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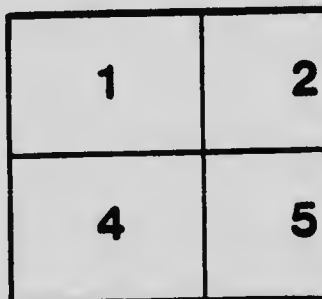
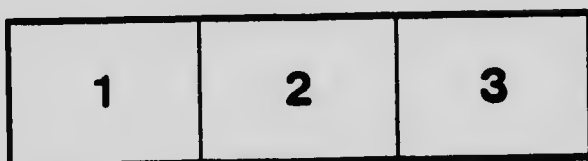
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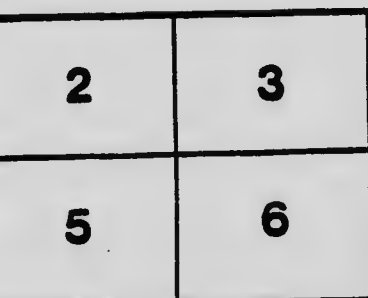
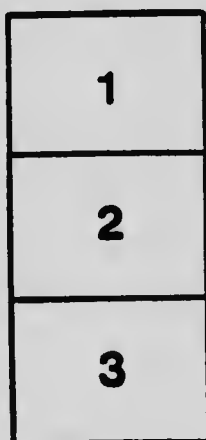
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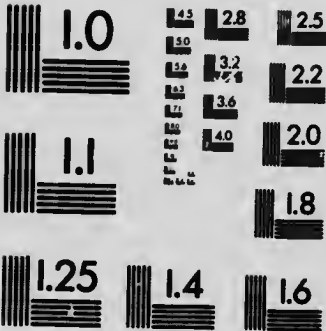
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THE CULTIVATION OF FLAX FOR FIBRE

BY

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Description.—The flax plant (*Linum usitatissimum* L.) is an annual with delicate roots, a slender wiry stem, narrow leaves and blue, sometimes white flowers. The fibre, to which it owes its strength and its value, is situated near the outside of the stem, the central woody part or "shove" being of no commercial value. The flowers on the same individual plant open in succession and in consequence all the seeds do not ripen at the same time. Each seed-boll or capsule is dry when ripe and contains ten or fewer brown seeds. The capsules open by a series of narrow chinks, but these are not sufficiently wide to allow the seeds to fall out.

When flax is sown thinly each plant is extensively branched and shrub-like and the ripening of the capsules extends over a much longer period, as the number of flowers is much greater. Such a plant has little value for fibre. When the seed is sown sufficiently thickly each plant produces a tall, unbranched stem like that of a forest tree, and has only a few flowers at the top. This is the type of plant aimed at in growing flax for fibre.

Climate.—A climate where there is a considerable amount of moisture in the air and where the crops are not liable to suffer from drought is the most suitable. This being so, the western part of British Columbia, southwestern Ontario, the valley of the St. Lawrence and the Maritime Provinces may be expected to produce the best flax.

Soil.—A soil that is suited for the growth of cereals and other farm crops may be expected to give similar results when sown with flax. Where choice is possible a sandy loam is to be preferred. As uniformity in all characters is the most important point in connection with the production of flax fibre, it is advisable to choose a field that is as level as possible and has a uniform type of soil so that the moisture-holding capacity will be similar throughout.

Rotation.—Flax should not be sown on the same land oftener than once in five to seven years. Its exact place in the rotation varies, but the common practice is to sow after wheat or some other cereal, or on land that has been in sod.

Manures.—Stable manure should not be applied to a crop of flax. It is much better to manure heavily some previous crop in the rotation. The most important artificial fertilizer for flax is potash. As this is not available at present it may be possible to apply wood ashes, or in districts near the sea to apply seaweed to some previous crop.

DOMINION EXPERIMENTAL FARMS.

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Preparation of the Land.—It is very important that the land should be reduced to a fine state of tilth. It should be ploughed to a moderate depth in autumn and worked in spring to pulverize it thoroughly. Only land that is free from weeds should be sown with flax. Any weeding after the seed germinates must be done by hand and must be done with great care to avoid injury to the young plants. The land is sometimes rolled before sowing the seed, as it is held by some farmers that this practice facilitates the covering of the seed to a more uniform depth and makes the seed-bed more compact.

