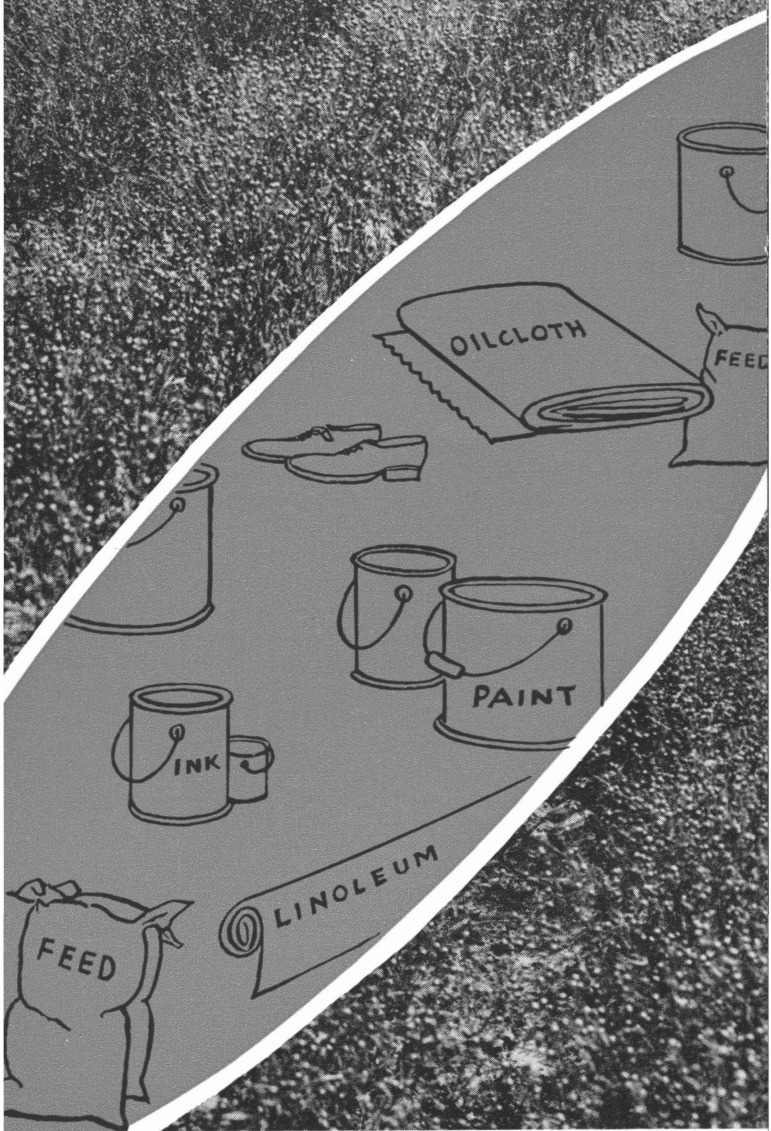


FLAX

PRODUCTION IN TEXAS



FLAX

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Flax is grown in Texas mostly from fall seeding. Commercial production is concentrated in an eight-county area of South Texas, with Karnes the major flax-producing county. A few attempts to grow spring-sown flax were made in North Texas and the Panhandle, but the crop has not become established. The Texas acreage in 1961 was estimated at 140,000 acres with production of 1,610,000 bushels or 11.5 bushels per acre. This is the largest acreage since 1949 when 349,000 acres were grown. The 1962 crop was destroyed by severe low temperatures, with the exception of about 4,000 acres of the newly released variety, Caldwell. Caldwell was more than 6 inches tall and survived the 12 degree freeze in January with 50 to 75 percent stands and yielded from 6 to 15 bushels per acre. A 24-year-average yield for the State is 7.5 bushels per acre.

USES AND MARKETS

Flax is grown principally for the seed from which oil is extracted. Flax seed yields 32 to 44 percent oil, based on dry weight. This oil, known as linseed oil, is used mainly in the manufacture of paints and varnishes with smaller amounts used in the manufacture of linoleum, oil cloth, printers' ink, patent and imitation leather products. The meal, a valuable livestock feed supplement, contains about 3 percent oil and 35 percent protein. The meal is highly palatable and slightly laxative. Under Texas conditions, flax straw has little value. The varieties grown in Texas are not suitable for fiber production, used in the manufacturing of linen, but they possibly can be used for paper production.

Texas flaxseed may be processed at special flaxseed oil mills, at cotton oil mills with certain adjustments or the seed may be shipped to northern markets for processing. A considerable amount of Texas flax is sold in foreign markets. The oil content and iodine number, measures of oil quality, of Texas flaxseed compare favorably with those of the same varieties grown in other areas.

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PRODUCTION PRACTICES

Soil Type

Flax may be grown on most soil types, but it is best adapted to deep, fertile loam soils. In South Texas, flax production is concentrated in an area where soil types vary from fine sandy loams to sandy clay loams. Flax has also been grown on the heavy clay soils along the coastal prairie since the acreage was expanded.

