



Field Pea

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Field pea is a high-quality, high-protein crop which is native to southwest Asia. Field pea was one of the first crops cultivated by man. While field pea has been predominantly produced in the Palouse region of Idaho, it is well adapted to North Dakota's climate. Field pea (also known as dry pea) differs from fresh peas in that field pea is marketed as a dry, shelled product for either human or animal food whereas fresh peas are typically marketed as a fresh vegetable for human consumption. Currently, the United States is the fifth largest producer of field pea. This publication provides an overview of the field pea industry, insight into the general aspects of production and an estimated budget for producing field pea in North Dakota.

Agronomic Information

Field pea is an annual, cool-season, pulse (legume) crop. Each leaf has a branched tendril at its tip and one to three pairs of leaflets. There are two main varieties of field pea. One type is an aggressive climbing variety and the other is a bush or dwarf type. Field pea stems grow from 2 to 4 feet in length. Most varieties of field pea produce reddish-purple or white flowers. Field pea stems (or vines) are prostrate at maturity. The pods contain from four to nine seeds and may be up to 3 inches in length. Field pea plants are classified by the color of their seed, which is green or yellow. Field pea seeds have extremely low levels of fat, moderately high levels of protein, medium levels of carbohydrates and relatively high levels of fiber compared to soybean.

Field pea is well adapted to cool, semi-arid climates. Optimum yields result at growing temperatures between 55 and 65 F. Extremely hot weather, especially during flowering, can drastically reduce seed production. Young field pea plants are extremely tolerant to frost. If the main sprout is killed by frost, another shoot will emerge from below the soil surface. A winter variety of field pea is planted in September in the Pacific Northwest; however, this variety cannot survive cold winters in North Dakota.

Planted as a spring annual in North Dakota, field pea reaches maturity at 95 to 100 days after emergence. Field pea has similar moisture requirements to those of cereal grains. However, timing of rainfall may be more critical for field pea than wheat. Field pea will perform best with the majority of moisture available in the spring and limited rainfall during pod fill and ripening. Field pea has been grown successfully across the upper Midwest, particularly in the northern states.

Seeding

Field pea can be grown in a variety of soils providing they have good internal drainage. Field pea cannot tolerate water-logged soil conditions. The ideal soil pH for field pea is between 5.5 and 6.5. Field pea seed should be inoculated with *Rhizobium leguminosarium* bacteria to enhance nitrogen fixing ability. High quality seed that is guaranteed free of

diseases and noxious weeds and has acceptable germination should be used. If field pea is planted on land which had nodulated field pea or lentil produced on it in the last two years, inoculation is not necessary. The seeds should be inoculated within 24 hours of seeding. Also, the seeds should not be exposed to sunlight or allowed to dry after inoculation. Some seed treatments will harm the inoculant, so check the seed treatment label.

Field pea will germinate best when the top inch of soil is from 50 to 64 F. In North Dakota, field pea is usually planted when soil temperatures reach 40 to 50 F or about mid to late April. Field pea should be planted in firm soil that is relatively free of crop residue to allow better seed to soil contact and enhance germination. Also, crop residues may harbor soil pathogens which may weaken field pea seedlings.

Field pea is generally seeded 1 to 2.5 inches deep in 6- to 7-inch rows. The rate of seeding changes relative to the size of the pea seed. Generally, seeding rates between 114 and 176 pounds per acre will result in an ideal plant population of nine plants per square foot. Because of variation in seed size, the grain drill seeding rate should be monitored. Also, the feed cups in the drill may need to be adjusted to prevent cracking of the seed hull. Cracked pea seeds will not germinate. Pea seedlings are not competitive against weeds; therefore, poor seed, poor germination or seeding at lower than recommended rates can result in severe weed problems.

Nitrogen fertilizer is not required for optimal field pea production, unless the soil has less than 20 pounds per acre of available nitrogen. In this case, an application of nitrogen to get the young plants off to a good start is recommended. Over-application of nitrogen will increase costs without increasing yield.

Relatively large amounts of potassium and phosphorus are required by field pea. They should be applied as recommended by a soil test. Required fertilizer is usually applied before spring planting. Because young pea plants are sensitive to fertilizer salt concentrations, fertilizer should not be placed in direct contact with the seed.

Varieties

Several varieties of field pea are available to North Dakota producers. Most field pea currently produced is yellow pea. Buyers have not encouraged the production of green field pea because of harvesting problems involving bleaching of the seed, which results in lower quality. Most field pea varieties were developed in Canada but are available to producers in the United States. A listing of the more popular varieties of field peas and their distributor is shown in Table 1.

