

New England Pea Pest Management Strategic Plan



**New England
Pest Management Network**

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Executive Summary

Representatives from the New England pea industry met for two days in November 2004 to discuss strategic issues concerning pea production in New England. The input from this meeting, along with commodity statistics, has been used to develop this report.

I. Introduction

Background: Peas in New England

In New England, peas are produced by diversified fresh market vegetable producers. Most peas (68%) are grown for local retail fresh market, 12% are wholesaled, 11% are for pick-your-own markets, 1% are for processing and 8% are grown for other uses (home use, farm stands, senior farm share, restaurants, CSAs, and unpicked). Growers reported managing an 72 acres in 2002. Over the past five years the average annual yield of peas per acre was 3959 lbs. Of the farmers who responded to our survey, 40% of their crop was English/garden peas, 36% was sugar peas/sugar snap, 23% was edible podded/snow peas, and 1% was other varieties.¹

The average yield per acre in 2005 according to the USDA was 2,600 pounds²; the survey respondents, however, reported a yield of 3,959 pounds. The wholesale value reported for wholesale peas was \$2.10 per pound, giving the New England pea production a value of \$5,460–\$8,313 per acre.

Peas are a cool-season crop that may be planted as early in the spring as the soil becomes tillable. Pea seed will germinate well at soil temperatures as low as 50°F, but germination is slow. Extended periods of cool, wet weather during the germination period may cause rotting of the seed. For this reason, fertile, well-drained sandy soils should be selected for early season plantings. Finer-textured soils with high moisture-holding capacities are preferred for late spring crops. The use of treated seed is helpful in overcoming the problem of seed decay.

Root rot organisms that attack peas usually begin at the tips of the feeder roots and progress towards the main roots, or occasionally show on the stem slightly above ground level. The occurrence of these diseases makes rotation a desirable practice when growing peas.

Peas that mature during hot, dry weather frequently show reduced yield and quality. Where hot, dry conditions occur, pea planting should be suspended in mid-May and resume in July for fall harvest. If hot, dry summer weather occurs for only short periods, plantings can be made throughout the summer using heat-resistant varieties for mid-summer harvest.

1 New England Pea Survey, 2002

2 New England Agricultural Statistics, NASS. USDA. 2005

Benefits to the New England Peas Industry

The New England Pea Pest Management Strategic Plan identifies at-risk pesticides and proposes future research, regulatory, and education priorities necessary to establish alternative pest management methods in the event of loss. These priorities will be used to inform EPA and state agency decisions and outline a development path for pest management researchers and educators. Current pest management programs can be made more effective through implementation of actions proposed in this plan.

How this Plan was Created

A review group of vegetable growers, researchers, and industry stakeholders throughout New England met for two days in November 2004 at the Grappone Conference Center in Concord, New Hampshire, to develop this strategic plan. It was based on the 2003 New England Pea, Bean, and Carrot Survey. The group's tasks were to assess the state of current pest management recommendations as well as to identify the regulatory, educational, and research issues impacting pea production.

The review group consisted of the following individuals:

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II. Summary of the Pea Pest Management Strategic Plan

Key Pest Strategic Issues

Insects and Mites

The most serious insect pest on pea crops is the pea aphid. These pests occur each year in every field but the extent of infestation will depend on current weather conditions. Generally warm conditions in early spring, followed by rainfall in May and June, provide conditions that favor the development of pea aphids. Currently registered products have been helpful in controlling the aphid if coupled with field scouting and properly timed applications.

Diseases

Because peas are an early season crop, many potential diseases are not a problem. Generally, relatively few fungicide treatments are required for pea production. Cultural practices, such as the use of resistant varieties, adequate soil drainage, and crop rotation, have been successful management practices to keep disease problems at a minimum. Most growers use seed protectants to prevent damping off. According to the results of our survey, damping off, root rots, powdery mildew, and fusarium wilt are the most important diseases affecting pea crops in New England.

Weeds

Good weed management is essential for pea production, since peas do not compete well with weeds. Weed competition can reduce yields and affect harvesting. The cool soil temperatures that accompany early spring pea plantings generally retard the growth of most annual weeds. A second pea crop, however, can be planted in July for fall harvest, and weeds tend to be more of an issue with the second planting. On many farms, post emergent products are used in the spring along with scouting. Generally crops planted in late season receive preemergent herbicide applications.

Vertebrates

The most important vertebrate pests are deer, birds, rabbits, and woodchucks. All are capable of inflicting severe damage to a planting if no control measures are initiated. Growers lack registered pesticides and public opposition to controls is high.

