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Your

FLAX CROP

FLAX CAN FIT INTO YOUR FARM PROGRAM

- Flax can be included in your regular rotation. By using certified seed of adapted varieties, good seedbed preparation, proper seeding technique, and good weed control, Minnesota farmers can realize the value of flax.
- Research has indicated that flax can return a greater net profit per acre than small grains. To insure the potential value of this crop, we should understand its culture.
- Flax is unexcelled as a companion crop in the establishment of productive grasslands.

This folder deals with the flax crop from seed to harvested crop and attempts to answer those questions most frequently asked.

What Is the Place of Flax in Rotation?

Flax produces well following corn or soybeans. Shallow-worked corn or soybean land kept clean the previous year is desirable for flax. Fall-plowed, weed-free, dense-sodded fields that have been in meadow or pasture for several years provide suitable flax seedbeds. Stubble ground is good flax ground if it is surface tilled after harvest—the earlier, the better—so that weed seeds brought to the surface have an opportunity to germinate and then be cultivated to kill seedling weeds. This is particularly true if the stubble followed two clean intertilled crops.

Flax fits into the rotation after a row crop as a good companion crop for grass and legume seedlings. In areas which are subject to drouth, flax will not produce as well following alfalfa as following a cultivated crop. Flax fits into the rotation in exactly the same place as small grains.

Flax does best on a heavy or fine-textured soil. It is not suited or tolerant to high lime, peat, or coarse-textured soils.

What Factors Affect Flax Yields?

Yields of flax may be increased by attention to such practices as: using recommended varieties, sowing well cleaned seed, selecting soil relatively free from weed seeds, growing the crop in the most favorable place in the rotation, properly preparing seedbed, using commercial fertilizer where effective, treating seed, and sowing the recommended amount of seed when it should be sown and at the proper depth.

Varieties

Redwood, Marine, and B5128 are the only varieties recommended for Minnesota in 1957. Marine is an early-maturing variety, immune to rust, and more resistant to pasmo than B5128 or Redwood. It is especially adapted where early maturity is desired or where sowing has been delayed. Both B5128 and Redwood are immune to rust, but are a little more susceptible to pasmo than Marine. However, both are late maturing and should be sown early.

When improved varieties are developed, new recommendations will be made. These can be found in the current issue of Extension Folder 22, *Varieties of Farm Crops*, which may be obtained from your county agricultural agent, or the Bulletin Room, Uni-

Clean Seed

Thorough cleaning of flax seed cuts down weed competition, thickens flax stands, helps remove danger of disease, and increases yield. Flax is a poorer competitor with weeds than wheat, oats, or barley. A study made in 12 Minnesota counties indicated that well cleaned seed increased yield about a bushel.

Sieve sizes recommended by the manufacturer should be obtained for the fanning mill in use. A mill can't do a good job of cleaning when the capacity is crowded.

Seed Treatment

Flax produces best on fertile, fine-textured soils by treating each bushel of seed with one and one-half ounces of Ceresan M or Panogen. The seed may be treated when convenient, even 6 to 8 months before sowing. The cost of material for treating averages from 2 to 3 cents per bushel.

Seed-dusting machines provide the best seed coverage. A treater which can easily be made at home is described in Extension Folder 118, *Minnesota Seed Grain Treater*. Because the dust is poisonous, follow the directions on the container carefully.

Preparation of Seedbed

Flax produces best on fertile, fine-textured soils worked to provide a firm seedbed. The surface should be even so as to prevent rainwater from standing. Fall-plowed fields of pasture, hay, cornstalks, and bean stubble are preferred to similar fields spring plowed. Harrowing, disking, or springtoothing fall-plowed or clean fields to a depth of not over 2 inches will properly prepare a seedbed. On corn or soybean land not subject to wind erosion, fall disking followed by light spring disking and harrowing or cultipacking is preferred to deep spring disking.

Fields plowed in the spring need extra work such as disking to furrow depth and firming by cultipacking or rolling to remove air pockets. Spring plowing is objectionable because it delays sowing.

Soil that does not crust may be profitably cultipacked both before and after flax is drilled. If the field is to be cultipacked only once, the operation should precede planting to insure uniform depth of sowing. On soils that have crusted after planting, using a rotary hoe or harrowing before the seedlings emerge will improve stands of flax.

