New England Bean
Pest Management Strategic Plan

New England Pest Management Network
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Executive Summary

The Food Quality Protection Act (FQPA) has required EPA to register and re-register pesticides in regard to health risks to consumers. The EPA is looking closely at organophosphates, carbamates, and suspected B2 carcinogenic pesticides. Many of these products will not be reregistered and there is a risk that many of the older pesticides that have been effective in controlling pest problems will lose registration status. Some pesticides with newer chemistries are becoming available and their efficacy is unknown. University extension research is needed to determine efficacy and economic feasibility of these products to control current pest pressures. Representatives from the New England bean industry met for two days in November 2004 to discuss strategic issues concerning bean production in New England. The input from this meeting, along with commodity statistics, has been used to develop this pest management strategic plan.

See Section II for the research, regulatory, and educational issues determined most critical by the review group of vegetable growers, researchers, and industry stakeholders during the Pest Management Strategic Plan process.

I. Introduction

Background of Beans in New England

The bean crop in New England consists primarily of bush and pole green snap beans and, to a lesser extent, yellow, purple, lima, fava, soy, romano, haricot, and tiny French beans. The bean acreage in New England for 2005 is reported to be a total of 669 acres with a price of $1.30 per pound.[1] Beans are produced on farms throughout New England by diversified fresh market growers. The average farm is approximately two acres, with an average yield of 2900 pounds per acre. This would place the New England bean production value at 2.5 million dollars. The majority of this yield is for fresh market, with less than 1% directed to processing.[2]

1 New England Agricultural Statistics, NASS. USDA. 2005
2 New England Bean Survey, 2002

Benefits to the New England Bean Industry

The New England Bean 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 will 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 pesticides and pest management recommendations as well as to identify the regulatory, educational, and research issues impacting production of these crops.

The review group consisted of the following individuals:

Hank	Bissell	Lewis Creek Farm / producer
David	Dumaresq	The Stand at Brox Farm / producer
Frank	Whittemore	Brookdale Fruit Farm / producer
Janice	Goranson	Goranson Farm / producer
Eeru	Ruuttila	Nesenkeag Farm / producer
Timothy	O'Connell	NH Farmer / producer
Margaret	Siligato	University of Rhode Island / Extension
Jennifer	Dacey	University of Rhode Island / Extension
Richard	Bonanno	University of Massachusetts / producer, Extension
George	Hamilton	University of New Hampshire / Extension
Glen	Koehler	University of Maine / Extension
Ann	Hazelrigg	University of Vermont / Extension
Alan	Eaton	University of New Hampshire / Extension
Amanda	Duphily	University of Massachusetts / Extension

II. Summary of the Bean Pest Management Strategic Plan

Key Pest Strategic Issues

Insects and Mites
Leafhoppers are the most serious insect pest on bean crops, especially with earlier plantings. Leafhoppers cause direct damage to plants by feeding. Currently insecticide sprays are effective in controlling this pest. Mexican bean beetles tend to be more of a problem in dry warm years and can be a severe problem. Seed corn maggot is another big problem in some years, with few products effective for control. Tarnished plant bug, European corn borer, cutworms, two-spotted spider mite, and aphids do not seem to be a significant problem in the area; however, they occasionally need to be controlled.

Diseases
White mold, rust and Anthracnose were the most important diseases affecting the mature bean plant in New England. Fungi that can cause seedling diseases are common in many soils and preventing these is crucial to obtaining a significant planting.

Weeds
Maintaining low weed densities is essential for maximum snap bean production. The typical grassy and broadleaf weeds need routine control in bean crops. Methods of control range from stale seed bed preparation to preplant incorporated, pre-emergence, and post emergent controls.

Vertebrate and Other Pests
The most important vertebrate pests are deer, birds and woodchuck. All are capable of inflicting severe damage to a planting if no control measures are initiated.

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: To assist in control measures, more information is needed on host plants, over wintering, the life cycle of the Mexican bean beetle, and seed treatment to prevent against seed corn maggot damage.

