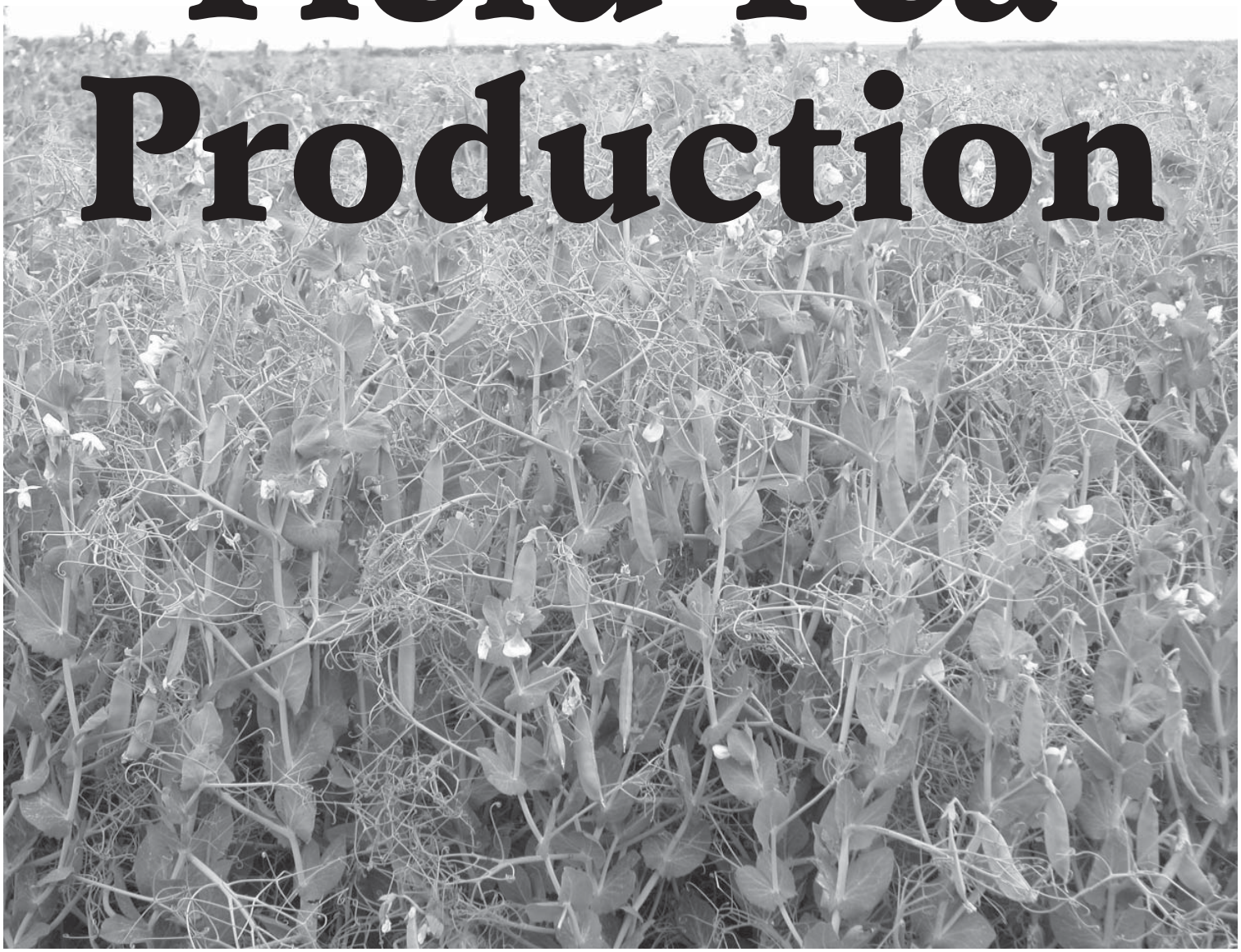
A-1166 (Revised)

Field Pea Production



Kent McKay
Area Extension Specialist/Cropping Systems

Blaine Schatz
Carrington Research Extension Center Director/Research Agronomist

Gregory Endres
Area Extension Specialist/Cropping Systems

MARCH 2003

NDSU EXTENSION SERVICE

North Dakota State University, Fargo, North Dakota 58105

Field pea is a cool-season legume crop that is grown on over 25 million acres worldwide. Field pea or "dry pea" is marketed as a dry, shelled product for either human or livestock food. Field pea differs from fresh or succulent pea, which is marketed as a fresh or canned vegetable.

