FIELD PEAS

for Seed and Forage

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CONTENTS

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IN MINNESOTA, FIELD PEAS ARE GROWN for dry seed and for silage. The harvested seed acreage for the past few years has varied from 3,000 to 10,000, mostly in Polk, Marshall, and Kittson Counties. The major market is Crookston. Figures for the silage acreage, mostly in central and eastern Minnesota, are not available.

The seed is used for human food, pigeon feed, livestock feed, and planting seed. The silage crop is grown and harvested in mixture with oats.

WHAT ARE FIELD PEAS?

Field peas are legumes and belong to the same species as canning or garden peas but there are some differences.

Field peas are smooth-seeded. Canning peas have wrinkled mature seed. Alaska variety is an exception since it is smooth-seeded and is used either for canning or dry seed. Field pea seed usually has a higher starch content and is less sweet than seed of canning peas. Field peas are available in various blossom and seed colors. Canning peas have white flowers and green seed.

Cowpeas or blackeye peas are sometimes confused with field peas. However, they are actually beans and do not yield well in Minnesota.

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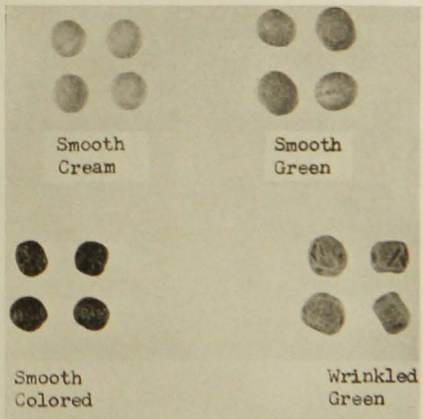
ADAPTATION

Peas are sown as early as possible in the spring and harvested for seed in August or for silage in July.

The crop grows well in most of the state but is least adapted in the southwestern and west central areas. Peas



Wrinkled varieties are canning or garden peas; smooth varieties are field peas.

are less resistant to drought than small grain so seed yields may be greatly reduced by hot, dry weather in June or July. Excellent yields have been obtained on clay, silt, loam, peat, and sandy soils.

Average yields of clean seed are slightly below 1,200 pounds per acre. Prices received by farmers in recent years have ranged from 2½ to 4 cents per pound.

MARKET REQUIREMENTS AND VARIETIES

Various markets have rather exacting seed color, size, and general quality requirements of major importance to the dry pea producer. Poor quality seed usually cannot be marketed but can be fed as a protein supplement for livestock.

The bulk of Minnesota's crop is marketed at Crookston and shipped out of the state for pigeon feed. This market requires a high quality, small, cream-colored pea such as the Chancellor variety. Certain birdfeed buyers also buy a small amount of olive-colored, brown mottled seed such as the Maple variety.

Pea-oat silage producers also prefer a small-seeded variety like Chancellor. Since it takes fewer pounds of small seed than of large seed to sow an acre, seed cost is lower with small seed.

A smaller portion of Minnesota's crop is used for human food—chiefly for split and whole pea soup. Cream and green varieties are used. However, production of green varieties is not recommended because bleaching at harvest time sometimes makes the seed appear to be a mixture of cream and green varieties. The consumer prefers either pure green or pure cream peas, so it is difficult to sell mixed or off-color seed.

First and Best is the major cream variety used for soup. Only a small amount is grown in Minnesota; the rest is imported from northwestern United States. The new variety, "Stråℓ," may prove desirable for soup and replace the imported First and Best. The St. Lawrence Seaway may make it possible to develop larger markets for Minnesota-grown dry peas in Europe and South America.

Some consumers prefer split peas. A factory at Crookston markets this product. The seed coat is removed in the splitting process. "White caps" (split peas that still have their seed coats) are undesirable.

Other consumers prefer whole peas (including seed coats). Cooking quality is measured by the length of time it takes peas to soften in boiling water. The variety and the environment in which the seed was grown affect cooking quality. Peas harvested too early may cook poorly. Certain soils (or localities) are better than others for producing good quality peas. Experimental work in Sweden shows that fertilizer can be used to improve cooking quality, but we have not tried this in Minnesota.