Regulatory Needs: The packaging size of pesticides is not appropriate in all cases for minor use crops. Many farms reported using products that they have on hand; these have a wide range of labeling. Sweet corn registration tends to be a driving factor in the selection of pesticides. Since Bravo® is labeled for tomatoes and several other vegetable crops it is often also used for beans because a supply has already been purchased for other crops, rather than for its on efficacy on bean diseases. The size of packaging and higher price of newer or safer products may be restrictive.

Farmers beginning production with organic seed in New England reported increases in seedborne diseases, which could result in greater crop losses or increased fungicide applications. Growers felt this aspect of organic production needs more research or regulatory changes to determine if organic growers are required to start production with organic seed. As for weed control, growers are looking for label expansion on Sandea® for post emergence use. With an increase in vertebrate pressures affecting crops, growers seek help on controlling the problems they cause. Severe restrictions on geese and crow hunting are hampering control efforts and thus crop yields.

Education Needs: Asiatic garden beetle is an emerging problem in our area. Adults are nocturnal and feed on foliage. They lay eggs in the soil and the larvae feed on roots. Prediction models are needed for disease identification, including white mold. Disease identification is difficult and can cause growers problems in selecting effective control measures. Bravo® is reported as being used for control of white mold but it is not registered for this disease, so we suspect errors in identification. Public education for residents about hunting, trapping, and other control methods is needed.

III. Strategic Issues for Key Bean Pests

Insects and Mites

1. Leafhoppers:

Leafhoppers can be a serious problem in bean plantings, especially with early spring plantings. Direct damage to plant is caused as a result of adult feeding. There are worker exposure issues with pesticide application on foliage.

Currently Registered Pesticides

Pesticide	Effi-cacy	Pros	Cons	Comments
acephate Orthene 97	G	Registered	Organophosphate	
bifenthrin Capture 2EC	G	Registered	Restricted Use Product	RUP product pesticide certification required.
esfenvalerate Asana XL	G	Registered	Restricted Use Product	RUP product pesticide certification required.
lambda-cyhalothrin Warrior	G	Registered Op alternative	Can be expensive	RUP product pesticide certification required..
methomyl Lannate LV	E	Good in combination with Asana	Toxicity Worker exposure issues.	RUP product pesticide certification required.
methyl parathion Penncap-M	G	Registered	Highly toxic to applicator Organophosphate	RUP product pesticide certification required.
carbaryl Sevin	G	Registered	Toxic to bees	
imidacloprid Provado 1.6F	G	Registered Op alternative		
dimethoate Malathion	G	Registered	May need several treatments to control. Organophospha te	
pyrethrin PyGanic EC 5.0	G	Labeled for organic use.	Expensive	
kaolin Surround WP	G	Effective for organic growers.		

Cultural and Biological Alternatives: None identified.

2. Mexican Bean Beetle:

This pest tends to be more of problem in dry, warm years. All products listed will control MBB. Many growers use products that are on hand rather than those that are most effective.

Currently Registered Pesticides

Pesticide	Effi-cacy	Pros	Cons	Comments
acephate Orthene 97	?	Registered	organophosphate	
dimethoate Dimethoate 4EC	?	Registered	organophosphate	
esfenvalerate Asana XL	G	Registered	Restricted Use Pesticide	RUP product pesticide certification required.
lambda-cyhalothrin Warrior	G	Registered Op alternative	Can be expensive	RUP product pesticide certification required.
methomyl Lannate LV	G	Registered	Toxicity issues. Organophosphate	RUP product pesticide certification required.
pyrethrin PyGanic	G	Can be used without residue problems		
endosulfan Thionex	F	Registered	Currently under review by EPA. Chlorinated hydrocarbon	RUP product pesticide certification required.
kaolin Surround WP	F	Registered	Not used due to fruiting stage/ Residue possible	
Malathion	G	Treatment timed when found on crop. Broad range of crop registration.	Organophosphate	
spinosad Entrust	F	Some reported using for control. Reduced risk product.		

Cultural and Biological Alternatives

Method	Pros	Cons	Comments
Crop Rotation	Helpful in control	Restricts growers' crop selections.	Reduces pest levels.