The major producing countries of field pea are Russia and China, followed by Canada, Europe, Australia and the United States. Europe, Australia, Canada and the United States raise over 4.5 million acres and are major exporters of peas. In 2002, there were approximately 300,000 acres of field peas grown in the United States.

Historically, field pea was primarily grown in the Palouse region of Washington and Idaho. In the 1990s, North Dakota, South Dakota, Montana and Minnesota began producing dry peas. In 1991, approximately 1,600 acres of dry peas were planted in North Dakota; in 2002 157,000 acres were planted. The majority (over 70 percent) of the dry pea produced in the United States is exported.

■ Uses

Field pea is primarily used for human consumption or as a livestock feed. Field pea is a grain legume commonly used throughout the world in human cereal grain diets.

Field pea has high levels of amino acids, lysine and tryptophan, which are relatively low in cereal grains. Field pea contains approximately 21-25 percent protein. Peas contain high levels of carbohydrates, are low in fiber and contain 86-87 percent total digestible nutrients, which makes them an excellent livestock feed. Field pea contains 5 to 20 percent less of the trypsin inhibitors than soybean. This allows it to be directly fed to livestock without having to go through the extrusion heating process. Field pea is often cracked or ground and added to cereal grain rations.

Research has shown that field pea is an excellent protein supplement in swine, cow, feeder calf, dairy and poultry rations.

Field pea is often used in forage crop mixtures with small grain. Field pea forage is approximately 18 to 20 percent protein. Pea interseeded at 60 to 100 pounds per acre with a small grain such as oat can increase the protein concentration of the mixed forage by two to four percentage points and increase the relative feed value by 20 points over oat seeded alone.

Field pea also may be grown as a green manure or green fallow crop. With either option, soil and future crop productivity will be maintained or improved. Use of field pea for green fallow instead of black fallow protects the soil from erosion, improves soil quality, substitutes water loss by evaporation or leaching from black fallow with transpiration through plant growth and exploits rotational benefits. Costs of tillage and idled land in black fallow are substituted with costs of field pea establishment and termination (at early flowering) in green fallow.

Field pea in a green fallow system yielded 3,425 pounds per acre of biomass and 103 pounds per acre of accumulated nitrogen in above-ground biomass at the Carrington Research Extension Center during 1990-1992. Spring wheat averaged 39 bushels per acre over a two-year period at Carrington when grown without additional N fertilizer following green fallow as field pea or following black fallow. This demonstrates that wheat following pea green fallow can be as productive as wheat grown on black fallow, plus the numerous rotational benefits of the legume can be utilized.

■ Adaptation

Field pea is an annual cool-season grain legume (pulse) crop. There are two main types of field pea. One type has normal leaves and vine lengths of three to six feet; the second type is the semi-leafless type that has modified leaflets reduced to tendrils, resulting in shorter vine lengths of two to four feet. Pea normally has a single stem but can branch from nodes below the first flower.

Most varieties of pea produce white to reddish-purple flowers, which are self-pollinated. Each flower will produce a pod containing four to nine seeds. Pea varieties either have indeterminate or determinate flowering habit.

Indeterminate flowering varieties will flower for long periods and ripening can be prolonged under cool, wet conditions. Indeterminate varieties are later in maturity ranging from 90 to 100 days. Determinate varieties will flower for a set period and ripen with earlier maturity of 80 to 90 days. Field pea is sensitive to heat stress at flowering, which can reduce pod and seed set. Indeterminate varieties are more likely to compensate for periods of hot, dry weather and are more adapted to arid regions. Determinate, semi-leafless varieties that have good harvestability are more adapted to the wetter regions.

Pea roots can grow to a depth of three to four feet; however, over 75 percent of the root biomass is within two feet of the soil surface. A relatively shallow root system and high water use efficiency make field pea an excellent rotational crop with small grains, especially in arid areas where soil moisture conservation is critical.

Field pea is well adapted to cool, semi-arid climates. Field pea seed will germinate at a soil temperature of 40 degrees F. Emergence normally takes 10 to 14 days. Field pea has hypogeal emergence in which the cotyledons remain below the soil surface. Seedlings are tolerant to spring frosts in the low 20s and if injured by frost, a new shoot will emerge from below the soil surface.

Flowering usually begins 40 to 50 days after planting. Flowering is normally two to four weeks, depending on the flowering habit and weather during flowering.

