Crop Profile for Peas (Green) in Delaware

Prepared: August, 2000
Revised: July, 2006[1]

General Production Information

- Acres of green peas planted and harvested for processing in Delaware have grown from 5,550 in 1996 to 10,700 in 1998 (1).
- Production per acre has grown from 1.15 tons/acre in 1996 to 1.85 tons/acre in 1998 on a shelled basis (1).
- Total production has grown from 6,380 tons in 1996 to 19,800 tons in 1998 (1).
- Value of production has grown from $1,883,000 in 1996 to $6,635,000 in 1998 (1).
- Nationally, 273,000 acres of green peas were harvested for processing in 1998. Yield was 483,840 tons (2).

Production Regions

Production is centered in southern Delaware.

Cultural Practices

Peas are members of the legume family which produce their own nitrogen. They need soil that is only slightly acid (pH 6.0-6.5). Because peas are very susceptible to root rot, they should also be planted in well-drained soil. These crops require very little fertilizer. For a new planting, probably 1-1/2 pounds of 10-10-10 per 100 square feet is adequate. For a well-established planting, 1/2 pound of 10-10-10 is more than enough.

Peas are a cool-season vegetable that should be planted in early March to April. They can be planted in a single row, but grow best planted in double rows. Plant peas 6 inches apart with 30 inches between the double row. One option is to set up a fence

of chicken wire, or similar material, between rows to support the peas. This keeps them off the ground and reduces bird damage. Peas are at their highest quality when harvested just before the pod is full but still firm with tender peas. Harvest the edible pod or sugar pod type of peas before the pea seeds are

clearly visible.

The major problem in growing peas in Delaware is root rot. Root rot can be controlled by rotating the planting site and selecting a site with well-drained soil. Birds also love peas because the pea crop is one of the earliest available to feed their young. The best control against birds is netting.

Insect Pests

In Delaware, there are two main insect pests of peas: seed corn maggot and pea aphid.

Seed Corn Maggot(*Delia platura*)

This insect is a problem in spring planted peas. It is primarily a problem during cool, wet growing seasons. Only a few maggots per seed or plant can significantly reduce stands. It overwinters primarily as a puparium in the soil. Eggs are laid just below the surface of recently plowed ground. High crop residue and fresh manure also attract flies which feed on the organic matter. The maggots hatch in four to seven days and feed primarily on decaying organic matter. After feeding for seven to 21 days, the larvae pupate in the soil, usually near the place of larval feeding. The entire life cycle is completed in three to four weeks. There may be three to five generations of seedcorn maggots per season, however the first is usually the only generation to cause any damage to peas.

Monitoring: Scouting and applying rescue treatments after the damage is observed are ineffective. Management options must be applied to high-risk fields prior to planting.

Frequency of Occurrence: most seasons

% Acres Affected: Up to 80% of the acreage with economic levels each year.

Timing of Control: At planting.

Yield Losses: In severely affected fields, yields may be decreased by as much as 50% due to stand loss. Losses typically are 10 15%.

Controls:

Biological - Although predators, parasitoids, and pathogens are known to slightly reduce infestations, they do not provide economic levels of control.

Cultural: The use of cultural management practices before planting is critical to reduce the potential for

economic problems. A combination of the following cultural strategies can be used: (1) plow down cover crops at least 3-4 weeks before planting or transplanting, (2) completely bury cover crops or previous crop residue to reduce fly attraction to rotting organic matter on the soil surface, and (3) avoid the use of heavy manure applications close to planting. No resistant varieties are available.

Chemical: In the past, seed treatments and soil insecticides provided fair to good control, especially under heavy seed corn maggot pressure. However, with the cancellation of diazinon, soil insecticides are not an option. The use of chlorpyrifos seed treatment alone can help to reduce damage.

Chloropyrifos seed treatment: used on 15% of the acreage; providing 70-80% control

Alternatives: Thiamethoxam, a new material from Novartis (trade name Adage) may be an effective alternative.