Fertilization

Flax responds to nitrogen or nitrogen and phosphate fertilizer applications. Forty pounds per acre of nitrogen and 80 pounds of phosphorus are maximum recommendations. Potash would only be recommended on soils where a soils test had indicated that potash was very low.

Nitrogen-phosphate combinations give the best results if flax is sown alone after row crops or non-legumes. When flax is sown alone after plowed-down legumes or fallow, the nitrogen usually isn't required. When flax is sown alone, the fertilizer can be applied in the drill.

When flax is underseeded with grasses and legumes following a row crop or nonlegume, not more than 20 to 25 pounds of nitrogen is recommended. Heavy application may injure the legume seeding. The amount of phosphate and potash applied should be based on a soils test. For complete fertilizer recommendations see Extension Bulletin 276, *Guide to Fertilizer Use in Minnesota*.

Where weeds are a problem, either spray to control or limit the amount of nitrogen applied. Do not use fresh manure the year flax is sown because it increases the danger of weeds.

Time of Sowing

Flax yields heaviest when sown early. The crop may be sown successfully as early as wheat. The most tender seedlings will endure a moderate frost if the soil is moist and the frost is not followed by a drying wind. Plants 2 or 3 inches high and hardened by exposure will endure a short temperature drop to 22° F. or even to 20° F. without material injury.

Experimental results in Minnesota over a five-year period showed an average decrease in yield of 22 percent when seeding was delayed just 10 days beyond the earliest date that a good seedbed could be prepared.

Cool weather at blossoming time and ample moisture until ripening begins are most favorable conditions for flax development. In Minnesota early planting usually assures such conditions.

Rate of Sowing

It is recommended that Redwood and B5128 be sown at the rate of one bushel (56 pounds) per acre. Because of its smaller seed size, Marine may be sown at a slightly lighter rate of about 48 pounds per acre. These rates are based on a germination of 90 percent

or better. Rates of sowing should be proportionately increased if the germination is below 90 percent.

Depth of Sowing

Seed placed in moist soil at a depth of $\frac{1}{2}$ to $1\frac{1}{2}$ inches has given good results. Set the drill to seed about an inch deep. Only a firm seedbed makes possible a uniform shallow planting depth.

How Can You Control Weeds in Flax?

Weed seeds in the soil within sprouting depth constitute a flax crop hazard. Many weed seeds retain their viability for years and germinate readily when brought near the surface.

It is the annual early-starting, tall-growing weeds that overtop the flax before the bolls fill that reduce yields the most.

Cultural Control

Cultural control of weeds by selection of weed-free ground, good tillage operations, and a sound rotation can do much in effectively reducing the weed problem in flax. Early after-harvest tillage of small grain stubble to control perennial weeds, to prevent weed seed production, and to stimulate annual weed seed germination in late summer and fall is a recommended method of preparing land for flax. Where wind erosion is a problem, this after-harvest tillage method should not be used.

Preventing weed seed production and shallow tillage in row crops is desirable. Delayed sowing of flax to permit spring tillage for wild oat control has been successful in some areas. When this is practiced, sow an early-maturing variety.

Chemical Control

Flax should be sprayed with MCP or 2,4-D as soon as there is sufficient emergence of susceptible weeds to make spraying practical. Spraying may reduce yields of seed and straw unless weed competition is reduced sufficiently to offset injury from spraying.

MCP is less likely to injure flax than 2,4-D and is therefore the preferred material. Use 2 to 3 ounces per acre of MCP or 2,4-D in sodium or amine formulations for susceptible weeds like wild mustard. Use 4 ounces for lambs-quarters, pigweed, stinkweed, cocklebur, marsh elder, and ragweed.

For moderately resistant weeds, spot spraying at heavier rates may be necessary. Use MCP at 5 to 6

ounces per acre to prevent seed production by Canada thistle. Use 2,4-D ester at 3 ounces per acre to control Russian pigweed and Russian thistle.

TCA at 5 pounds per acre will kill green foxtail, yellow foxtail, giant foxtail, and barnyard grass in young flax. For best results the flax should be at least 2 inches tall and the weeds less than 2 inches. TCA can be applied in mixture with MCP or 2,4-D to kill susceptible grass weeds and susceptible non-grass weeds with one application.

As new methods of controlling weeds are developed, new recommendations will be made. These can be obtained from your local county agricultural agent. These chemicals and rates and time of application are found on registered labels in the Minnesota State Department of Agriculture.

