

Cooperative Extension Service

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Weed Control In Flax

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INTRODUCTION

Weeds are a major deterrent to flax production. Populations of only 40 wild oat (*Avena fatua* L.) plants per square yard caused a 75 percent flax yield reduction. Wild buckwheat (*Polygonum convolvulus* L.) at 15 plants per square foot caused a 5 bushels per acre flax yield loss with a flax seeding rate of 42 pounds per acre and a 7 bushels per acre loss with a 14 pounds per acre seeding rate. These are examples of competition of individual weeds in flax, but weed species mixtures in flax are equally or more competitive.

Flax must compete economically with wheat in North Dakota if it is to remain an important crop. Historically, flax yields are low because of late seeding and lack of effective weed control. Late seeding is not consistent with good physiological principles of crop production and is no longer essential as modern machinery has shortened the time required for soil preparation and seeding. Early flax seeding with effective weed control can make flax an economically competitive crop.

Flax is a poor competitor with weeds. Thus, flax seed yield can be increased greatly through effective weed control. A complete, integrated program of weed control, involving both cultural methods and various herbicide applications either alone or in combination, may be needed to minimize weed competition. The weed control approach will depend upon the weed species and density as well as economic considerations.

74.3 Cultural weed control involves planting the flax on fields relatively clear of weeds. The popu-

lation of weeds in a field can be minimized by effective weed control in all crops grown in a rotation. Thus, use effective herbicides or cultural weed control systems in the crops preceding flax in a rotation. In addition to weed control within the preceding crop, prevent post-harvest weed seed maturation through early tillage or herbicide application. Control of perennial weeds is especially important as these are very competitive with flax and nearly impossible to control within flax.

Preplant tillage and delayed flax seeding have been used together as a cultural approach to weed control in flax. Through this approach, several "crops" of weeds are controlled before the flax is seeded, reducing the weed seed supply in the soil to infest the flax. Delayed seeding of flax reduces flax yields. Thus, although weeds may be controlled, flax yields are not the best. Research conducted over a 10-year period in North Dakota indicated a 0.28 bushel loss per acre for each day delay in seeding after late April or early May.

Herbicidal weed control in flax can consist of preplant soil incorporated EPTC (Eptam) and/or diallate (Avadex) fall or spring applied and/or postemergence MCPA, dalapon (Dowpon, Basfapon), barban (Carbyne), or bromoxynil (Buctril, Brominal). None of these herbicides will control all weeds so a sequence or combination of several of these herbicides may be needed, depending upon the weed species present. The general weed control ratings of these herbicides are given in the table. The herbicide weed control ratings in the table are for average conditions and may vary, depending upon climatic and soil conditions.

Table. Response of flax and various weeds to specific herbicides, under average environmental conditions.

Herbicide	Control of Specific Weeds								
	Flax Tolerance	Wild Oat	Foxtail	Barnyard Grass	Kochia	Redroot Pigweed	Common Lambsquarters	Wild Mustard	Wild Buckwheat
EPTC	P-G*	G	E	E	F	G	G	P	G
Diallate	G	E	P	P	N	N	N	N	N
MCPA	G	N	N	N	F	F	E	E	P
Dalapon	F-G	P	G	G	N	N	N	N	N
Barban	F-G	F-G	N	N	N	N	N	N	P
Bromoxynil	F-G	N	N	N	G	G	G	F	E

*Average effectiveness. E = Excellent; G = Good; F = Fair; P = Poor; N = None

PREEMERGENCE HERBICIDES

EPTC (Eptam) in research plots conducted at the various North Dakota Experiment Stations in 1974, 1975, and 1976 effectively controlled weeds and increased flax yields consistently. Flax seed yields generally were increased from 4 to 10 bushels per acre, compared to the yield from the weedy plots or in some cases to the MCPA plus dalapon treated plot. In several experiments, no yield increases were obtained when weed stands were extremely light.

The above yield increases occurred despite severe flax stand reductions from EPTC injury in some cases. Flax tolerance to EPTC is marginal; thus, rates must be adjusted to soil characteristics. A limited reduction in flax stand will not reduce yield since with decreased weed competition, the remaining flax will compensate for the reduced stand by increased branching.