Pea Aphids(*Acyrthosiphon pisum*)

This aphid pest of peas overwinters as eggs in alfalfa and clover. In spring, eggs hatch into wingless parthenogentic females which, after reaching the adult stage, give birth to young nymphs, often ten to fourteen per day. Winged aphids appear at the second or third generation and fly to pea fields, often producing, under favorable conditions, 12 or more wingless generations in rapid succession throughout the summer. As peas become mature and less favorable for feeding, winged adults again appear, and many of these fly back to clover and alfalfa where males and egg-laying females are produced. Pea aphids are sucking insects that feed directly on plant sap

Monitoring: Fields should be sampling from the bud stage until harvest using a 15-inch diameter sweep net or by examining individual plants. Take 5 sweeps in 10 locations or examine 5 plants in 10 locations throughout a field for the presence of pea aphids. A treatment is recommended if you find 50 or more aphids per sweep or 5 to 10 aphids per plant.

Frequency of Occurrence: Economic levels occur most seasons.

% Acres Affected: approximately 70% typically affected in any given year.

Timing of Control: Bloom until harvest.

Yield Losses: 20-25% yield loss; additional loss has occurred from virus vectored by pea aphids

Cultural Control Practices: No resistant varieties available.

Biological Control Practices: Naturally occuring predators, parasitoids, and pathogens help suppress aphid populations.

Chemical Controls: There are several foliar insecticides labeled for pea aphid control in peas:

- dimethoate 4EC 0.33 pt/acre, 0 day PHI; 1 application, 15% of the acreage
- malathion 57EC 1.5 pt/acre, 3 day PHI; not used on peas in Delaware
- methomyl (Lannate) L 1.5 3 pt/acre, 1 day PHI; 1 applications; used on 55 % of the acreage

Diseases

The cool early growing season for peas does not favor the development of most potential diseases. Pea production requires relatively little fungicide use. Apart from seed protectants, which are widely used to reduce incidence of damping off due to Pythium root rot, no other fungicides are used. Crop rotation, the use of resistant varieties, and preparation of fields to allow adequate soil drainage are key management strategies for diseases of peas (4, 17).

Bacterial Diseases

Bacterial blight

Damage and Life Cycle: Bacterial blight of peas is caused by the bacterium Pseudomonas *syringae* pv. *pis*i (11). Bacterial blight affects all above ground portions of the plant. The pathogen overwinters in seed (18). Infection can also result from soybean residue (4). Symptoms are first seen in seedlings grown from infected seed. The disease can spread to other plants in the same field. Secondary infections often occur when hard rain or sand drainage result in wounds where new infections can start (17). Water-soaked spots develop on the pods, stems, and leaves of infected plants. In wet weather, spots enlarge and a white to cream-colored slimy ooze may collect on the surface of the spots. In dry weather, spots dry up, becoming brown and papery (18). Blowing rain facilitates the spread of the pathogen from one plant to another in the field (4).

Frequency of Occurence: Bacterial blight is of minor economic importance. Its occurrence is linked to contaminated seed and wet weather. Use of certified seed produced by reliable companies is essential, but doesn't completely eliminate the potential for the disease. Even rigorous seed testing cannot detect every infected seed (17). Bacterial blight can cause significant losses, but its occurrence is relatively rare. When it occurs, it is due to the combination of a low level of contamination in the seed and weather conditions that are favorable for infection (17).

Management: This disease is managed primarily by planting certified seed (17). Resistant cultivars are not currently available. Research is underway to identify the genes responsible for susceptibility, but little is known about the number of races of this bacterial pathogen or how readily it mutates (4).

Chemical Controls: There are no chemical controls that work directly on bacterial diseases (19).

Alternative Controls: Resistant cultivars are not used by growers. Some of the available cultural controls, such as reducing traffic of people and machines in the field, are not practical. Plowing down soybean residue prior to planting helps reduce disease incidence and is practiced by most growers (4).