Worker Activities: Field activities that may expose workers to pesticide residues are: the preparation of the seed bed, planting, cultivation, application of pest control measures, and crop harvesting.

Pest Management Priorities

Research Needs:

The most critical needs for pea crop production are

- the use of fungicides for disease control;
- the possibility of using T22 for root rot pathogens (The group questioned compatibility issues of T22 with legume inoculants);
- resistant varieties for fusarium wilt and other disease organisms.

Regulatory Needs:

The packaging size of pesticides is not appropriate in all cases for minor use crops. Many farms reported using products with a wide range of labeling that they have on hand for other crops rather than selecting the optimum pesticide for the desired results on their pea crop. Sweet corn registration tends to be a driving factor in the selection of pesticides. Bravo® is labeled for tomatoes, so may be used for peas due to availability around the farm. The size of packaging and higher price of newer or safer products may be restrictive.

There appears to be a push from organic certification programs to start with organic seed, which is causing seed supply to come in with seed-borne diseases that could result in more crop loss or increased fungicide applications.

As for weed control, growers are looking for label expansion on Sandea for post emergence use. The group identified a need for the resolution of Command restrictions in NH with microencapsulation formulation.

With an increase in vertebrate pressures affecting crops, growers seek help on minimizing the damage they cause. Severe restrictions on geese and crow hunting are hampering control efforts and thus crop yields.

Education Needs:

Misidentification appears to be an issue with several New England growers. In our survey they identified corn ear worm as a problem in May and June and a pest of importance. Since CEW is not prevalent at that time, this could be a case of misidentification. We do not address it in this report. Fall Armyworm was possibly confused with the true armyworm and several growers indicated control for this pest in the survey.

Growers also need to be educated about

- Controlling damping off with proper timing of plantings, which can prevent this disease;
- Selecting mixtures of fungicides;
- Powdery mildew spot on peas late in the season, specifically cultural practices to reduce contact with the soil;
- Weed identification and control. Many of the newer herbicides have narrow time windows for effective application. Identification of weed species becomes critical for control.

III. Strategic Issues for Key Pests

Varieties grown: sugar peas/ snap peas, shelled English pea/ pea shoots-greens

Insects and Mites

1. Pea Aphid

Pea Aphid. *Acyrtosiphon pisum* is the most important pest on pea crops and is a persistent problem in pea shoots during mid summer, especially with hot, humid weather. Pea aphid overwinters in the egg stage. In the spring, eggs hatch into wingless parthenogenetic females that give birth to young nymphs. Winged aphids appear at the second or third generation and fly to pea fields, often producing 12 or more wingless generations throughout the summer.

Acres Affected: Potentially 100% of the crop can be affected if pea aphid gets into the planting.

Yield Losses: 50% crop loss if no control measures are initiated.

Currently Registered Pesticides

Pesticide	Effi-cacy	Pros	Cons	Comments
bifenthrin Capture 2EC	G	Effective	Restricted Use product	
dimethoate	G	Effective	organophosphate	
esfenvalerate Asana XL	G	Effective	Restricted Use Product	
lambda-cyhalothrin Warrior	G	Effective Registered OP alternative	Can be expensive	
methomyl Lannate	G	Effective	Toxicity and worker exposure issues	
pyrethrin PyGanic EC 5.0	G	Effective	Could use to spray for it but logistical difficulty on pea shoots. May work for some growers with different systems.	

Cultural and Biological Alternatives

Method	Pros	Cons	Comments
mowing down pea shoots	No pesticides effective	When they are found, the crop is over. Mow down and try for second crop	Heat and high humidity bring in aphids. Can have harvest season May–July then Aug–Nov. if weather is cooperative

2. Corn Earworm

Not a major problem in this area due to the timing of pea crops in New England.

3. Fall Armyworm

Not a major problem in this area due to the timing of pea crops in New England.

Diseases

1. Damping Off

Seeds may be infected as soon as moisture penetrates the seed coat or a bit later as the radical begins to extend. The seed rots immediately under the soil surface (pre-emergence damping-off). This condition results in a poor, uneven stand of seedlings, often confused with low seed viability. Cotyledons may break the soil surface only to wither and die or healthy looking seedlings may suddenly fall over (post-emergence damping-off). Infection results in lesions at or below the soil line. The seedling will discolor or wilt suddenly, or simply collapse and die. Weak seedlings are especially susceptible to attack by one or more types of fungi when growing conditions are only slightly unfavorable. Damping-off is easily confused with plant injury caused by insect feeding, excessive fertilization, high levels of soluble salts, excessive heat or cold, excessive or insufficient soil moisture, or chemical toxicity in air or soil.