Seedbed Preparation

Seedbed preparation for flax is similar to that for small grains. Early fall preparation increases the possibility of adequate moisture for planting and crop establishment. Flax does not compete well with winter weeds. Weeds should be controlled by cultivation before seeding. Seed flax with a grain drill on a firm seedbed at a shallow depth. When moisture is sufficient, cover the seed $\frac{1}{2}$ to $\frac{3}{4}$ of an inch. Use of a culti-packer before seeding or press wheels on the drill may be advantageous if the soil is loose or light textured. In dry years or on weed-infested soils, flax may be planted in 28 to 38-inch rows. This method is suitable on fairly level fields, and the weed problem can be controlled by cultivation with little reduction in flax yields. However, plantings at 7 or 8-inch drill spacing, with normal rainfall, generally have resulted in higher yields.

Seeding Rate

The seeding rate should be 25 to 30 pounds per acre when using a grain drill, and 16 pounds per acre when seeding in wide-spaced rows. However, for the newly released Caldwell variety, which has smaller seed and forms many branches near the crown, the seeding rate can be reduced approximately one-fourth.

Clean seed and treat with an approved mercurial fungicide such as Ceresan or Panogen. Adequate rates and proper methods of seed treatment may reduce seed decay.

Time of Seeding

When possible, time flax to reduce damage from low temperatures in both seedling and blooming stages. After flax reaches the four-leaf stage, it becomes more cold resistant. Also, seed the crop so it will mature before hot weather. When moisture conditions permit, seed between November 10 and December 10. Flax seeded after January 1 usually produces lower yields than December seedings. Make spring seedings

in North or Northwest Texas only after danger of freezing weather passes.

FERTILIZERS

Response to fertilizer applications depends upon moisture conditions. Experimental data show fertilizer applications to be profitable if moisture is adequate, but in many seasons or under some conditions, fertilizers have not been profitable. The most consistent increases from fertilizer applications were apparent when the fertilizer was applied to a summer legume crop followed by flax. However, with inadequate rainfall, summer legumes can reduce soil moisture to critical levels for the following flax crop. Summer legumes, such as guar or peas, should be fertilized with 100 to 150 pounds of 16-20-0 per acre, when followed by a fall flax crop. When large crop residues are returned to the soil prior to planting flax, make an application of 40 to 60 pounds of nitrogen per acre. Application of 20 to 30 pounds of nitrogen per acre prior to blooming, approximately February 15, was profitable in some instances. Base fertilizer use on soil analysis. Where irrigation water is available, fertilizers usually are profitable for flax.

WEED CONTROL

Flax does not compete well with winter or summer annual weeds that develop when the flax is growing and maturing. Cultural practices, such as killing weeds prior to seeding, rotation with clean-cultivated summer crops and seeding when moisture conditions are favorable for quick emergence of the flax plant, help keep weeds under control. When herbicides are used for weed control, follow closely the directions of the manufacturer. Use herbicides when the weeds and flax are small, usually during January and February, but *never* after the flax has formed flower buds. MCPA and 2,4-D control many broad leaved weeds. The amine or sodium salts of MCPA or amine salt of 2,4-D at $\frac{1}{8}$ to $\frac{1}{4}$ pound in 5 to 20 gallons of water, applied when weeds are small and flax is 2 to 6 inches tall, give effective control. MCPA is less likely to injure flax than 2,4-D. TCA at 5 pounds per acre controls some of the annual grasses. A mixture of $\frac{1}{4}$ pound MCPA and 5 pounds TCA per acre in 10 to 20 gallons of water controls both broad leaved and grassy weeds. For control of specific weeds or grasses, consult the manufacturer and your county agricultural agent.

VARIETIES RECOMMENDED

Types of flax that can be grown in Texas are: (1) early-maturing, short-stature Indian flax varieties, such as Punjab and Imperial, which make up most of the California acreage of fall-sown flax; (2) spring-type flax varieties from the northern Great Plains; and (3) cold-tolerant, winter-type varieties grown only in Texas. The first type was grown to a limited extent in extreme South Texas, but the latter two groups now make up most of the Texas acreage. Six-year average yields for the varieties grown in Texas, ranked in order, are Caldwell, B5128, Norland, Deoro, Redwood, Linda, Rio, Marine, Arny, Viking, Newturk and Bolley. All varieties are the spring type from the northern Great Plains with the exception of Caldwell and Newturk which are winter types.