Table 1. Recommended Field Pea Varieties, Distributors, and Comments

Variety	Distributor	Comments
Century	not available	Medium yield, long vines, large cream-colored seeds
Lenca	not available	High yield, medium maturity, medium cream-colored seeds
Miranda	Wilbur-Ellis Co. Spokane, WA 99206	Very high yielding, early maturing, very short, large cream-colored seeds
Paloma	not available	High yield, very short, early maturing, large cream-colored seeds
Procon	not available	Released by Minnesota Ag. Exp. Station in 1986, high yield, early maturing, short vines but not a dwarf, large cream-colored seed used for livestock feed
Trapper	not available	Low yielding, late maturing, small cream-colored seeds used for bird feed
Belinda	International Seeds Inc. Box 168 Halsey, OR 97348	High seed yield, early maturity, short vines with large cream-colored seeds
Tipu	SeCan 512-885 Meadowlands Drive Ottawa, Ont. K2C3NC	High seed yield, medium maturity with long vines and yellow-or cream-colored seeds
Victoria	Bonis and Company, Ltd. Lindsay, Ont.	High seed yield, early maturity, medium length vines and small cream-colored seeds
Bellevue	SeCan 512-885 Meadowlands Drive Ottawa, Ont. K2C3NC	Higher yield than 'century' or 'trapper,' medium maturity and vine length, is susceptible to Ascochyta and Septoria leaf blotch
Helka	NorFarm Seeds Box 37 Roseau, MN 56751	Early maturity, medium vine length, and bush-type growth habit, yield information not available
Impala	International Seeds Inc. Box 168 Halsey, OR 97348	Medium to early maturity with cream-colored seeds, yield information not available
Kimbo	NorFarm Seeds Box 37 Roseau, MN 56751	Early maturity and short vines with green medium-large seeds, yield information not available
Renata	International Seeds Inc. Box 168 Halsey, OR 97348	Medium maturity with large cream-colored seed and highly resistant to Fusarium wilt and Downy Mildew, yield information not available
Solara	International Seeds Inc. Box 168 Halsey, OR 97348	Medium maturity, short vines with very large bluish seed, resistant to Fusarium wilt, yield information not available

Weed Control

Because field pea does not compete well with weeds, it should be planted in ground that is relatively free of weeds, especially perennials. Also, a thorough weed control program using both tillage and chemical control may be necessary. Glyphosate, used as a replant burndown herbicide, is especially effective for quack grass control. Trifluralin can be used as a preplant herbicide at recommended rates for control of wild oats, green foxtail, buckwheat, pigweed and lambsquarters. Propachlor is used post-emergence for control of many annual grasses. Bentazon will control smartweed, wild mustard, stinkweed and redroot pigweed. Pea seedlings are delicate; therefore, harrowing after the seedlings have emerged is not recommended.

Diseases and Insect Pests

Seed can be infected by fungi shortly after planting. The most common infecting agents are *Pythium*, *Fusarium solani* or *Rhizotonia solani*. Treatment of the seed with a fungicide can be effective. Growers are cautioned to apply a fungicide that does not inhibit the nitrogen-fixing *rhizobium* bacteria.

Mycosphaerella blight caused by *Mycosphaerella pinodes* fungus probably causes the greatest economic damage of all diseases infecting field pea. Moderate to severe infections can reduce yield by 20 to 50 percent. To control this disease, plant certified seed, till crop residue under soil immediately after harvest, control volunteer field peas and do not plant field pea on the same field more than once every five years. *Fusarium* root rot can be a problem in warm, dry soil that has low fertility and excessive compaction. The best method of control is producing field pea in a four-year rotation. Powdery mildew and Downy mildew cause yellowing of leaves in cool, wet conditions, but they can be prevented by planting disease-resistant varieties.

Pea aphids are the most common insect pest affecting field pea. Field pea can normally tolerate small populations of aphids without sustaining economic damage. However, in hot, dry weather, aphids multiply quickly and can cause severe damage, especially during flowering or early pod stage. If field pea have infestations of three or more aphids per 8 inches of leaf material, spray the field with an insecticide. Other problem insects include loopers, army worms and alfalfa caterpillars.

Harvesting

Field pea is usually harvested at 16 to 18 percent moisture or when the seeds are hardened and fully mature. Field pea is generally ready for harvest about the same time as spring wheat. Green pea is usually harvested slightly earlier at 18 to 20 percent moisture to maintain good seed color. If the field pea seed is greater than 16 percent moisture at harvest, it should be dried to 15 percent for storage. If the pea seeds are to be used for seed, drying temperature should not exceed 115 F, otherwise maximum drying temperatures should not exceed 160 F.

Upon maturity, field pea vines are prostrate which can make harvesting difficult. Field pea may be swathed or straight combined. Whether swathed or combined, the cutting platform must be kept as close to the ground as possible. To reduce harvesting losses, the swather or combine straight head should be equipped with pick-up guards and pickup reels or fingers. Field pea should be swathed on a calm day. If the windrows are to be left overnight, they should be packed behind the swather with a light roller to prevent the wind from blowing them. It may be easier to swath an amount of field pea which can be combined the same day. Combine adjustments are critical to successfully harvest high quality field pea. Combine adjustments may be necessary as weather and crop conditions change. Start with the cylinder speed at 500 to 600 revolutions per minute for a trial run. Continually monitor the pea seeds for cracking and splitting and make necessary adjustments.

