are not selective. They kill by either a rapid burning of the leaves or by injury



causing chlorosis or yellowing, or both. Selective use of contact materials is based on two factors: (1) some plants are more easily wetted than others and (2) plant seedlings are more susceptible to injury than are more mature plants. Successful use of the contact weed killers depends upon complete coverage of all the vegetation. This requires volumes of spray material of 100 gallons per acre and above. Temperatures of at least 70° F. are needed for best results. The use of oils and oil emulsions are of value and are suggested for this type of herbicide.

For best results on the annual bromes (downy brome, hairy chess, and cheat), sprays should be made on the seedlings which germinate in the fall or early spring. Use 1 quart per acre of concentrated materials such as Sinox General or Dow General and 3.5 pints per acre of Dow Selective. Dow Selective is soluble in water; Sinox General is emulsifiable with water, but Dow General is soluble only in oil. All three can be effectively emulsified using a proportion of 15 gallons of oil (diesel or heating fuel) to 85 gallons of water. The herbicide must be mixed with the oil first and then this mixture poured into continuously agitated water. The addition of 0.1 per cent (0.8 pound in 100 gallons) of a detergent or wetting agent helps to secure the emulsion and obtain better wetting of the foliage.

Contact herbicides usually do not kill perennial grasses; however, some top kill can be expected.

#### Canning peas, field peas, and seedling alfalfa

For peas use 3 pints of Dow Selective or 4 pints of Sinox W per 100 gallons of water when the peas are 4 to 6 inches tall. Do not spray when the peas are wet following a dew or a rain. One gallon Sinox W or 3 pints Dow Selective per acre has been used on seedling alfalfa which has four to six true leaves. Follow the manufacturer's recommendations whenever possible.

## USE OF SALTS OF TCA (TRICHLOROACETIC ACID)

### Quackgrass

The use of ammonium or sodium TCA at rates of 80 to 100 pounds acid per acre has been effective in eradicating infestations of quackgrass. Applications made during periods of good plant growth have given the best results. The grass can be held in check with rates of 10 to 15 pounds per acre. Present cost of the material will limit its use to small areas. Caution: prolonged contact with the skin may produce painful irritation and peeling of the skin. Spray equipment should be rinsed after each use to prevent harmful corrosion.

### Johnson grass

Preliminary work indicates that rates of 100 pounds or more per acre of TCA will be required to kill this species with spot treatment of survivors necessary.

### Prickly pear cactus

Sodium or ammonium TCA at a rate of 1/2 pound per gallon of water used as a wetting spray has given good results on this pasture and range land pest. Applications made when the plants are growing rapidly seem necessary for best results.

## OTHER HERBICIDES

Ammonium sulfamate, commercially called "Ammate", as a foliage spray is recommended for control of woody plants not affected by 2,4-D or 2,4,5-T, or where adjacent sensitive plants would be injured by the growth regulators. Dry "Ammate" spread on cut surfaces of large stumps is effective in preventing sprouting.

Stoddard solvents such as those of the Atlantic Refining Company, Gulf Stoddard Solvent 59081, Shell



Weed Killer No. 1-8381, Esso Varsol No. 2, and Solvasol No. 5 of Socony Vacuum Oil Company at the rate of 100 gallons per acre have given selective weed control in carrots after the first true leaves have emerged on the carrots.

Calcium cyanamide, commercially known as Cyanamide, applied just prior to emergence of asparagus, has been effective at rates of 80 to 100 pounds per acre. Since this is a nitrogenous material, it has further value in that nitrogen is released upon chemical breakdown of the cyanamide in the soil.

Sodium chlorate is suggested for control and eradication of bindweed, Canada thistle, leafy spurge, hoary cress, Russian knapweed, dogbane, bur ragweed, and tanweed. This material seems best suited for small or inaccessible areas which do not permit field scale eradication measures. Soil sterility of four to seven years generally results from rates of 3 to 4 pounds per square rod. Four to five pounds of Atlacide (a commercial chlorate containing five retarding ingredients) are necessary because of its lower chlorate content. Best time for application is in the fall, preferably September, followed by spot treatments on survivors in the spring. Caution: all inflammable material becomes subject to explosive combustion when impregnated with sodium chlorate.

Borax. Agricultural mesh borax and a less refined form known commercially as Borascu have value for the control and eradication of leafy spurge and the eradication of dogbane. Borax, being a fire retardant, can be used where chlorate may be too dangerous. Since Borax is a slow-acting, long-lasting chemical causing soil sterility, ranging from seven to nine years, it should not be used where sterility is objectionable. It may be applied dry at any time using 20 pounds per square rod, but quicker results are obtained from applications made during the more moist months of the year. Preliminary results show Borax is somewhat less effective on soils high in lime.