Acres Affected: Potentially 100% of the crop can be affected.

Yield Losses: 50% crop loss if no control measures are initiated.

Currently Registered Pesticides

Pesticide	Effi-cacy	Pros	Cons	Comments
chlorothalonil Bravo Ultrex 82	F		Cannot be used by organic growers	

Key: F=Fair; G=Good; E=Excellent; ?=Unknown

Cultural and Biological Alternatives

Method	Pros	Cons	Comments
High seeding rate to get a good stand.			

2. Seed Decay/Root Rot

Pythium ultimum and other Pythium species have a wide host range and can survive in soils for many years. These soil-borne fungi reduce crop stand by causing seed decay and death. In mature plants, root rots will cause lower yields from stunting and rotting root systems. Most damaging to seedlings during cool weather. *Rhizoctonia solani* is another common soil fungus with a very wide host range. These root rots can take down an entire crop. All varieties are susceptible. Most frequently found in earliest crops. Acres Affected: 50% of first planting and can be devastating about every third year. Yield Losses: 100%

Currently Registered Pesticides for seed treatment

Pesticide	Effi-cacy	Pros	Cons	Comments
Seed treatment captan, Captan	G	only stage to control	Cannot be used by organic growers	
Seed treatment thiram, Thiram	G	only stage to control	Cannot be used by organic growers	
Seed treatment mefenoxam, Apron	G	only stage to control	Cannot be used by organic growers	

Key: F=Fair; G=Good; E=Excellent; ?=Unknown

Cultural and Biological Alternatives

Method	Pros	Cons	Comments
Trichoderma harzianum Rifai T-22 Fungicide	New product registered by EPA for all crops. Seed applied.	Biological alternative	Best if used in combination with fungicide.
3-4 year rotation	Effective	Limiting crop choices	
Planting on well drained soils	Effective	Weather unpredictable in nature.	

3. Powdery Mildew

Erysiphe pisi forms on the surface of leaves, shoots, and fruit. The spots generally spread over a large area of the leaves and produce yellow patches on leaves. Infected leaves usually die and fall off. Pea pods may get brownish spots. It is most prevalent with hot humid conditions occurring July through October and reduces plant growth.

Acres Affected: 100 %

Yield Losses: Can significantly reduce yield on fall crop 50%

Currently Registered Pesticides

Pesticide	Effi-cacy	Pros	Cons	Comments
chlorothalonil Bravo Ultrex 82	F	Wide range of crops on labels		Pea shoots
copper hydroxide Champ	?		No data on effectiveness	

Key: F=Fair; G=Good; E=Excellent; ?=Unknown

Cultural and Biological Alternatives

Method	Pros	Cons	Comments
Sanitation	Effective		
Plow down infested crop	Effective		
Early seeding	Effective		
Provide good air circulation	Effective		
Crop rotation	Effective		

4. Fusarium Wilt

Fusarium oxysporum is a wilt that causes yellowing in tissues. Damage occurs to nonresistant varieties. Currently an infrequent problem, but could become more problematic as Heritage varieties become more prevalent in use.

Acres Affected: Can significantly reduce yield on fall crop.

Yield Losses: Potentially 50%

Currently Registered Pesticides – none known

Cultural and Biological Alternatives

Method	Pros	Cons	Comments
Resistant varieties	Only control available		
10 year rotation	Effective	Limits crop selection	

Weeds

Peas are an early season crop and weeds are not a large problem because cool soil temperatures retard weed growth for most of the annuals.

Acres Affected: all acreage will be affected if no controls are initiated.

Yield Losses: potentially 100% loss without weed control measures especially in late season crops.

1. Weed group: Stale Seed Bed

Stale beds preparations do not seem to be an issue since weeds are not present for early spring plantings; rather, they are more relevant for fall plantings

Currently Registered Pesticides

Pesticide	Effi-cacy	Pros	Cons	Comments
glyphosate, Roundup 4S	G-E	Effective on all weed species if small enough	Does not control seed stage. Drift issues	Most commonly used herbicide
paraquat Gramoxone Max 3S	G-E	Works well with smaller weeds	Toxicity issues. Not effective on larger weeds. Does not control seed stage. Drift	
pelargonic acid Scythe 4.3	F	Low toxicity	Expensive. Does not control seed stage. Offensive odor	