Field pea has shown to be well adapted to most regions of the Northern Great Plains. Field pea yields are similar to or exceed spring wheat on a pound or bushel basis within a specific region. A six-year average (1993-1998) of 'Profi' field pea yield on re-crop at the North Central Research Extension Center at Minot was 2,784 pounds per acre or 46 bushels per acre, compared to spring wheat on re-crop at 2,148 pounds per acre or 36 bushels per acre.

■ Varieties, Types and Performance

Selecting the appropriate field pea variety should be based on review of the many differences that exist among varieties. Factors to consider should include market class, yield potential, harvest ease, vine length, maturity, seed size and disease tolerance.

The first criterion for selecting a variety should be market class. The green and yellow cotyledon types are the primary classes. All field pea varieties may be considered feed peas, but only selected varieties are acceptable for either the green or yellow human edible market.

After market type is determined, growers should review the field pea performance test information from trials conducted across the state with particular attention paid to those trials reflective of their farming area.

Crop harvestability is a very important factor in variety selection and is often noted by harvest ease scores in trial results. Most growers prefer a variety that will stand upright at harvest since it allows a faster harvest, minimal equipment modification and higher quality seed. The newer varieties that have shorter vines and are semi-leafless will be easier to harvest. It is important to review harvest ease data since varieties within this plant type differ greatly in standability.

Another factor to consider in variety selection is the producer's location. The indeterminate nature of the long-vined normal leaf type varieties may make them a preferred type in western North Dakota where moisture stress is more prevalent. Indeterminate varieties tend to express more stable seed yields when moisture and heat stress impact crop development. This type of variety will normally be heavily lodged at harvest and require special harvest procedures.

Most growers will select among the semi-leafless varieties that are more determinate in development. Selection within these semi-leafless types should consider the impact of vine length. In areas with higher rainfall and cool summers, the shortest-vined varieties may be best, while in the drier regions, a grower should choose a semi-leafless type with longer vines.

A wide selection of field pea varieties exists for producers across the region. A good source of information to aid in variety selection is field trial evaluations conducted by the various NDSU research extension centers across the state. These trials include the most promising varieties with information recorded on the important traits necessary for making proper variety selection.

■ Field Selection

Field pea can be grown on a wide range of soil types, from light sandy to heavy clay. Field pea has moisture requirements similar to those of cereal grains. However, peas have lower tolerance to saline and water-logged soil conditions than cereal grains. Peas most often will die after 24 to 48 hours in a water-logged condition. Poorly drained and saline soils should be avoided when growing peas.

Field peas are most often grown on re-crop following small grain. Being a legume, field pea will fix the majority of required nitrogen if the seed is properly inoculated. Residual nitrogen will also be present for the succeeding crop.

Fields that have a history of perennial weed problems such as quackgrass, Canada thistle, perennial sowthistle and field bindweed should be avoided. Check field records for prior use of herbicides with soil residual. Consult the current North Dakota Weed Control Guide (NDSU Extension Service circular W-253) and herbicide labels for rotational restrictions prior to seeding field pea.

Seeding

Field pea can be grown in a no-till or conventional-till cropping system. Avoid excessive tillage in the spring to avoid drying out the seedbed. Pea seed requires considerably higher amounts of moisture for germination than cereal grains. Field peas are typically seeded in narrow row spacings of 6 to 12 inches. A conventional grain drill or air seeder that is capable of handling large seed without cracking is essential.

Field pea should be seeded early, April to mid-May, so flowering will occur during potentially cooler weather in June and early July. Seeding date studies conducted in North Dakota indicate that field pea yields decrease significantly when seeding is delayed beyond mid-May. Seeding peas beyond mid-May will result in the crop beginning flowering in mid-July, which increases the risk of heat stress and disease problems, such as powdery mildew, reducing yields.

Maintaining firm seed-to-soil moisture contact is critical. Seeding pea well into moisture is critical and seeding peas into dry soil should be avoided. Seeding depth of one to three inches is recommended, with a rule of thumb that pea should be seeded at least a half inch into moisture and never seeded onto the interface where soil moisture meets dry soil.

Seeding Rate

The seeding rate will depend on the size of the seed. Field pea varieties will range from 1,600 to 5,000 seeds per pound. A plant population of 300,000 plants per acre or seven to eight plants per square foot is recommended. Always select high-quality, disease-free seed. When seeding pea, always adjust for germination. Planting equipment should be calibrated or modified to allow for seed and inoculant to flow properly without cracking the seed or plugging the opener.