Seed.—Various varieties of flax are grown, some being blue-flowered, others white-flowered. Blue-flowered flax is considered to give a slightly better quality of fibre. The seed used should be that of a fibre-producing flax and not that of a flax grown solely for oil. If possible, Russian or Dutch seed should be obtained or else the produce of such seed grown in Canada.

Flax seed often contains immature seeds and weed seeds, and it is very desirable that these should be got rid of by rescreening and recleaning. It is usually impracticable to do much weeding among a growing flax crop, and weeds are a great nuisance at harvesting time.

Disinfection of Seed.—Flax is subject to several diseases which may be carried by infected seed. Before sowing, the seed should be treated as follows: Spread the seed on a clean floor or canvas in a thin layer. Use one ounce of formalin to ten quarts of water and apply two quarts of the mixture to each bushel of seed by means of a knapsack sprayer. Mix the flax seeds thoroughly until each seed is covered with the solution. Continue stirring the seeds until they are dry.

Amount to Sow.—Flax should always be tested for germination before sowing, otherwise it is impossible to tell what amount of seed to use. If the seed gives after three days a germination of 95 per cent or over, 1½ bushels of seed will suffice. With a germination of 85 to 95 per cent, 1¾ bushels per acre should be sown, and if the germination falls between 75 and 85 per cent, 2 bushels of seed will be necessary. About 56 pounds are reckoned to the bushel.

Time to Sow.—The best time to sow will depend on the character of the season which, however, can not be foreseen. It will consequently be a good plan to sow half the crop as early as the land can be got into proper condition, and the rest about a week or ten days later. This will also have the effect of distributing the labour somewhat at harvest time. Flax when quite young can withstand a considerable amount of frost. In fact, only a frost sufficient to freeze the ground solid is likely to injure it.

Method of Sowing.—The seed is usually sown broadcast, and a calm day should be chosen. If sown by hand, care must be exercised to have the distribution uniform as the seed is slippery. It may be drilled in rows four inches apart and then cross harrowed. It should be covered about half an inch deep and the surface is usually rolled. If the land contains a considerable amount of clay it will be advisable not to roll it as the surface may become too much compacted after rain. In this case it should be rolled before sowing. Clover is frequently sown with flax and makes a considerable growth the first year.

Harvesting.—Flax for fibre is always pulled up by the roots. As it has a slender root there is not any difficulty in this, as much flax as can easily be grasped between the hands being caught just below the seed-bolls at each operation. Great care should be taken to keep the root-tips quite uniform and any soil adhering to the roots should be knocked off. The handfuls of flax are laid on the ground and are afterwards tied in bundles of about eight inches in diameter. The bundles should be tied rather loosely, a few stalks of the flax being generally used for the purpose. The bundles are then set up in stooks to dry. It will be found to be an advantage to tie the bundle not in the middle but nearer the upper end. Each bundle may then during

wet weather be spread out at the base and will stand alone. After rain it will dry much more quickly than in the stook. Any short patches of flax should be pulled separately and kept separate from the rest of the crop through the various stages. An average worker will pull an acre in four days. At present, experiments are being conducted with machines for pulling flax but more thorough testing will be necessary, before any of them can be recommended. In case a crop of flax is over 30 inches in length there seems to be no very strong objection to cutting it, provided it is cut very close to the surface of the ground and that the cutting machine is very sharp and that great care is taken to avoid tangling.

Flax is ready for harvesting when about half the seed-bolls are ripe. If crushed between the fingers the seed-boll will be found to be quite dry and the seeds dry and brown. At this time the lower half of the stem will be yellow and devoid of leaves as a general rule. The rest of the seeds will ripen subsequently in the sheaf. Over-ripening before pulling should be carefully avoided as the quality of the fibre will suffer in consequence.

Threshing.—The dry flax may be stacked or housed until time is available for removing the seeds. This can readily be done during the winter months when other work is slack. The seeds can be removed by crushing the capsules between rollers, care being taken not to injure the seeds or the stalks. An alternative method is "rippling" which consists in pulling handfuls of flax over and between iron teeth placed close enough to pull off the capsules which can be crushed afterwards by a wooden mallet. The deseeded flax straw should then be tied up again in uniform, rather loose bundles of the same size as before, the band being in the same position. The flax should be kept dry until early summer when it is retted. If flax is rippled a few days after pulling it can be retted the same season. The rippled capsules should in that case be spread on a clean floor and turned frequently until quite dry.