Viral Diseases

Pea viruses can be of economic importance. The worst of these is **enation mosaic virus** (4).

Life Cycle: A number of viruses are known to infect peas worldwide (14). Four of these are of potential economic importance to pea production in the Mid-Atlantic. Each of these viruses is responsible for a unique disease characterized by distinct symptoms as described below. All of them overwinter in clover, alfalfa, and other plants in the legume family, and are transmitted by aphids (18). For this reason, viruses sometimes occur in peas as complexes (14). These are very minor problems in Delaware.

Damage and Frequency of Occurence:

Pea Enation Mosaic - This disease is caused by the pea enation mosaic virus (PEMV). Periodic serious losses to this disease among susceptible cultivars are seen in the Northeast (18). If contracted early, it can cause distortion of leaves and pods or plant death prior to bloom (14). Typical symptoms include areas of yellow discoloration on foliage, blister-like ridges (enations) on pods and on the underside of leaves, pod distortion and suture splitting (18). Conditions that increase aphid populations can increase the occurrence of this virus (4). Tolerant cultivars are available, but are not used by processors because economic impact of the disease is very low and because varieties are selected based on qualities related to ease harvesting and processing (4, 18).

Pea Stunt - Pea stunt is caused by the red clover vein mosaic virus (RCVMV). The virus is endemic to all major areas of pea production in the U.S. (14). This disease occurs to some extent every year. It can be seen on occasional plants in the field but does not spread easily and so is of little economic importance (4). Symptoms are characteristic chlorosis or necrosis of the veins, stunting, terminal rosetting, and poor pod set. Early infection can lead to plant death prior to bloom. Stunt-tolerant cultivars are available and are the primary means of control (14).

Bean Yellow Mosaic - Bean yellow mosaic virus (BYMV) causes this disease, also called pea mosaic. Symptoms include green and yellow mottling or mosaic patterns and characteristic growth from axillary buds (18). This disease is of no economic importance, due the availability of good resistant varieties (14).

Pea streak - The condition known as pea streak is actually caused by multiple viruses or a complex of viruses. The primary causal agents in the U.S. are pea streak virus (PSV), red clover vein mosaic virus (RCVMV), and necrosis-inducing strains of the alfalfa mosaic virus (AMV). The most severe form of

the disease is caused by PSV. Early infection with PSV kills most pea cultivars. Later infections are characterized by brown and purple leaf spots that follow the vascular system. Necrosis follows quickly after transmission of PSV by aphids, which typically carry the disease from nearby alfalfa fields. Entire fields can be devastated in a very short time. Infection by PSV at early bloom stage results in dark or sunken spots on pods (14). Other forms of pea streak are characterized by purplish brown streaks on stems, flattened purplish brown pods, death of veins, and wilting and death of terminal growth (18). Occurrence of the most severe forms of pea streak are associated with proximity of alfalfa fields, where PSV persists (14). Disease occurrence is somewhat cyclic, with peak occurrence every 5 to 7 years.

Management: Although aphids are important vectors for all of these viruses, insecticide applications to control aphids are only used in cases where aphid populations are large and feeding injuries are occurring. Since one or a very few aphids may spread viral diseases quickly, the level of aphid control required to prevent any viral transmission is not economically or biologically feasible. Because viral diseases in peas are of little economic importance, no specific management strategies are used (4).

Chemical Controls: There are no chemical controls that work directly on viruses (4).

Alternative Controls: Newer pea varieties exhibit some resistance to viruses, however, economic loss due to viruses has not been severe enough to cause processors to give up the desirable characteristics of currently used varieties (4).