Seed Treatments

Seed treatments are not commonly used with field pea; however, there are seed-borne and soil-borne diseases such as Fusarium, Rhizoctonia, Alternaria and Pythium that can cause significant stand reduction. Field pea is often seeded early into cool or cold soil conditions. In 2002, there were numerous reports of seed rot in field pea caused by Fusarium, Pythium and/or Rhiztoctonia. This resulted in significant stand loss, which caused weed control and harvest problems later in the growing season. Preventing seed rot or seed decay with the use of fungicide seed treatments in pea is recommended when field pea is planted into cold soils and is seeded close in rotation with other broadleaf crops. Large-seed field pea varieties appear to be more susceptible to Pythium; therefore, seed treatments such as Apron or Allegiance that control Pythium should be considered.

For a listing of registered seed treatments and specifics on disease control, consult the most current version of NDSU Extension Service circular PP622, North Dakota Field Crop Fungicide Guide. It is very important to consult the seed treatment label for its effect on rhizobial inoculants. Most seed treatments have little or no effect on rhizobial inoculants and nodulation; however, there are seed treatments that are very toxic to all formulations of inoculants. Allowing the seed treatment to fully dry and adding inoculants just prior to planting is always recommended.

Inoculation

Field pea is a legume crop and has the inherent ability to obtain much of its nitrogen requirement from the atmosphere by forming a symbiotic relationship with Rhizobium bacteria in the soil.

Grain legumes vary widely in the proportion of the crop's total nitrogen requirement that may be met through nitrogen fixation. The total amount of nitrogen fixed by the crop also depends on favorable growing conditions. Hot temperatures and dry soils during the later vegetative and early reproductive stages are especially detrimental for N-fixation. Field peas are among the most highly efficient nitrogen fixing crops and may obtain as much as 80 percent of their total nitrogen requirement under good growing conditions.

However, for this relationship to occur, the seed must be properly inoculated with the appropriate strain of

Rhizobium bacteria. Producers must be certain that the inoculum product they obtain is specific for field pea. Use of an inoculum labeled for soybean, clover or other legume will not allow the nitrogen fixation process to occur. Inoculants are available in various forms including dry peat, liquid and granular.

Application of inoculant to the seed is an extremely important procedure. Many failures with nitrogen fixation have been associated with improper application technique. Thorough coverage of the seed is critical since seeds not exposed to the bacteria will result in plants unable to fix nitrogen. Inoculants are living organisms, so proper storage and handling is important.

Granular inoculant, a relatively new form of inoculant, has alleviated many of the concerns with inoculant applications. This inoculant is metered through the planter and delivered directly into the seed furrow.

Producers should refer to the manufacturer's package labels to review proper inoculum rate and handling procedure.

Growers should check their fields to determine if inoculation was successful. Normally, nodules will form on the roots two to four weeks after emergence. To check for nodulation, carefully dig up a number of plants and gently clear the soil from the root mass. Nodules will be present both on the primary root and on the lateral roots. Effective nodules will have a pink to red coloration on their interior. If nodulation does not occur and soil nitrogen levels are low, an application of nitrogen fertilizer over the top may be required to optimize seed yields. Nitrogen fixation will take place from about four weeks after emergence through seed formation.

■ Fertilization

Under most conditions, the use of inoculants will satisfy the nitrogen requirement of a field pea crop. A soil test should be conducted to determine the status of the primary nutrients.

Addition of a nitrogen fertilizer may be required when field pea is planted on land with less than 30 pounds of available nitrate N in the top two feet of the soil profile. Under these conditions, the addition of 20-30 pounds of nitrogen with commercial fertilizer is recommended to meet the needs of the developing field pea plant until nodulation becomes fully effective.

Producers should avoid planting field pea on fields that have a high level of nitrogen. Excess nitrogen will promote vegetative development over reproductive seed production. Higher nitrogen levels will also reduce the potential of nitrogen fixation and increase the potential for lodging.

A rule of thumb is that 1.25 pounds of residual nitrogen per acre is available for every bushel of peas (field pea has a standard bushel weight of 60 pounds) produced per acre. For example, 50 pounds of residual nitrogen per acre may be expected from a field pea crop of 40 bushels per acre.