Varieties with seed color other than cream or green are not considered edible in the United States, so they are used as seed for forage production. Large acreages are grown for winter pasture and for green manure in southern United States.

Chancellor and Stråℓ are recommended by the Minnesota Agricultural Experiment Station. Field pea variety recommendations are published in Minnesota Agricultural Experiment Station Miscellaneous Report 24 available from your county agricultural agent.

OAT + PEA MIXTURE FOR SILAGE OR FEED GRAIN

Farmers raising oats for feed should consider raising oat + pea mixture for silage or feed grain. This mixture produces more protein per acre and feed of higher protein content than do oats alone (tables 1 and 2).

Because of the greater concentration of protein in the silage or feed grain, some livestock producers may be able to buy less commercial protein supplement and still maintain high production. In addition to making a higher protein silage than oats alone, oat + pea mixture may retain more succulence thus prolonging the time available for harvest and may compact better in the silo.

When used for silage, the mixture should be chopped standing or chopped from the windrow since it is too difficult to handle the lodged and twining vines by other methods. Harvest for silage when the oats are in late milk to mid-dough stage and turning yellow. When used for feed grain, the mixture can be windrowed and combined.

Trials have shown that oats 48 pounds + peas 90 pounds is a good mixture. However, oats 64 + peas 60 is more practical for areas where lodging is severe and in southwestern and west central Minnesota where

Table 1. Comparative forage production of oats and oat + pea mixture from 1954 to 1957 at three locations in southern Minnesota and 1959 to 1961 at Duluth

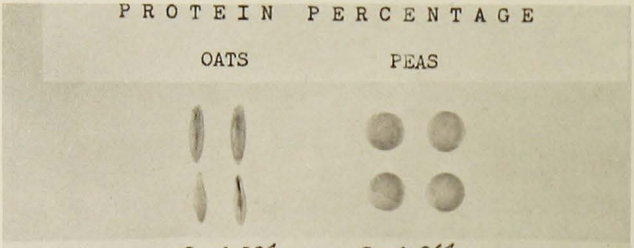
Sowing rates per acre	Anoka County	Rosemount	Southwestern Minnesota	Duluth†
	pounds	forage yield* per acre, pounds		
Oats 80	2,903	7,249	5,513	2,511
Oats 48 + peas 90	3,869	7,314	5,084	3,174
		forage protein content,* percent		
Oats 80	7.9	9.2	8.1	8.9
Oats 48 + peas 90	10.4	11.0	11.1	10.9
		forage protein yield* per acre, pounds		
Oats 80	214	677	432	223
Oats 48 + peas 90	428	794	549	346

* Adjusted to a 15-percent moisture basis.
† W. W. Nelson, D. E. Baker, and R. S. Grant conducted the trials at Duluth.

Table 2. Comparative grain production of oats and oat + pea mixture from 1955 to 1957 at three locations in southern Minnesota and 1959 to 1961 at Duluth

	Feed grain (oats + peas) yield				Protein yield
Sowing rates per acre	Anoka County	Rosemount	Southwestern Minnesota	Duluth*	Average four locations
	pounds	pounds			pounds
Oats 80	1,220	2,236	1,600	1,564	219
Oats 48 + peas 90	1,529	1,907	1,230	1,957	332

* W. W. Nelson, D. E. Baker, and R. S. Grant conducted the trials at Duluth.



Protein percentages of oats and peas.

Protein of mixtures ranges between above percentages.

peas are not consistently productive. In certain areas of northern Minnesota, oats 64 pounds + peas 60 pounds or even a smaller proportion of peas is satisfactory because of the relatively vigorous growth of the peas. The high cost of commercial pea seed in the spring has discouraged some farmers from growing oat + pea mixture for silage. This cost can be reduced to that of farm-grown grain by leaving part of the oat + pea silage field for seed production. Test the harvested seed for germination. Use a fanning mill to separate oats and peas, and then make the desired sowing mixture.

Planting

GOOD SEED IMPORTANT

Average yields of dry peas give less than a 10-fold increase from seed planted. The average Minnesota grower plants 120 to 150 pounds of Chancellor per acre and harvests about 1,200 pounds of seed. Therefore, it is essential to have good quality seed that will establish a high percentage of plants from seed planted.