Fungal Diseases

Aphanomyces Root Rot

Damage and Life Cycle: Aphanomyces root rot is caused by the fungal pathogen *Aphanomyces euteiches* f. sp. *pisi*, although the other soil-borne organisms contribute to the disease complex. Oospores can remain dormant in the soil for years. When conditions are favorable, the spores germinate and pass through several life stages before developing into hyphae that can grow through host plant tissue. Infection can occur at all temperatures favorable for pea development. Once pea roots are infected, the mycelium of the fungus begins to decay the root tissue. As roots decay, the oospores return the soil to serve as inoculum in years to come (14). Characteristic symptoms include water-soaking, softening, and slight discoloration of the taproot and lower stems of infected plants. The outer root tissue of infected plants can be easily sloughed off (18). Symptoms develop faster at warmer temperatures (14).

Frequency of Occurence: Aphanomyces root rot, or common root rot, is one of the most destructive diseases of peas. It occurs in most pea producing regions of the U.S., including the Mid-Atlantic. In the Northeast, average annual yield loss to this disease is about 10%, though losses in individual fields may be up to 100% (14). Wet soil conditions and poor drainage are associated with higher rates of infection. The disease is most damaging in years when a cool, wet spring is followed by an early, warm summer with low rainfall (14).

Management: Attempts to control this disease through the development of resistant host plant strains have not been successful. Crop rotation is an extremely important practice, but because oospores can survive in the soil for years, even the recommended rotations of 4 to 5 years may not be sufficient in all cases. Other host plants such as beans, alfalfa, and spinach must be avoided in the rotation. Many leguminous weeds can also serve as host plants and should be controlled (14). The best management strategy includes using long rotations, planting in fields with well-drained soils, avoiding soil compaction with heavy farm machinery, and avoiding planting in moderately to highly infested fields (14, 17).

Chemical Controls: There are currently no registered fungicides that can consistently control moderate to high infestations of *Aphanomyces* (14). Soil fumigants are not used to control this disease (4).

Alternative Controls: No effective soil tests for *Aphanomyces* are being used locally, so infestation levels are not determined prior to planting (4). Crop rotations of 4 to 5 years and avoidance of double cropping peas with beans are recommended practices (9). Local growers have found that double cropping with lima beans does not add years to the required rotation interval (4).

Fusarium Wilt

Damage and Life Cycle: Fusarium wilt of peas is caused by the soil-inhabiting fungal pathogen *Fusarium oxysporum f. sp. pisi* (14, 18). Near-wilt, a related disease, is caused by a different race of the same pathogen. Both diseases can be introduced from soil borne pathogens, but the symptoms and control strategies for the diseases differ somewhat (17, 18). The fungus can survive in the soil as long as 10 years as chlamydospores and by association with the roots of non-host crops. The fungus penetrates the roots of peas and may colonize the vascular system of non-resistant varieties. The pathogen spreads in contaminated soil, seed, and plant debris, and can be transported from field to field by wind and water. Soil temperature, pea cultivar, and soil type can affect the rate of disease spread (14, 17).

Fusarium wilt is characterized by yellowing of the lower leaves and a general stunting of the plants. Leaf margins curl downward and, in some cases, the stem becomes swollen and brittle at the soil line (18). A discoloration of internal root tissue also occurs. At soil temperatures above 20oC, the disease progresses rapidly, plants may be killed, often in small patches (depending upon the race of the fungal pathogen). These dead plants serve as a reservoir of inoculum for spread of the disease. One of the outcomes of Fusarium wilt infection is uneven maturity among plants in the field, which leads to yield loss and reduced quality of produce (14).

The symptoms of near wilt are similar, but the disease's progress and plant death generally occurs more slowly than in Fusarium wilt. The diseases can also be distinguished by differences in the quality and extent of internal root discoloration (18).

Frequency of Occurence: Some races of the fungus are widely distributed and can kill 1 to 3% of plants in infected fields. Because warm soil temperatures are conducive to the spread of inoculum,

damage can vary significantly from year to year and the most severe losses occur in late peas (4, 14).

Management: Fusarium wilt is controlled through the use of resistant varieties and crop rotation (9, 14) .

Chemical Controls: Fungicides are not used for the control of Fusarium wilt (9, 14).