INFORMATION TABLE ON 2,4-D ESTER FORMULATIONS

2,4-D Product	: : Manufacturer : or : Distributor :	: : % : 2,4-D: : Acid: :	: : Weight: : per : gallon: :	: : Pounds : 2,4-D Acid: : per gal. :	: : Pounds : 2,4-D Acid: : per pt. :	: : Pints per : acre to : give 1# : 2,4-D Acid: :	: : Pints in : 100 gal. : water to : give 2000 : ppm.
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Butyl ester

Weedanol Butyl Ester	Associated Chemists	32	8.26	2.64	.33	3	5
Co-op 40	Consumers Coop. Assn.	32	8.26	2.64	.33	3	5
Weedester	Miller Chemical Co.	32	8.26	2.64	.33	3	5
RH 40% Butyl Ester	Reasor-Hill Co.	32	8.26	2.64	.33	3	5
Weedestroy 43	Riverdale Chem. Co.	34	8.26	2.85	.35	3	5
Weed No More 40	Sherwin-Williams	32	8.26	2.64	.33	3	5
Weedicide 40	Thompson Hort.	32	8.26	2.64	.33	3	5

Isopropyl Esters

Weedanol Isopropyl Ester	Associated Chemists	34	8.36	2.81	.35	3	5
Estericide 330	Cal. Spray Chem. Co.	37	8.89	3.29	.41	2 1/2	4
Chipman 2,4-D Ester	Chipman Chem. Co.	37	9.20	3.34	.42	2 1/2	4
Esteron 44	Dow Chemical Co.	37	8.89	3.29	.41	2 1/2	4
Weed Kill E3.34	Dr. Salsbury Lab.	37	9.20	3.34	.42	2 1/2	4
DuPont 46	E. I. DuPont & Co.	39	8.60	3.32	.42	2 1/2	4
Weedeath Ester 44	Howard Hanson & Co.	37	9.20	3.34	.42	2 1/2	4
Isopropyl Ester 44	Miller Chemical Co.	37	8.89	3.29	.41	2 1/2	4
Weed Blitz Ester	O'Shea Rogers	37	8.89	3.29	.41	2 1/2	4
Weed Kill 44	Purina Co.	37	8.89	3.29	.41	2 1/2	4
Stantox P44	Standard Agri. Chem.	37	8.89	3.29	.41	2 1/2	4
Gold Bear 44	Swift & Co.	37	8.89	3.29	.41	2 1/2	4
Weedicide 45	Thompson Hort.	38	8.89	3.36	.42	2 1/2	4
Tufor E	U. S. Rubber	37	8.89	3.29	.41	2 1/2	4
-----	Warren Douglas	37	7.95	3.00	.38	2 2/3	4 1/2

Ethyl Ester

Weedone 48	American Chem-Paint	35	8.6	3.00	.38	2 2/3	4 1/2
Weedone	American Chem-Paint	9.6	8.1	0.76	.10	10	17



INFORMATION TABLE ON 2,4-D AMINE SALTS

2,4-D Product	Manufacturer or Distributor	% 2,4-D Acid	Weight per gallon	Pounds per gal.	Pounds per pt.	Pints per acre to give 1# 2,4-D Acid	Pints in 100 gal. water to give 2000 ppm.
Weedar 64	American Chem. Paint	41	10.0	4.10	.50	2	3 1/4
Weedanol 40	Associated Chemists	40	10.3	4.12	.52	2	3 1/4
Weed-B-Gon 64	Cal. Spray Chem. Co.	40	10.0	4.00	.50	2	3 1/4
Chipman 2,4-D Amine	Chipman Chemical Co.	40	10.0	4.00	.50	2	3 1/4
Co-op Conc't	Consumers Coop. Assn.	40	10.3	4.10	.51	2	3 1/4
Farm Weed Killer	Cook Chemical Co.	40	10.0	4.00	.50	2	3 1/4
2,4 Dow 40	Dow Chemical Co.	40	10.4	4.16	.52	2	3 1/4
Dr. Hess Weed Killer	Dr. Hess & Clark	40	10.5	4.20	.52	2	3 1/4
Weed Kill 20	Dr. Salsbury Lab.	20	8.3	1.66	.21	5	8
Weed Kill A-4	Dr. Salsbury Lab.	40	10.0	4.00	.50	2	3 1/4
67% Amine Weed Killer	E. I. DuPont & Co.	40	10.3	4.12	.52	2	3 1/4
Weedeth 40	Howard Hanson & Co.	40	10.0	4.00	.50	2	3 1/4
Weedeth 40	Miller Chemical Co.	40	10.0	4.00	.50	2	3 1/4
Am Sol	Niagra Chem. Division	42	9.6	4.00	.50	2	3 1/4
Weed Blitz Amine	O'Shea Rogers	40	10.0	4.00	.50	2	3 1/4
Weodette	O. E. Linck & Co.	33	10.0	3.33	.42	2 1/2	4
Weedar 20	Purina Co.	20	8.3	1.66	.21	5	8
Huron	Port Huron Mach. Co.	43	9.3	4.00	.50	2	3 1/4
Weedestroy AM40	Riverdale Chem. Co.	40	10.0	4.00	.50	2	3 1/4
Kathon T-4	Rohm & Haas Co.	41	9.7	4.00	.50	2	3 1/4
Stantox 2,4-D Weed Killer	Standard Agri. Chem.	36	10.0	3.60	.45	2 1/4	3 1/2
Ded Weed 40	Thompson Hayward	40	10.4	4.16	.52	2	3 1/4
Weedicide Conc't	Thompson Hort.	40	10.0	4.00	.50	2	3 1/4
Twin-Kill	Twin Draulic	40	10.0	4.00	.50	2	3 1/4
Tufor 40	U. S. Rubber	40	10.4	4.16	.52	2	3 1/4
-----	Warren-Douglas	40	10.0	4.00	.50	2	3 1/4
Gold Bear 40	Swift & Co.	40	10.4	4.16	.52	2	3 1/4