Retting.—The object of retting is to bring the flax into such a condition that the fibre may be easily separated from the worthless woody portion or "shove." There are two methods of retting in common use, dew-retting and water-retting. In the former, the flax is spread in a thin layer on the surface of the grass and turned several times at intervals of a few days according to the weather. Two acres of grass land will be required for one acre of flax. Dew-retted flax is not so uniform in quality and brings a lower price than water-retted flax.

For water-retting it is necessary to dig a tank about $3\frac{1}{2}$ feet deep and about 6 feet wide. A pond 6 feet deep and 6 feet wide will be sufficient for one acre of flax, but it is better to dig several small retting ponds. The tank should be dug several months before it is required and if possible on a clayey soil. It will be a great convenience if it is so constructed that the water can be run off before the flax is taken out. It should be situated near a small stream, the water of which can be diverted to fill the dam. Beginning at one end of the dam the flax bundles are placed nearly erect with the root-ends downwards, but should not be pressed too closely together. All the flax in any one pond should be put into it on the same day. When the flax bundles have been put into the pond, stones of moderate size are placed on top as the bundles are liable to rise after fermentation begins. The water should then be turned on and allowed to flow until the flax is well covered after which no water should be allowed to flow through unless leakage has occurred. If the flax rises above the water during the process of retting it should be pushed down with a fork and more stones added.

Water containing lime is not suitable for retting. In this case, the dam may be filled beforehand with rain water provided that it has been constructed at the bottom of a slope. It will be more troublesome to put the flax into the dam if it is already full of water. The same pond can be used any number of times if the water is changed after each operation. The best temperature for retting is 72° F., but flax

can be retted at a lower temperature, a longer period being required in that case. After the flax has been in the water for five days it should be examined once or twice daily to see if the right stage has been reached. If the flax stem when bent breaks across sharply and the outer fibre can be readily peeled off clean from the central woody core it is sufficiently retted. The test should be made about half way up the stem. When it is being taken out of the dam any adhering mud should be washed off. After removal from the dam it is set up on end to drain, after which it is spread on the grass to dry. It is possible in suitable weather to dry it without spreading by opening out the bundles partly and inclining them against a fence or low wooden rail. When quite dry it should be carefully stacked or housed.

Scutching.—This is the term applied to the separation of the fibre from the woody core. The machinery required is comparatively simple and consists of a "brake" and a "scutching stock." The former consists of grooved rollers between which the flax straw is passed and the hard woody core is crushed and broken into short lengths. The latter consists of a revolving wheel with wooden or iron blades which beat out the woody "shoves" from a handful of broken flax when held against them. A small oil engine is the most convenient source of power, but electric or water power, if obtainable, will do equally well. Scutching is generally carried on during the winter months and should only be done by an experienced workman.

Yield.—About two tons of dried flax straw with the seed on are considered an average yield per acre. The average yield of flax seed per acre for the whole of Canada for the five years from 1911 to 1915 was 11½ bushels, while the average yield in the province of Ontario where the crop was grown primarily for fibre was for the same period 16½ bushels per acre. With proper attention an average yield of 450 pounds of scutched fibre per acre should be obtained.

Prices.—The price of flaxseed at Winnipeg during November, 1915, ranged from \$1.62½ to \$1.89 per bushel. The price of flax fibre is at present the highest on record. In January, 1915, the price at Belfast, Ireland, ranged from \$434 to \$607½ per ton for Dutch flax and was \$369 per ton for Russian flax. The prices since that date have gone still higher.

General Considerations.—A farmer who has never grown flax for fibre should not attempt more than 1 to 2 acres at first. Probably not more than one-tenth, at most, of the cultivated area of the farm should be devoted to flax in any one year. It is a crop that requires very careful attention and three acres well handled may produce a greater profit than five acres damaged by weather or over-retting. At what stage a farmer can most profitably dispose of his crop must be largely determined by circumstances. If the members of his own family can assist, and a considerable part of the work can be done during the slack winter months his profit will obviously be the greater. All the work except scutching can be done on the farm. It should be possible for a number of farmers to co-operate in the erection of a scutching mill at some central point.

Fuller information on this subject will be found in an illustrated bulletin to be published shortly.