Alternative Controls: Fusarium wilt-resistant varieties are available (4, 14). However, when disease potential is very high, some of these varieties do not offer sufficient control and there can still be a reduction in yield and quality (14). Good rotational practices are important. Most processors contract with growers with enough irrigated land to rotate into corn and grains for 3 years between plantings of peas or other leguminous crops. This rotation interval is not as effective for *fusarium* as it is for *Aphanomyces* and *Ascochyta* (4).

Damping-off (Pythium Root Rot)

Damage and Life Cycle: Damping-off refers to symptoms caused by several species of Pythium: seeds rot before they germinate, shoots decay before they emerge, and seedlings collapse (17). This fungus causes a soft, watery rot which can affect seeds or roots (14).

Pythium species are common in the soil and persist as spores in plant debris left in the field. They have a broad host range that includes many other crop plants and weeds. The fungus attacks peas during or immediately after germination. In established plants, immature secondary root tissue is attacked and destroyed, a condition known as "root pruning." If a plant survives, seedlings are weak and stunted and yield is reduced (14).

Frequency of occurence: In most seasons, damping off is not of great economic importance. It is seen to some degree in every field each year, but generally has little effect on yield (4). Severity of infection is dependent upon the weather. Damage is most severe when soil moisture is high. The Pythium species that cause damping off in peas differ in the temperature that is optimal for their growth, but the best range for most species is from 18-24oC (14, 17). Fortunately, pea germination occurs at lower temperatures, giving peas the chance to outgrow Pythium, especially early season plantings. Cultivars with wrinkled seeds are most susceptible to Pythium attack. Pythium often occurs as a part of a complex of other diseases, significantly, Fusarium species (14). Damping off affects up to 20% of pea acreage annually. Fortunately, damage occurs at an early stage when healthy pea plants can compensate for losses most effectively. For this reason, damping off generally has little impact on pea yield (4).

Management: Damping off is controlled with the use of fungicide seed treatments. Some newer cultivars show some resistance to Pythium (14).

Chemical Controls: Seed treatments are the most cost-effective means of control and captan is the principle fungicide seed treatment. Another option is to apply mefenoxam (Ridomil Gold) as a broadcast treatment at seeding at a rate of 0.25-0.5 lb ai/A (0.5 to 1 pt 4E/A)(9).

Alternative Controls: Cultural practices that aid in disease management include use of seed that has high vigor, seeding at the proper depth, and preparation of fields to allow for adequate drainage (14, 17).

White Mold (Sclerotinia Rot)

Damage and Life Cycle: White mold is the common name for Sclerotinia rot, a potentially destructive disease of peas caused by the fungal pathogen *Sclerotinia sclerotiorum*. The pathogen survives the winter within the soil in the form of sclerotia. Sclerotia germinate, form apothecia, and disseminate spores that infect plant tissue. The fungus grows rapidly under favorable field conditions. Mature peas develop watery lesions in infected tissue, especially where air circulation is poor and humidity is high (14, 17). White mycelial growth develops into dense mats, and the surface tissue becomes slimy. Dark, irregular sclerotia develop in infected plant tissues. Leaves, stems and pods may become infected. Stem rot is common in this disease, and is most problematic, destroying plants outright. The disease can be distributed with the seed, transmitted by farm equipment or animals, and spread by irrigation water. Also, spores can be blown on the wind from plant to plant and from field to field (14).

Frequency of occurence: The fungus can tolerate a broad range of temperatures, but fungal growth is most rapid at temperatures between 20 and 25o C (14). This disease can be a recurring problem in specific fields, where it can result in a yield loss of 5 to 10% (4, 17).

Chemical Controls: Fungicides are not used to control this disease (4).