Beyond nitrogen nutrition, phosphorus fertilization is likely the primary concern for field pea growers. Research has indicated the importance of adequate phosphorus fertility for optimizing seed yield. Proper fertilizer source, rate and placement are necessary to avoid reductions in plant stand while at the same time meeting the P needs of the field pea plant. Avoid placing fertilizer directly with the seed. North Dakota research has indicated stand loss is likely while yields are not increased.

Refer to NDSU Extension Service circular SF-725, Fertilizing Field Pea and Lentil, for additional information that relates to field pea nutrient requirements.

■ Weed Control

Field pea is a poor competitor with weeds, especially during the first month after planting. Relatively slow early-season growth and lack of complete ground cover by the crop canopy allow weeds to be competitive. Field pea is most competitive with even, rapid emergence. A well-established stand of seven to eight plants per square foot is critical for field pea to be competitive with weeds.

Perennial weeds and annual weeds that emerge early in the season, including common lambsquarters, kochia, volunteer grain, wild mustard and wild oat, are very competitive with pea. For example, a Canadian trial indicated that two wild mustard plants per square foot reduced pea yield as much as 35 percent. Good weed control is also very important in raising high-quality human edible pea. Weeds such as kochia, Russian thistle, nightshade and wild buckwheat can cause harvest problems with fields that are intended to be straight combined. Nightshade berries can stain the pea seed, causing a reduction in quality.

Cultural methods that should be used as part of an integrated weed management system include crop rotation,

field selection, rapid crop establishment at an adequate density and use of clean seed. Pre-emergence or early post-emergence tillage with a rotary hoe or harrow can reduce populations of shallow-emerging weeds such as common lambsquarters, foxtail, kochia and pigweed. Post-emergence tillage with a rotary hoe or light spring-tooth harrow needs to be timed to control emerging weeds on small (half- to two-inch tall) field pea. Pea stand reduction probably will occur with post-emergence tillage.

There are several soil-applied and post-emergence herbicides labeled for weed control in field pea. Generally, post-emergence herbicides should be applied to small weeds and pea (two- to four-inch height) to maximize weed control and minimize crop injury. Pre-harvest desiccants also are labeled to dry weeds for a more efficient harvest.

For a listing of registered herbicides and directions for use, consult NDSU Extension Service circular W-253, North Dakota Weed Control Guide, and herbicide labels.

■ Diseases

Controlling disease in field pea begins with crop rotation. A preferred crop rotation would have field pea planted with at least two cropping years between plantings. Long-term crop rotational research in Canada indicates that a rotation of small grain/canola, or flax or lentil/small grain/field pea has been successful without any major buildup of disease.

Mycosphaerella and ascochtya foot rot are the main diseases of economic importance in field pea. It is often difficult to distinguish between these diseases in the field. They are fungus diseases that cause purple spots or lesions on the leaves, stems, flowers, pods and seeds.

Disease is most severe with continuous wet weather. Fungal spores may spread by splashing rain to uninfected tissue. Severely infected leaves will prematurely die, resulting in premature ripening of the plant. Lesions on pods can develop, which may result in the seed becoming infected. Infected seed will be shrunken and discolored. Ascochtya foot rot will form blackish-purple lesions on the stem at the base of the plant. Severe infections will result in premature ripening, lodging, shriveled seed and reduced yields.

Both fungi survive on plant debris, and spores can survive for years on field pea stubble. Spores of both fungi can also be carried on the seed; therefore, planting disease-free seed is very important. Producers who buy or use their own seed should know the level of seed-borne inoculum present on the seed.

Aphanomyces root rot is another disease that can affect field pea. Aphanomyces root rot is caused by a fungal-like organism. It overwinters in the soil as thick-walled spores (oospores) that can survive for many years. In the presence of pea roots, the oospores will germinate and eventually swimming spores (zoospores) will be formed that can infect pea roots. Infection may occur at any stage of plant growth. Plants are most at risk when soil is saturated for a long period of time. Symptoms appear as black lesions on the roots. The pathogen infects the cortex (outer portion) of the root; therefore, when plants are pulled from the soil, the cortex may slough off, leaving only a small strand of vascular tissue intact. Minimizing soil compaction will help manage the disease. Planting oat as a pre-crop has also been shown to reduce disease severity.