Is Flax Difficult to Harvest?

Flax is less subject to crinkling and shattering than small grains and the harvest period can extend over a relatively long period. Yield and quality of flax seed are not reduced if the crop is harvested when only 90 percent of the bolls are brown. Early harvesting tends to reduce the volume of weed growth. Many weeds make rapid growth during the last few days that the flax is ripening.

Flax does not cut as easily as small grains. Ripe plants cut easier than those on the green side. A sickle with smooth-edged sections is preferred. The gum that often gathers on the cutting parts may be easily removed with kerosene.

Because of the structure of the flax plant and the presence of weed growth, flax bundles do not dry out readily. Drying will be aided by loosely binding the flax into small bundles.

Flax is better adapted than wheat, oats, or barley to windrow combining because of its resistance to discoloring and after-harvest sprouting, and an increasing acreage is being harvested in this manner each year.

Does Flax Thresh Hard?

Flax is not difficult to thresh when dry. The sizes and weight of the seed make steady feeding very important. The seed is easily put in the straw pile by uneven thresher speed and by overloading the sieves. If you attempt to do too good a cleaning job while threshing you are likely to lose flax with the straw.

The germ end of flax is often injured by too close threshing, resulting in greatly reduced germination.

Whether seed is sold directly from the machine or stored, there is an advantage in threshing separately the weediest parts of the field. The percent of dockage may be less and bin spoilage danger will be reduced.

Is Flax Difficult to Store?

Flax should be stored in tight bins. A large quantity of flax will find its way through a small opening.

When the moisture content reaches 10 percent, flax may be safely stored. Removing dockage with a fanning mill will reduce the moisture content of threshed flax. Shrinkage of flax will not exceed 2 to 3 percent if there is no bin leakage and the moisture is down to 10 percent when stored.

Flax is subject to insect damage and bins should be examined every three to four weeks. At the first signs of damage the flax should be sold or fumigated.

What Are the Marketing Problems?

At present, more flax is grown than needed in the United States. A knowledge of government price supports and government flax loan rates, when such exist, as well as the market price will guide the producer in selling his crop to best advantage.

The grower rarely receives any returns from the dockage sold in flax even though it has a feeding value, especially with small grains present as dockage. When livestock feeds are scarce and high in price, there is usually a market for the dockage. However, a farm with livestock needs no outside market. The dockage can be fed to good advantage on the farm if special care is used in grinding.

There is a market for clean flax straw during all or a part of the year in most of Minnesota. Research has indicated an average yield of about 0.5 ton of straw per acre.

Is Flax Hard on the Land?

It has been frequently stated that "flax is hard on the land," but recent experiments would indicate that this is not true. This old belief was based on observations of poor yields of flax and other crops on land previously cropped to flax.

The poor flax yields were due at least in part to flax wilt. Crops also suffered from a lack of nitrogen following the plowing under of flax straw. Now that wilt-resistant varieties and fertilizers high in nitrogen are available, this problem no longer exists.

What Flax Diseases Are Important?

Wilt

Wilt is a fungus disease that attacks flax seedlings principally. The affected plant often wilts and dies. The disease may be carried to new fields by infected seed, trash, wind-blown soil, or runoff water. Sowing wilt-resistant varieties (Redwood, Marine, and B5128) is the practical control.

Rust

Rust appears as bright orange pustules on the leaves and stems. As the plants mature, the spots become black in color. The disease is spread from old straw and stubble of the previous year. Thorough turning under of infected stubble and planting flax on land which has not grown flax the previous year will help to control rust. The best control is growing resistant varieties such as Redwood, Marine, and B5128.

Heat Canker

Heat canker attacks the plants at the surface of the soil when they are 2 to 6 inches high. The stems are girdled and the plants break over. The best control is early sowing so the ground is shaded before the hot weather.

Pasmo

Pasmo has increased rapidly in Minnesota, but fair yields have been obtained with considerable disease present. Bolls on badly infected plants drop off the stems during storms and harvest operations. Pasmo appears as brownish spots on the first leaves and foliage of young flax plants. As the plants ripen, brown and green mottled areas become noticeable on the flax stems. The disease is carried on the seed and straw. Thorough seed cleaning and treatment will help to prevent the spread of the disease into new territory. Marine is moderately susceptible to pasmo; Redwood and B5128 are susceptible.

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