SEED PREPARATION AND INOCULATION

Because seed cost is high, it is worthwhile to give considerable care to seed preparation and grain drill calibration.

Seed treatment to control seedling diseases often gave a 20-percent increase in emergence over untreated seed and the plants were more vigorous. Use a treatment that will not cause peas or pea + oat mixture to stick in the drill and result in uneven seeding. Chloranil (Spergon) has been used successfully in experiment station trials. Other materials sold for use on pea seed include thiram (Arasan and Thiram), captan (Orthocide and Captan), and dichlone (Phygon). For pea + oat mixtures, the two crops can be treated separately with the proper chemical for each crop and then mixed in the desired proportions. Pea + oat mixtures pass through a grain drill satisfactorily without separation.

At sowing time, peas and pea + oat mixtures should be inoculated to supply bacteria for nitrogen fixation.

Calibrate the grain drill for the desired rate of sowing. The drill gates below the outlets in the grain box should be set so that peas are not crushed when they leave the box. Sow small-seeded varieties such as Chancellor at 120 to 150 pounds per acre and medium-seeded varieties such as Stråal at 150 to 180 pounds per acre. Higher sowing rates give better weed control and may give higher yields. For drills not calibrated for peas, approximate settings on the oat scale are 6¼ pecks oats for Chancellor at 120 pounds, 8 pecks oats for Stråal at 160 pounds, 9¼ pecks oats for peas 90 + oats 48 mixture, and 9½ pecks oats for peas 60 + oats 64 mixture.

TIME AND DEPTH

Peas germinate and grow at low temperatures so they should be sown early in the spring. Early sowing avoids midsummer drought and many weed problems since the peas cover the ground before late-germinating species such as pigeon grass emerge.

Young peas are moderately resistant to frost and the base of the stem remains below ground. Seed of peas and beans is composed of a seed coat(s) surrounding two large cotyledons (seed leaves). The cotyledons are attached to the first node of the very small stem. Between this first node and the very small root is the hypocotyl. In beans, the hypocotyl elongates and pulls the cotyledons above ground thus exposing them and the base of the stem to the weather. In peas, the hypocotyl does not elongate. The cotyledons and about three of the lower nodes and internodes of the stem remain below ground. Thus emergence of peas is accomplished by elongation of the lower two or three internodes. If the above-ground portion of a pea stem is destroyed, axillary buds at lower nodes may develop into branches, but a soybean plant given the same injury dies. (See photograph on page 8.)

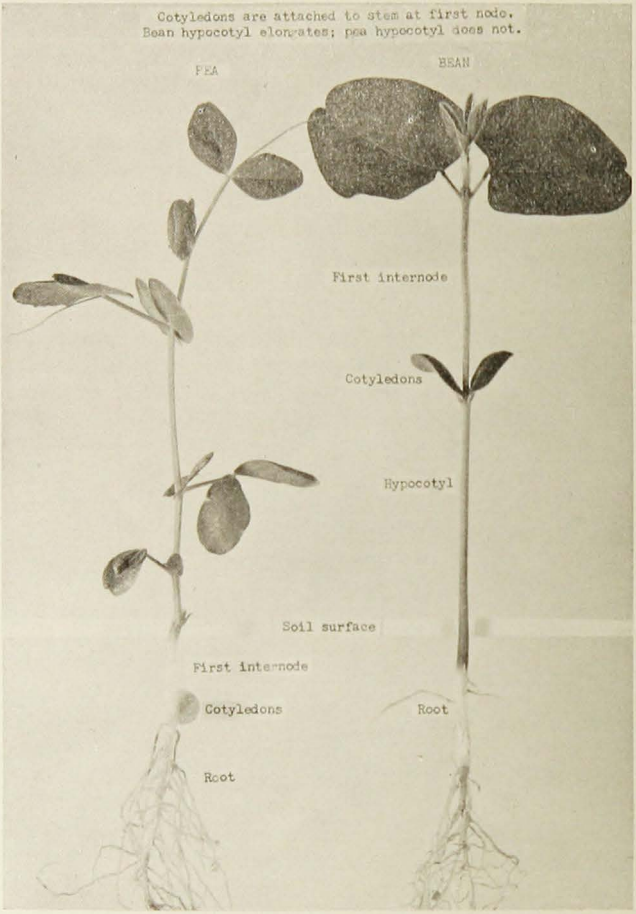
Planting depth is not critical but peas should be planted in moist soil and covered well. Two inches is generally satisfactory.