Key: F=Fair; G=Good; E=Excellent; ?=Unknown

Cultural and Biological Alternatives

Method	Pros	Cons	Comments
Cultivation important	Effective	Summer plants – in row cultivation may be less effective due to need to minimize soil contact with plant.	Disease prevalence/exposure with cultivation of soil

2. Weed group: Preplant Incorporated /preemergence

Preemergent herbicides are generally applied when soil temperatures have warmed to allow rapid growth of crops. Generally this is with late season plantings. Most herbicides would damage pea crops, so many are incorporated into soils. Most products control annual weeds and grasses and several broadleaf weeds

Currently Registered Pesticides

Pesticide	Effi-cacy	Pros	Cons	Comments
clomazone Command 4ME	G	Velvetleaf control	Carry over issues during same growing season and regulatory concern in NH. Must be incorporated.	Not common in spring plantings
trifluralin Trilin 4 EC	G	Annual grasses and small seeded broadleaf weed control.	No large seeded broadleaf weed control. Must be incorporated.	Not common in spring plantings.

Key: F=Fair; G=Good; E=Excellent; ?=Unknown

3. Weed group: Postemergence

Post emergent products are used when weeds are at a susceptible growth stage. Often this window of application is narrow and only lasts a few days. If weather conditions are not suitable there will be a reduction in control.

Currently Registered Pesticides

Pesticide	Effi-cacy	Pros	Cons	Comments
bentazon Basagran	G	Yellow nutsedge and other broadleaf	Narrow window of application	Most commonly used post emergence product
MCPB Thistrol 2S	G	Dandelion, Canada thistle control	Potential crop injury in warm weather	
sethoxydim Poast 1. 53 EC	G	Emerged summer annual grasses		No volatility issues with any of the products listed

Key: F=Fair; G=Good; E=Excellent; ?=Unknown

Cultural and Biological Alternatives

Method	Pros	Cons	Comments
hand weeding	Effective	Labor intensive	
cultivation	Effective	Labor intensive	
high density stand will help compete with weeds and disease	Effective		

Vertebrates

Deer eat blossoms

Birds eat seeds

Woodchucks eat the whole plant

Rabbits eat the whole plant

Acres Affected: Varies yearly depending on population density, control measures, and other crops in area.

Yield Losses: Up to 100% possible from deer and woodchucks

Currently Registered Pesticides

None identified

Cultural and Biological Alternatives

Method	Pros	Cons	Comments
Fencing permanent wire	Effective	Expensive and impractical	
Shooting (crows, deer, geese, woodchuck)	Target guilty individuals	Safety concerns Legal restrictions on timing.	Needs increased hunting permitting
Trapping	Woodchuck	Limited effectiveness, rabies exposure, unable to relocate. Labor intensive	
Temporary electric	More affordable alternative	Requires weed free strip	
Smoke bombs in woodchuck burrows	Effective	Needs repeat applications	
Garlic and fish oil	Effective for Deer	Needs repeat applications, expensive.	
Dogs trained to control wildlife problems.	Effective	Training and maintenance of animals	

IV. Appendices

Pesticide Efficacy for Insect and Mite Pests

Active ingredient	Brand name(s)	Pea aphid
bifenthrin	Capture	G
carbaryl	Sevin	G
esfenvalerate	Asana xl	G
lambda cyhalothrin	Warrior	G
methomyl	Lannate	G
pyrethrin	Pyganic EC 5.0	G

Key: F=Fair; G=Good; E=Excellent; ?=Unknown

New Pest Management Technologies for Insect and Mite Pests

Method	Source	Status	Pests Affected
Spinosad, SpinTor	Dow	Registered	Pea aphid

Pesticide Efficacy for Diseases

Active ingredient	Brand name(s)	Damping off	Seed decay, Root rot	Powdery mildew	Fusarium wilt
chlorothalonil	Bravo	F		F	
pyrethrin	Pyganic EC 5.0				
cooper hydroxide	Champ				
Seed Treatment mefenoxam	Apron		G		
thiram	Thiram		G		
Trichoderma harzianum	T22		?		

Key: F=Fair; G=Good; E=Excellent; ?=Unknown

Pesticide Efficacy for Weeds

Active ingredient	Brand name(s)	Stale seedbed	Preemergent	Postemergent
glyphosate	Roundup	G		
paraquat	Gramoxone max	G		
pelargonic acid	Scythe	G		
clomazone	Command		G	
trifluralin	Treflan 4EC		G	
bentazon	Basagran			G
MCPB	Thistrol 2S			G
sethoxydim	Poast			G

Key: F=Fair; G=Good; E=Excellent; ?=Unknown

V. Acknowledgements

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