Sclerotinia stem rot can infect field pea. Symptoms of the disease include a white, frothy, fungal growth found on dead or decaying tissue. The fungal growth can develop into hard black bodies (sclerotia) found inside the stem which can cause premature ripening of the plant. Typically, long vine varieties having normal leaf arrangement are more susceptible to sclerotinia, for they tend to lodge after flowering, forming a dense canopy close to the soil surface and increasing the risk of infection. Generally, semi-leafless pea that has good standibilty will avoid any serious sclerotinia infections. Infection risk increases if field pea is planted close in rotation with broadleaf crops such as sunflower, dry edible beans, canola, mustard or crambe.

Powdery mildew is an economic disease with late-planted field pea. The disease overwinters on plant residue. Powdery mildew infection usually does not occur until mid-summer. Yield loss typically doesn't occur unless the infection occurs prior to or during early pod set. Research indicates that planting field pea beyond mid-May will result in plants more susceptible to powdery mildew. Powdery mildew will cause a white "powdery" spot on the lower leaves and stems. Wet or heavy dew conditions help to spread the disease to upper leaves, flowers and pods. Severely infected plants will not mature normally. In most instances, infected plants stay green while healthy plants mature and ripen normally. This will result in harvest moisture problems at harvest and decreased seed yield. The combination of planting early and use of tolerant varieties will aid in reducing risk with this disease.

■ Insects

There are a few insects that are of economic importance in field pea. Aphids that infest peas are small, about ½ inch long, and light green in color. Aphids do not overwinter in North Dakota and are often blown in from southern states in early summer. Populations usually increase as the summer progresses. Aphids usually don't reach economic importance in field pea. Aphids will pierce the plant tissue and suck plant juices, causing the plant to weaken, especially under drought stress. There are no threshold populations developed for aphids in field pea. Aphid populations are usually kept low by heavy rains or by beneficial insects such as lace wings or the lady bird beetle.

The lygus bug or "tarnished plant bug" has the potential of being the most serious insect pest in field pea. Lygus bugs feed preferentially on meristematic tissue or developing reproductive tissue. The effect of Lygus feeding is shriveled seed. "Chalk spot" is a damage consideration in field pea. Chalk spot is a chalky white spot which may appear on the cotyledons of some legumes. It is considered as damage mainly because it severely affects the appearance of the seed, lowering the grade and marketability. In 1996 and 2002, chalk spot was a concern in the North Dakota pea crop. Chalk spot damage to some pea samples was as high as 27 percent; however, it could not be documented in all samples that it was the lygus bug that caused the damage. The other probable cause was that the pea was harvested at too high moisture. Peas harvested at high moisture are susceptible to bruising as they are harvested or handled roughly, causing damage similar to chalk spot.

Grasshoppers are usually not a major problem in pea. Pea is not typically a preferred host, but grasshoppers can cause damage to field pea, especially to pea that is in the flower to pod-filling stages.

■ Harvest and Storage

Harvest management is especially important if field pea is to be marketed as human food or as seed. Growers should have a goal of producing high-quality peas to receive a premium price for their crop in the human food or seed markets. If quality problems exist, including bleached, split, cracked or earth-tagged (dirt attached to seed that cannot be removed) seed, the livestock feed market will likely be the only option. The following suggestions will help growers maintain a high-quality crop during harvest and storage.

Field pea may be swathed before combining or straight (direct) combined. Peas are normally swathed to preserve quality if there is uneven crop maturity or heavy weed pressure present. If green-cotyledon pea harvest is delayed, bleaching may occur. Bleaching is caused by rainfall at maturity, high humidity, bright sunshine and warm temperatures. If green peas are swathed, timely harvest is essential, for green pea will be more susceptible to bleaching in the swath than if left standing.

When swathing peas, the seed needs to be at physiological maturity. At this stage of growth, the majority of pods should have turned from green to a yellow color. The crop matures from the bottom pods upward. Swathing will normally result in increased harvest losses, but swather modifications make the procedure easier and will reduce harvest loss. Vine-lifters enable producers to get under the pea vines and lift them over the cutting knife. Many growers use a pickup reel as well. Peas should be swathed in the early morning or late afternoon when the pods are tough to reduce shattering losses. Combining should not be delayed after swathing, because pea swaths are susceptible to movement by wind.

Straight combining is possible, depending on pea cultivar and harvest equipment. Many short- to medium-vine and semi-leafless pea cultivars have characteristics that allow straight harvesting compared to cultivars with indeterminate and prostrate-vine growth. For example, semi-leafless pea have a more open canopy, remain erect longer and dry down more rapidly after a rain or heavy dew than indeterminate long-vine type.