ROW SPACING

Growing peas in cultivated rows to lower the seed cost per acre and control weeds has been tried. Two years of trial on sandy soil in Anoka County and on heavy soils at Crookston and in southwestern Minnesota have shown this to be a poor practice.

Table 3. Yields of Dashaway peas grown as a cultivated crop in 24- and 40-inch rows and as a noncultivated crop in 6-inch rows, 1954 to 1955

Row spacing	Sowing rates per acre	Yields of seed		
		Anoka County	Crookston	Southwestern Minnesota
inches	pounds		pounds	
6	118	1,116	1,254	1,254
24	90	696	720	654
40	54	558	660	426



In beans, the hypocotyl elongates and pulls the cotyledons above the ground. In peas, the hypocotyl does not elongate.

Culture

WEEDS

Weeds are one of the greatest hazards to dry pea production. They reduce yields because of competition and they interfere with and delay harvesting. It is a mistake to sow peas on fields where weeds are a serious problem.

Peas should be sown early in the spring so they will cover the ground before emergence of late germinating weed species.

Pre- and/or early post-emergence use of the spiketooth harrow, rotary hoe, or weeder when weeds are emerging and still "white" is worthwhile whenever enough weeds emerge

at one time. The harrow setting or rotary hoe weighting is accomplished on a "try and adjust" basis to do most damage to the weeds and least to the peas.

Several herbicides can be used on field peas. Follow the manufacturer's directions for rate and time of application to avoid injury and to avoid liability for illegal chemical residues in the seed or vines.

Nongrass annual weeds, such as mustard and lambsquarter, can be killed with MCPA, amine, at ¼ pound per acre or DNBP, amine (Premerge, Sinox PE), at 1½-2½ pounds per acre when peas are 3 to 6 inches tall. Somewhat higher rates of MCPA may be used to prevent Canada thistle from blooming, but peas may be injured.

Pigeon grass can be controlled with dalapon at ¾ pound per acre when peas are 2 to 6 inches tall.

Mixtures of MCPA + dalapon or DNBP, amine, + dalapon for control of both pigeon grass and nongrass annual weeds have been effective.

DATC (Avadex) applied before planting or barban (Carbyne) applied post-emergence have shown promise for wild oat control in peas.

MIXTURES FOR VINE SUPPORT AND WEED CONTROL

Use of spring wheat at Crookston and flax at Rosemount mixed with peas to support pea vines and facilitate combine harvest was found to be unsatisfactory. Wheat lowered pea yields, and flax did not support pea vines.

Winter wheat sown at 30 pounds per acre in mixture with peas to control weeds was tried on sandy soil in Anoka County and on heavy soils at Crookston and in southwestern Minnesota. (Winter wheat sown in the spring develops a short leafy growth, does not head, and dries up in July.) Pea yields were reduced 10 to 15 percent.

APHIDS

Pea aphids spend the winter on alfalfa or clover and migrate to peas in the spring. The amount of damage depends on population, weather, and stage of growth. With ample moisture, peas can stand a moderate aphid infestation without wilting; whereas under dry conditions, a moderate population will cause wilting and yield loss.

It may not be economically practical to spray oat + pea mixtures. In contrast to the quite general spraying of canning peas, field peas are usually not sprayed. About 40 percent of the planted dry field pea acreage each year is plowed under for green manure. This high abandonment is probably due mostly to poor stands and uncontrolled weeds and, to a lesser extent, uncontrolled aphids.

Insecticides and rates per acre that can be used to control aphids on field peas include malathion at ¾ to 1 pound, dibrom at 1 to 2 pounds, parathion at ¼ to ½ pound, or phosdrin at 0.2 pound. The latter two are especially poisonous to livestock and humans so should not be used by untrained or unprotected workers. Normally field peas for seed or silage will be harvested long enough after spraying so that insecticide residues are no problem. However, the legal time limit between spraying and harvest is 10 days for parathion, 3 days for malathion, 4 days for dibrom, and 1 day for phosdrin.