Alternative Controls: Resistant varieties are not used (4). Growers plant disease-free seed into well drained fields (14). A 5- year rotation into non-leguminous crops is recommended, but a minimum 3 year rotation is observed by most growers of processing peas. Plant debris is plowed deeply under the soil surface following harvest (14). Growers avoid dense stands in order to promote good air circulation among the plants. Also, careful and restricted use of irrigation helps to reduce disease incidence (4).

Ascochyta Diseases

Damage and Life Cycle: Three species of related fungal pathogens cause important diseases of peas. *Ascochyta pisi* causes leaf and pod spot; *Mycosphaerella pinodes*, the perfect stage of *A. pinodes*, causes blight; and *Phoma medicaginis* var. *pinodella*, causes foot rot. All of these diseases are characterized by lesions on leaves, stems, blossoms and pods, and by discoloration of the hypocotyl, cotyledons, and roots (14). All of these pathogens are soil-borne and persist to a greater or lesser degree in or on soil and plant debris; *A. pisi*, however, is primarily carried on or in the seeds. Infested seeds may be infected and develop into weak, stunted plants that are unproductive or die (14, 17). Leaf lesions vary in appearance, depending on the fungal species involved and on the geographic region. Stem lesions of *Mycosphaerella pinodes* can cause girdling. When flowers are infected by one of these species, sepals may become girdled, killing the developing pod or resulting in distorted pods. Leaves of infected plants become desiccated on all but the highest nodes. Root infection is often limited to the primary roots, but in some

cases lateral roots are also destroyed (14). *A. pisi* is the most common in Delaware

Frequency of occurence: These diseases are common in pea production areas worldwide (14). It is difficult to estimate yield loss attributed directly to Ascochyta diseases. *Phoma medicaginis* var. *pinodella*, which causes foot rot, is the most serious of these pathogens.

Chemical Controls: Captan seed treatments greatly reduce seed-borne sources of infection (14, 6). No foliar fungicides or other chemical controls are used by growers to control Ascochyta diseases.

Alternative Controls: Good resistant cultivars are not available, though tolerance levels can vary significantly among pea cultivars for a particular region. Planting seeds that were produced in dry areas is the first line of defense against Ascochyta diseases (14). Field preparation to facilitate good drainage will also reduce this disease (17). Crop rotation is practiced but will not reduce infection caused by *M. pinodes*. Pea refuse is plowed under immediately following harvest to prevent dispersal of the fungus by wind (14).

Nematodes

Nematodes are very seldom an important pest control issue in peas. Fields with moderate to heavy infestations of nematodes generally have no significant effects on yield in peas (4). Peas are a good host for nematodes, but because they are planted early and grow during cool weather, they are harvested before damage from nematodes becomes evident (17). Fumigants are not used prior to planting peas, but may be used following pea harvest before planting of certain rotational crops in double cropping situations (4).

Weeds

Annual and Perennial Broadleaves and Grasses

Frequency of Occurrence: Annually.

Damage Caused: Reduced yields from weed competition, and loss due to interference with harvesting equipment. Crops can become contaminated with weed plant parts (e.g. nightshade berries, Canada thistle buds or daisy buds) during harvesting which can result in reduced selling price or in severe cases, rejection of the crop.

% Acres Affected: 100%

Pest Life Cycles: A wide range of summer and winter annual and perennial weed species is present in pea fields in DE. Some of the more common ones include smooth pigweed, common lambsquarters, common ragweed, eastern black nightshade, yellow nutsedge, Canada thistle, mustards, and various annual and perennial grasses.

Timing of Control: Preplant, at planting, and postemergence.

Yield Losses: Can be as high as 100% in severely infested fields. Fields with infestations of weeds posing contaminant problems (Canada thistles, daisies) can be passed over for harvesting.

Regional Differences: While weed species spectra can vary regionally, weeds are a serious pest of peas throughout the state.

Cultural Control Practices: Cultivation is generally not useful in pea weed control because of the narrow row spacing.

Biological Control Practices: None.

Post-Harvest Control Practices: Application of herbicides and/or tillage after harvest can control perennial weeds.