The first choice for direct harvest of short- to medium-vine and semi-leafless pea varieties is a combine header with a floating cutter bar or flex head. Also, attachments such as lifter guards and pickup reels reduce losses and improve harvest efficiency. Direct harvesting of weak- and prostrate-vine cultivars is most efficient with an aggressive pickup attachment and a lead coulter on a standard combine.

Field peas should be combined with seed moisture of 14 to 20 percent. At this moisture range, the seeds are firm and no longer penetrable with a thumbnail. Harvest should occur during humid conditions to minimize seed shatter. However, pea vines must be dry or harvest will be extremely slow and difficult. Seed that is too dry will be susceptible to seedcoat breakage or peeling.

Correct combine settings and operation are important to maintain seed quality. Reel speed should be slow to minimize seed shatter. Low cylinder speeds, normally 350 to 600 rpm, should be used to minimize seed cracking or splitting. Initial concave settings of 0.6 inch clearance at the front and 0.2 inch at the rear are suggested. Adjust combine settings as crop and weather conditions change.

Combine and portable augers should be operated at full capacity and low speeds to reduce pea seed damage. Alternative seed handling equipment such as belt conveyors should be considered for handling seed intended for seed or the human food market. Minimize the number of times seed is handled. Also, don't handle peas during cold temperatures as potential for seed damage dramatically increases.

Green weed seeds or foreign material should be cleaned from the crop before storage to avoid spoilage and fewer market opportunities. Seed should be stored at 14 to 16 percent moisture. Seed that is marketed in the human edible market often requires moisture below 14 percent. Pea seed at 18 percent moisture can be stored for 20 weeks at 68 degrees F, but only for four weeks at 77 degrees F. An aeration system should be present in the storage facility. The recommended airflow volume for bins is about one to two cubic feet of air per bushel per minute. Warm seed should be immediately cooled after binning, even if seed moisture is low.

■ Markets

Primary field pea market opportunities are for livestock feed, seed and human food. Markets are readily available with minimal quality restrictions for peas sold as livestock feed. Prices received for feed peas should be considered base prices. Opportunities exist to enhance the value of feed peas by using the commodity as an on-farm livestock feed source. Consult the NDSU Extension Service circular EB-76, Feeding Peas to Livestock.

Premium prices are associated with the human food and seed markets. Selling peas in the premium markets is a greater challenge than marketing a traditional small grain crop. Premium pea markets are normally limited and require a more aggressive approach by the grower. Pea markets should be identified before peas are produced to optimize the ability to harvest a crop that will meet market standards. For example, when marketing food-grade peas, numerous factors that affect market grade include market class (e.g. green or yellow cotyledon, specialty types), seed size and shape, splitting potential, harvest moisture, seed handling techniques during harvest and storage and seed damage factors (e.g. bleach, cracked seed coats, splits, shriveled seed, earth tag, chalk spot, etc.).

After harvest, the crop needs to be graded to determine what markets are options for the grower.

A representative two-pound sample may be sent to the Federal Grain Inspection Service: USDA-GIPSA FGIS, P.O. Box 13427, Grand Forks, ND 58208-3427. Peas grading U.S. No.1 or 2 qualify for the human food market.

It is important to keep abreast of current markets by using sources such as written or electronic agricultural publications. Due to limited market opportunities for human food grade peas, make sure local, state or regional buyers are aware of the quality and quantity of crop you have available for sale. An additional market option for human food grade peas is the PL-480 program, a U.S. government program designed to distribute surplus commodities to aid developing nations.

A listing of potential buyers and market opportunities is available from the North Dakota Dry Pea and Lentil Association (4023 State Street, Bismarck, ND 58501; telephone 701-222-0128) or NDSU Extension Service offices.

For more information on this and other topics, see: www.ag.ndsu.nodak.edu

A- 1166

NDSU Extension Service, North Dakota State University of Agriculture and Applied Science, and U.S. Department of Agriculture cooperating. Sharon D. Anderson, Director, Fargo, North Dakota. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. We offer our programs and facilities to all persons regardless of race, color, national origin, religion, sex, disability, age, Vietnam era veterans status, or sexual orientation; and are an equal opportunity employer.

This publication will be made available in alternative formats for people with disabilities upon request, 701/231-7881. 2M-3-03