FERTILIZERS

Dry peas remove less soil nutrients than canning peas since only the dry seed is removed and the vines remain on the field. However, when portable field viners are used, canning pea vines also remain on the field. The crop is harvested when the soil is dry and firm, thus avoiding the extreme soil compaction that occurs when canning peas are removed in wet weather.

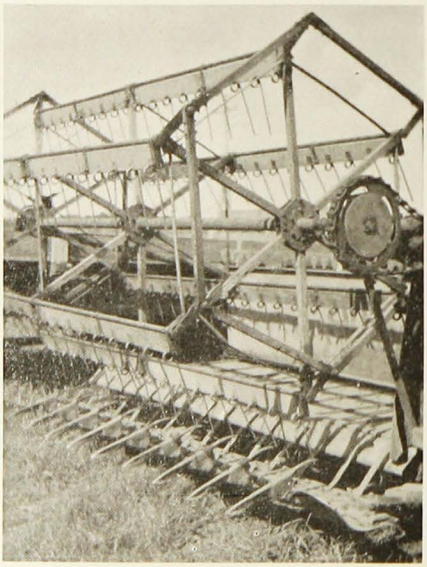
The crop does not always respond to fertilizer applications. However, it needs good soil fertility since it has a small root system and must make its growth in a relatively short time. Peas do not deplete the soil of nitrogen if they are inoculated and well supplied with lime, phosphate, and potash. Therefore, nitrogen fertilizer is not used or only a small amount is used to start the crop.

Phosphate and potash in 40- and 80-pound rates alone and in combination did not increase yield of Multiplier variety at Crookston in 2 years of trial and gave a noneconomic increase the third year. This Fargo silty clay soil is high in potassium so it would not be expected to show a response to potash. Growers should use soil test recommendations and experimentation to determine fertilizer rates on field peas.

Although peas will grow on soils too acid for alfalfa, the crop does best on soils that are limed or have adequate lime near the surface.

Harvesting Dry Peas

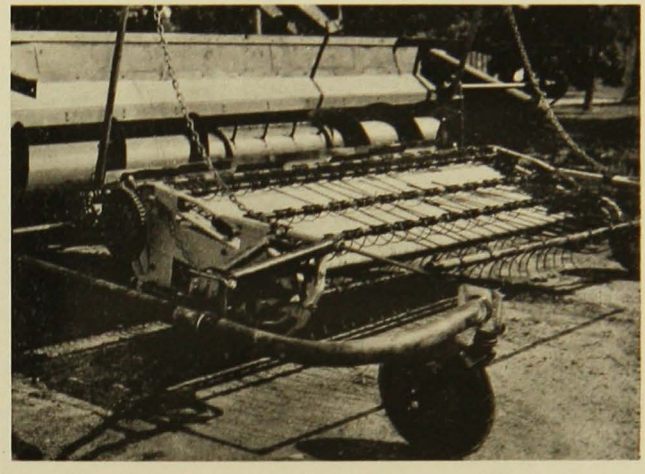
Dry peas are either windrowed and combined or combined directly from the uncut crop.



Pea windrower or swather.

The pea guards in front of the sickle on the cutter bar slip under and raise the lodged pea vines. This type of reel is good for raking the vines on to the swather canvas.

Attachment for direct combining. The windrowing operation is eliminated and the peas are combined directly. This special pickup attachment pulls the vines on to the combine, and the dry vines break off at ground level.



FOR FURTHER INFORMATION—

—refer to the other available field crop publications. See your County Agent for copies.

Ext. Bul. 299—*Sunflower Production in Minnesota.*

Plan Sheet—*Sunflower Attachment for Combines.*

Ext. F. 212—*Weed Control in Field Crops.*

Misc. Rpt. 24—*Varietal Trials of Farm Crops.*

Misc. Rpt. 28—*Minnesota Hybrid Corn Performance Trials.*

Misc. Rpt. 40—*Grain Sorghum Variety and Herbicide Trials in Minnesota.*

The following annual publication can be obtained from the Minnesota Crop Improvement Association, St. Paul 1, or from your County Agent.

Minnesota Registered and Certified Seed Directory.

UNIVERSITY OF MINNESOTA, INSTITUTE OF AGRICULTURE, ST. PAUL 1, MINNESOTA

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