3. Seedcorn Maggot:

This pest can be a big problem in some years, with up to 50% crop loss. Often growers can recover by replanting the crop when the insects destroy the first planting.

Currently Registered Pesticides

Pesticide	Effi-cacy	Pros	Cons	Comments
phorate Thimet 20-G	F	Registered	Difficult application methods, needs specialized equipment to apply granular over seed bed.	RUP product pesticide certification required.
chlorpyrifos Lorsban	F	Registered for seed treatment	Organophosphate	RUP product pesticide certification required.

Cultural and Biological Alternatives

Method	Pros	Cons	Comments
Avoiding soils high in OM content	For early plantings provide dry sandy soils	Later plantings ok	
Avoid applying manure	Reduce attraction of adults for egg laying	Need to find another source of nitrogen	
Avoid early spring planting	Less insecticide needed	Delay of harvest	

4. Tarnished Plant Bug

Tarnished plant bug doesn't appear to be a severe issue, but can cause a dimple on fruit where feeding occurs. The insect targets flowers and young developing fruits.

Currently Registered Pesticides

Pesticide	Effi-cacy	Pros	Cons	Comments
acephate Orthene 97	G	Registered	Organophosphate	
bifenthrin Capture 2EC	G	Registered	Restricted Use product	RUP product pesticide certification required.
dimethoate Dimethoate 4EC	G	Registered	Organophosphate	
methomyl Lannate LV	G	Registered	Organophosphate	RUP product pesticide certification required.

Cultural and Biological Alternatives: None identified.

5. European Corn Borer / Corn Earworm

*** Not a significant problem in this area

6. Cutworms

*** Not a significant problem in this area

7. Two Spotted Spider Mite

*** Not a significant problem in this area

8. Aphid

*** Not a significant problem in this area

Diseases

1. White Mold - Sclerotinia

White mold is a sporadic problem if weather is wet at blossom time. Damage by disease is a sporadic devastation to one planting, while another may be fine. Selection of product is based on what is available. Monitoring for this disease is helpful.

Currently Registered Pesticides

Pesticide	Effi-cacy	Pros	Cons	Comments
iprodione Rovral 50W	G	No PHI		
coniothyrium Contans WG	?	Soil treatment after problem	Expensive	May work well in greenhouse
thiophanate-methyl Topsin M 70W	G	Provides good control	Long PHI	14 Day PHI
chlorothalonil Bravo	?	Unsure of efficacy		

Cultural and Biological Alternatives

Method	Pros	Cons	Comments
Good air circulation	Effective	Less plants for harvest	
Crop rotation	Effective	Rotate with less valuable crop	
Monitor weather during bloom to determine if it will be a problem	Effective	Labor intensive	
Chlorine wash in post harvest	Effective	Labor intensive	

2. Rust

Rust is a foliar disease affecting all bean crops. The severity to wax beans is significant, especially in wet weather.

Currently Registered Pesticides

Pesticide	Effi-cacy	Pros	Cons	Comments
chlorothalonil Bravo	G	Has wide range of crops on label		Use when wet conditions
myclobutanil Nova	G	Kick back, can put on existing infestation	Expensive	

Cultural and Biological Alternatives

None identified.

3. Anthracnose

This disease attacks the beans and can be a sporadic minor problem. The disease is easily visible and affected plants must be discarded. Because it is not really an issue in this area, control is generally not needed. Organic seed production has more sensitivity to this and other diseases.

Currently Registered Pesticides

Pesticide	Effi-cacy	Pros	Cons	Comments
Chlorothalonil Bravo	G	Has wide range on crops on label	Toxicity issues worker protection	
copper sulfate Basicop	G			

Cultural and Biological Alternatives

Method	Pros	Cons	Comments
Good air circulation	Effective	Less crop harvest	
Multiple plantings	Effective	Labor Intensive	
Organic seed	Effective	Variety selection limited	
Hydrogen peroxide is labeled for organic growers to use.	Effective		

Weeds

1. Stale seed bed

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	
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	

Cultural and Biological Alternatives

Method	Pros	Cons	Comments
Flaming	Works well on smaller weeds Cheaper than hand weeding	Timing critical, doesn't work well on grasses or larger weeds	Safety issues Applicator hazard Brush fire danger Equipment quality important. Propane gas, fire hazards
Shallow cultivation then plant seed	Lighter weight tractors not a compaction problem. Must be shallow cultivation	Must get weeds small, timing critical. More soil drying?	