The average yield for the 6 years ranged from 15.9 bushels per acre for Caldwell and B5128 to 10.3 for Bolley. Deoro and B5128 are the most popular commercial varieties at present, but the acreage of Caldwell is increasing rapidly. Caldwell was developed cooperatively by the Texas Agricultural Experiment Station and the U. S. Department of Agriculture, and was distributed to producers in 1960. This new, cold resistant winter-type flax variety was sown on an estimated 16,000 acres in the fall of 1961. All fields of flax that survived the extremely low temperatures in January, 1962, were Caldwell, so it is estimated that more than half the 1963 acreage was seeded to this variety. The recommended varieties are Caldwell, Oeoro and B5128. Very early-maturing varieties, such as Bolley and Arny, are not well adapted to fall seeding in Texas.

DISEASES

Diseases are serious factors in Texas flax production during certain seasons and in local areas. Diseases which may attack flax are rust, Pasma, wilt, seedling disease, aster yellows and curly top.

1. *Rust* occurs on the leaves and stems as bright-orange pustules or spots about the size of a pinhead. Cool, moist weather favors the disease which overwinters on flax straw from which resting spores germinate and infect young flax plants. Plowing under of old stubble, crop rotation and growing resistant varieties are practical means of flax rust control. Since varieties now grown have considerable resistance, rust is not a serious problem.

2. *Pasmo* develops primarily on the maturing stem tissues and overwinters on these parts. The infection appears on young plants as brown, circular lesions on the seed leaves and yellow-brown spots on the older leaves and stems. Near maturity the stems have irregular bands of brown alternating with uninfected green tissue. Infected plants often ripen prematurely and darken. No highly resistant varieties are known. Plowing under of crop residues and rotation with other crops aid in control of this disease as well as others.

3. *Wilt* may attack flax at any stage of growth. The lower leaves turn yellow and drop off, or the entire plant suddenly dies. The only means of control is by use of resistant varieties. Most varieties now grown are resistant, so the disease has not been serious in Texas.

4. *Seedling disease* is caused by the soil-borne fungi, *Rhizoctonia solani* and *Pythium* sp. The principal damage is thinning of stands and weakening of seedlings. On seedlings up to 3 or 4 inches high, brown sunken areas develop on the tap root, causing death. Seedling disease at present is one of the most damaging diseases to the South Texas flax crop and appears to be increasing. It causes severe reductions in stands and heavily infested fields have shown 40 to 50 percent losses. Greatest damage occurs in fields where flax follows flax. Seed treatment with mercurial fungicides provides protection against seed decay, but little against seedling disease.

5. *Aster Yellows*, a virus, is carried to healthy plants by the six-spotted leafhopper. Infected plants are bright yellow and have abnormally shaped foliage and floral parts. Although the insects can be controlled by frequent treatments, the practice is not practical under Texas conditions because the disease has not yet become serious in the State.

6. *Curly Top* is a virus carried by the sugar beet leafhopper. Infection occurs any time from seedling stage to maturity. Infected plants show a characteristic clasping or erectness of leaves about the stem, may be yellow or reddish in color and the lower leaves drop off prematurely. Later the plants branch abnormally, the upper leaves and flowers are distorted and few seed are formed. The bolls have a pimpling or blistered surface and may be shrunk or greatly reduced in size. Relatively little is known about resistance of varieties, but in Texas tests Caldwell, Rio and Deoro appeared tolerant to the disease. Prolonged periods of drouthy weather encourage the migration

of the sugar beet leafhopper to the South Texas flax area. It is during such drouths when severe outbreaks of this disease occur. Although the insects can be controlled by frequent applications, the practice is not practical under Texas conditions.

INSECTS

Insects have not been a serious problem in Texas flax production except as the transmitter of curly top disease. Armyworms and cotton bollworms occasionally may cause damage to late-sown fields by eating the flowers and green bolls. Stink bugs occasionally migrate from adjoining fields puncturing the bolls, and sucking the juice from developing seed. If the population of such insects becomes sufficiently great, insecticides are available which give effective control. For specific recommendations, see your county agricultural agent.

HARVESTING

Do not begin harvesting flax until the bolls and upper plant parts turn brown and the straw is yellow. Harvesting while some bolls and plants are immature will cause heating of the seed, reduce germination and reduce grade at the market. Harvesting with a regular grain combine, by direct operation or by windrowing and pickup attachment is the method usually used. Concaves and cylinder speed should be adjusted as frequently as necessary to prevent cracking and injuring the seed. Flax harvested for seed must be handled more carefully than most other crops because cracking frequently reduces germination by allowing fungi to develop on the stored seed.

ARTIFICIAL DRYING

Flax should be harvested at moisture levels to 6 to 18 percent. Seed of 8 percent moisture may be safely stored in burlap bags in farm granaries for as long as 9 months without loss in germination or serious increase in acid number if given proper air circulation. With mechanical aeration, seed with moisture content of 8 percent or less was stored in farm type bins for 10 months with no damage. To prevent a reduction in germination by drying, the air temperature should not be above 150 degrees for seed with 9 to 11 percent moisture and not above 175 degrees for seed with a moisture of 15 to 18 percent. Seed temperatures above 86 to 88 degrees over a prolonged period will cause a reduction in germination.



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