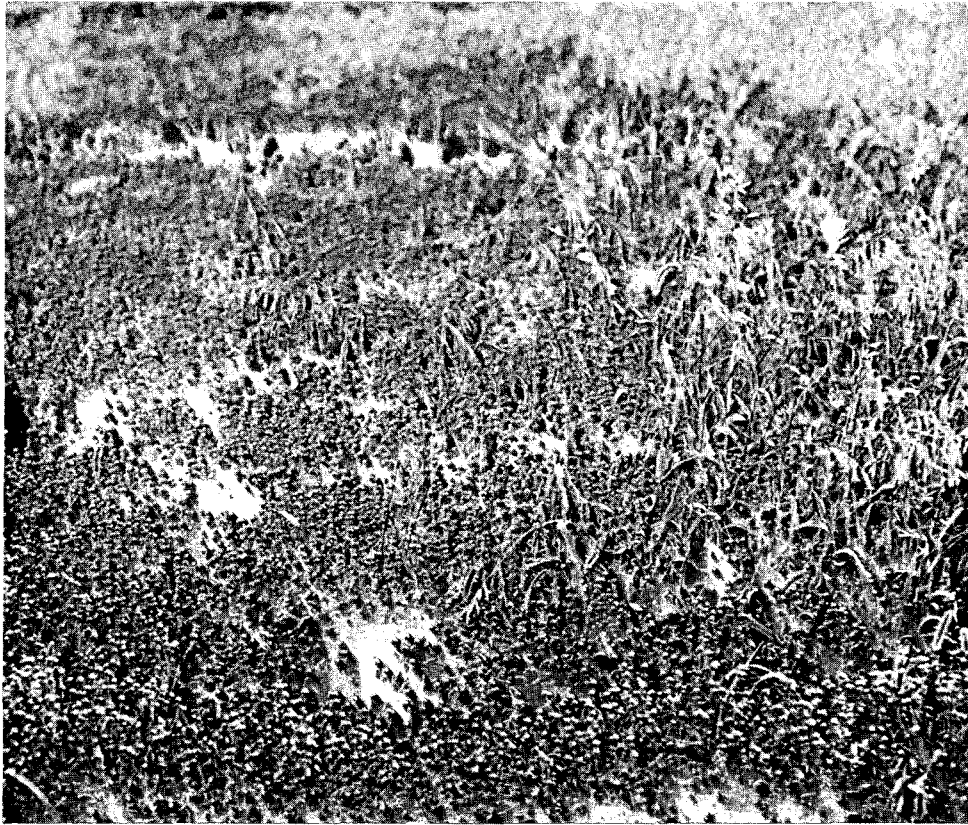
EPTC rates are 4 to 4.5 pounds per acre fall applied or 2 to 3 pounds per acre spring applied, depending upon soil texture and organic matter. Precision in application and many considerations are needed with the use of EPTC for weed control in flax to be grown in sandy loam or lighter soils with low organic matter as it is difficult to predict a safe rate on such soils. In experiments at North Dakota State University, EPTC has not caused flax injury on fine textured, high organic matter soils. A guide to rate is to select the higher rates for soils with a silty clay texture with more than 7 percent organic matter. The minimum listed rate may cause some injury to flax when the soil is a sandy loam or more coarse in texture and has less than 4 percent organic matter. EPTC rates

should be adjusted intermediate to the listed rates when the soil is intermediate in texture and organic matter to that mentioned above. The above is only a guide as soil moisture and incorporation also influence EPTC efficacy.

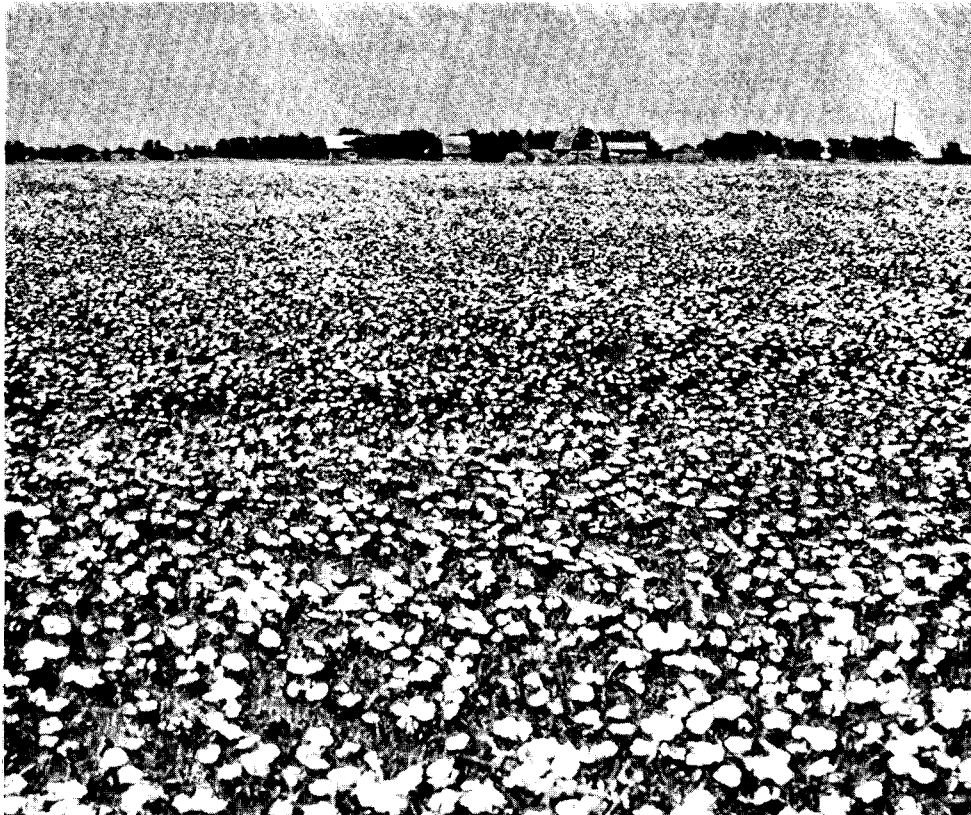
EPTC volatility is very high, requiring special spraying conditions and soil incorporation immediately after application. Spraying should be with low pressure (30 pounds per square inch) and high volumes (10 to 50 gallons per acre) producing large droplets to reduce evaporation during application. Evaporation during application also is increased by high temperatures, low humidity, and wind. So, when possible, select conditions during EPTC application which minimize vaporization.