Marketing

Field pea production in the United States is centered in the Palouse region of Washington and Idaho. The majority of all pea produced for export in the United States are classified as green pea. In 1991, approximately 80,500 tons of green pea were exported from the country. About 6,017 tons of yellow pea were exported from the United States during 1991. On average, yellow pea was more valuable than green pea in 1991: green pea sold for \$15.97 per hundredweight and yellow pea for \$16.37 per hundredweight. An estimated 70 percent of all field pea produced in the United States is exported. Nations which consistently import field pea for human consumption are Colombia, Venezuela, Brazil, United Kingdom, Taiwan and Japan.

In 1991, North Dakota produced about 1,700 acres of dry pea. About 27 percent of all pea acreage was reported in Divide County. Dry pea acreage in 1992 increased to about 4,200 acres in North Dakota, with 21 percent produced in Divide County and 24 percent produced in Bottineau County. The majority of pea produced in North Dakota is produced for the bird food market. Farmers interested in producing field pea for the bird food market may contact Steve Edwardson at Minn-Dak Growers, Ltd., POB 1307, Dickinson, North Dakota 58602.

Economics

North Dakota farmers may be able to diversify their farm income and crop rotations by raising field pea. Farmers who may be interested in producing field pea on their farm need to investigate profitability and cash flow of this alternative crop. Production coefficients used to develop the budgets are shown in Table 2, while the economic and cash flow budgets are shown in Table 3.

Field pea yields at crop experiment stations in North Dakota, averaged across varieties, have ranged from 510 to 3,948 pounds per acre or nine to 66 bushels per acre. The yield used to calculate the example budgets was 25 bushels per acre. The contracted selling price was \$4.65 per bushel. Field pea may be contracted with Minn-Dak Growers, Ltd. (see endnotes). Field pea was assumed to be transported 150 miles one way to be marketed. The seeding rate was two bushels per acre although seeding rates will vary from 1.9 to 2.9 bushels per acre, depending on seed size. Seed cost was assumed to be \$9 per bushel. The machinery complement for a typical farm in North Dakota could accommodate field pea production. Therefore, machinery complements developed by the NDSU Extension Service were used to estimate machinery operating and ownership costs. Opportunity cost of equity capital was 5.5 percent while the interest rate on debt capital was 9.5 percent. The field pea operation was assumed to be financed with 34 percent debt capital.

Table 2. Production coefficients for field pea production in northcentral North Dakota, 1993

Yield (bu/acre)	25
Seed price per bushel	\$9
Selling price per bushel	\$4.65
Debt-to-asset ratio	.34
Interest rate on debt-6 months (% APR)	9.5
Interest rate on equity capital-6 months (% APR)	5.5
Property tax per acre	\$2.89
Seeding rate (bu/acre)	2
Phosphorus price per pound	\$0.18
Trifluralin preplant herbicide (pint/acre)	1.25
Hauling distance (miles round trip)	300
Tandem truck capacity (bushels)	500

Table 3. Economic and cash flow budgets for producing field pea in northcentral North Dakota, 1993

	Profitability	Cash Flow
	--\$/acre--	--\$/acre--
Market Income	\$84.70	\$84.70
Variable Costs		
-Seed	\$18.00	\$18.00

-Herbicides	5.20	5.20
-Fuel and lubrication	6.60	6.60
-Repairs	8.39	8.39
-Miscellaneous	2.60	2.60
-Interest	1.94	1.94
Total Variable Costs	\$42.73	\$42.73
Fixed Costs		
-Miscellaneous overhead	\$3.83	\$2.06
-Machinery depreciation	15.10	xxx.xx
-Machinery investment	7.47	15.12
-Land taxes	2.89	2.89
-Land investment	22.77	9.66
Total Fixed Costs	\$52.06	\$29.73
Total Listed Costs	\$94.79	\$72.46
Return over variable costs	\$41.97	\$41.97
Return to labor and management	(\$10.09)	xxx.xx
Net cash flow	xx.xx	\$12.24

The economic budget is generated by charging market rates for all resources needed for production. It helps answer the question "Is this enterprise profitable?" The bottom line represents a return to labor and management.

The cash flow budget is an estimate of the out-of-pocket cash needed to run the enterprise, including not only direct costs but indirect cash costs such as principle and interest payments, insurance and taxes. It helps answer the question "Can I meet my cash obligations if I go into this enterprise?" Total cash expenses are subtracted from total cash receipts to calculate the net cash which is available for family living and other needs.

For more information contact:

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