Other Issues: Research on pea weed control is ongoing.

Chemical Controls:

Pesticide	% Trt.	Type of Appl.	Typical Rates lbs ai/acre	Timing	# of Appl.	PHI days	REI hours
clomazone *(Command)*	<5	soil incorporated or soil surface	0.25	preplant or preemergence	1	60	12
trifluralin *(Treflan)*	40	soil incorporated	0.5	preplant	1	60	12
bentazon *(Basagran)*	30	foliar	0.75	postemergence; when peas have 3 pairs leaves	1	21	12

sethoxydim *(Poast)*	10	foliar	0.2	postemergence; when grasses are actively growing	1	15	12
quizalofop -P-ethyl *(Assure II)*	<1	foliar	0.07	postemergence	1	30	12
imazethapyr *(Pursuit)*	50	soil incorporated or soil surface	0.02-0.03	preplant or preemergence	1	30	4

Use in IPM Programs: Use of these herbicides is consistent with IPM recommendations. Post-emergence herbicides (bentazon, sethoxydim, quizalofop P-ethyl) support the use of scouting and as-needed applications.

Use in Resistance Management: None reported.

Efficacy Issues: The listed herbicides have different but overlapping spectra of species control. Bentazon is typically used together for control of broadleaf weeds including Canada thistle. Grasses are controlled either with sethoxydim or quizalofop P-ethyl. Producers have a great need for new herbicide registrations, especially for herbicides, which will help, control problem perennial weeds such as Canada thistle or yellow nutsedge.

Alternatives: Other new herbicides under research include halosulfuron, sulfentrazone, imazamox, cloransulam, flumetsulam, imazethapyr, carfentrazone, flufenacet, and pendimethalin.

Contacts

Subject matter contacts at the University of Delaware, College of Agriculture and Natural Resources:

- Joanne Whalen
- Bob Mulrooney
- Mark Van Gessel
- Ed Kee
- TracyWootten

References

1. Delaware Agricultural Statistics Summary. Vegetables for Processing; Delaware 1996 to 1998.
2. USDA-NASS Agricultural Statistics 1999.
3. Caron, D. and R. Mulrooney. PEAS AND BEANS. University of Delaware Cooperative Extension. HG - 13.
4. Baugus, Albert. Pest Management Consultant, Saulsbury Bros. Incorporated, Ridgely, Maryland. Personal Communication. 2000.
5. Beste, C.E., E. Lichtenberg, and J.J. Linduska. Pesticide Usage and Benefits for Processing Peas in Maryland. Report to the Northeast Agricultural Pesticide Impact Assessment Program. 1997.
6. 2000 Commercial Vegetable Production Recommendations: University of Maryland Cooperative Extension Bulletin 236 (revised). 2000.
7. Crop Profile for peas in New York. 1999. http://ipmwww.ncsu.edu/opmppiap/proindex.htm
8. Compendium of Pea Diseases. Donald J. Hagedorn, Ed. American Phytopathological Society in cooperation with the Department of Plant Pathology at the University of Wisconsin, Madison. 1984.
9. Everts, Kathryne. Plant pathologist, University of Maryland and University of Delaware. Personal communication. 2000.
10. Identifying Diseases of Vegetables. MacNab, A.A., Sherf, A.F., Springer, J.K. The Pennsylvania State University, College of Agriculture. 1983.
11. Dutkey, Ethyl. Plant Pathologist, University of Maryland, Department of Entomology. Personal Communication. 2000.

Authors:

- Dewey Caron, Bob Mulrooney, Ed Kee - Production Information
- Joanne Whalen - INSECTS
- Mark VanGessel - WEEDS
- Bob Mulrooney - DISEASES
- Susan Whitney - General Information

[1] FOOTNOTES:
Peas have been removed from the Diazinon label; thus, this insecticide has been deleted from this Profile for use on Seed Corn Maggot. Listed herbicides and fungicides are currently labeled for peas.