Laboratory experiments have indicated that 50 percent of the surface applied EPTC (Eptam) was lost from wet soil in 30 minutes, thus indicating the importance of thorough soil incorporation immediately after EPTC application. Tandem disking or field cultivating at a depth of 4 to 6 inches and a speed of 6 miles per hour twice at right angles gives good herbicide incorporation. Any method of incorporation which thoroughly mixes EPTC with the top 3 inches of soil will be effective. The mechanical operations of herbicide incorporation loosens the soil surface, which causes drying and a poor seedbed for flax. Thus, packing the soil after herbicide incorporation will reduce moisture and EPTC loss and make a better seedbed for flax.

Delaying flax seeding for 3 to 5 days after spring EPTC applications may reduce flax injury without



At left of photo is weed control with diallate (Avadex) preplant-incorporated plus post emergence application of MCPA plus Dalapon. At right, untreated check.



Weed-free flax field in bloom.

affecting weed control. However, this delay may cause soil drying and poor flax emergence. Soil packing discussed previously will reduce the soil surface drying.

Fall applications of EPTC have reduced flax injury. Higher rates of EPTC are required in the fall than the spring. Fall applications require soil incorporation similar to spring applications. An advantage of fall application and incorporation is a better seedbed for seeding flax in the spring than with spring incorporation. Redroot pigweed control has been less effective with fall than with spring applications. Fall applications should be as close to freeze-up as possible to reduce time for herbicide loss before weed emergence the following spring.

Granular and liquid formulations of EPTC are available. The granular formulation is more costly than the liquid but more adapted to application on trashy and possibly somewhat lumpy surfaces. Granules also require soil incorporation.

Diallate (Avadex) at 1.5 to 2 pounds per acre is effective in controlling wild oat in flax. Soil incorporation of diallate is as described previously for EPTC. Fall or spring applications of diallate are possible and both granular and liquid formulations are available.

POSTEMERGENCE HERBICIDES

Postemergence herbicide application may be used to supplement a preplant soil incorporated herbicide for control of tolerant species (wild mustard) or weeds which survived treatment for various reasons, or used as the only treatment.

Flax yield increases from using only post-emergence treatments have not been as great as with preemergence weed control. The weed competition early before postemergence control may have already reduced yields, or the herbicides may be causing injury to flax which is growing

in competition with weeds. Apply postemergence treatments early when the flax is between 2 and 6 inches tall and weeds less than 2 inches tall. Apply postemergence weed control early to reduce weed competition, increase weed control, and allow the flax more time for recovery from possible injury. Research has indicated that MCPA and dalapon applications beyond the 4-inch stage of flax may cause injury which reduces yield.

MCPA is effective for control of many broadleaf weeds in flax. MCPA amine at 1/4 pound per acre effectively controls wild mustard and common lambsquarters. However, 1/2 pound per acre of the ester formulation may be required for good redroot pigweed, kochia, and Russian thistle control. Wild buckwheat control is poor with MCPA.

Dalapon (Dowpon, Basfapon) at 3/4 pound per acre will control green and yellow foxtail less than 2 inches tall. Do not use higher rates as flax injury and reduced yields may result. MCPA may be mixed with dalapon for the control of broadleaf weeds in addition to the grasses.

Barban (Carbyne) at 4 to 6 ounces per acre may be applied for wild oat control. Apply to wild oats in the 1.5- to 2-leaf stage and before the flax has 12 leaves. Wild oat control has only been fair to good with barban because flax does not give the competition with wild oats needed for good control.

Bromoxynil (Buctril, Brominal) at 1/4 to 1/2 pound per acre gives good control of wild buckwheat and many other broadleaf weeds. Apply to small weeds less than 2 inches tall. The higher rates are for larger weeds.

Good weed control in flax requires a system which integrates cultural weed control and a combination of various preemergence and postemergence herbicides applied precisely and timely to meet the specific weed infestations.

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