2. Pre-plant Incorporated / Pre-emergence

Currently Registered Pesticides

Pesticide	Effi-cacy	Pros	Cons	Comments
Eptam 7E EPTC	G	Good activity on annual grasses and small seeded broadleaf weeds. Good on velvet leaf	Doesn't control most large seeded broadleaf weeds, ragweed, galinsoga	Eptan & Dual in combination is often used
pendimethalin Prowl	G	Velvetleaf, annual grasses, small seeded broadleaf	Doesn't control most large seeded broadleaf weeds, ragweed, galinsoga	Velvetleaf covered
metolachlor Dual Magnum	G	Annual grasses, small seeded broadleafs, yellow nutsedge and galinsoga	Possible groundwater issues. Common lambsquarters and all large seeded broadleaf weeds Increased crop injury in cool soils.	
trifluralin Treflan	G	Annual grasses and small seeded broadleaf-	All large seeded broadleaf, ragweed galinsoga	Treflan and Dual combination
halosulfuron Sandea 75 WSG	G	Excellent on most broadleaf weeds	Weak on grasses and some crop injury potential	
Dacthal 75 WP DCPA	G	Annual grasses and small seeded broadleaf	Very expensive no large seeded broadleaf, short residual	Least commonly used.

Cultural and Biological Alternatives

Method	Pros	Cons	Comments
Hand weeding	Crop competes well with weeds	Labor intensive	
Cultivation	Responds well to cultivation	Timing is critical; weeds must be small to avoid crop root damage.	
Plant stand	Good seed germination	Requires good weather at germination	
Transplanting	Good	Expensive due to high plant stand.	

3. Post Emergence

Currently Registered Pesticides

Pesticide	Effi-cacy	Pros	Cons	Comments
bentazon Basagran 4E	G	Velvetleaf,smartweed, ragweed, mustard, jimson weed, yellow nutsedge, small.lambsqts.	Timing window is narrow	
pelargonic acid Scythe 4.2	F	Controls small weeds in sunny weather	Needs directed or shielded spray. Expensive odor	
sethoxydim Poast 1.53 EC	G	Summer annual grasses	Weak on cool season and perennial grasses. No soil activity	
quizalofop Assure II 0.88 EC	G	Cool season and perennial grasses.	No soil activity	

Cultural and Biological Alternatives

None identified

Vertebrates

Deer eat blossoms
Birds eat seeds
Woodchucks eat the whole plant

Acres Affected: Varies yearly depending on pressure, 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	Animals must be euthanized. Risk to handler.
Temporary electric	More affordable alternative	Requires weed free strip	
Smoke bombs in burrows	Effective	Needs repeat applications	
Garlic and fish oil	Deer	Needs repeat applications	
Dogs trained to control wildlife problems.	Effective	Training of animals	

IV. Appendices

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Pesticide Efficacy for Insect and Mite Pests

Active ingredient	Brand name(s)	Leafhopper	Mexican Bean Beetle	SCM
acephate	Orthene	G	?	
bifenthrin	Capture	G	-	
dimethoate	Dimethoate	G	?	
endosulfan	Thionex	F	F	
esfenvalerate	Asana	G	G	
imidaclorprid	Provado	F	-	
lambda-cyhalothrin	Warrior	G	G	
malthion	Malathion	G	G	
methomyl	Lannate LV	E	G	
pyrethrin	PyGanic	G	G	
carbaryl	Sevin	G	-	
kaolin	Surround	G	F	
phorate	Thimet	-	-	F
spinosad	Entrust	F	F	
chlorpyrifos	Lorsban	-	-	F

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

Pesticide Efficacy for Diseases

Active ingredient	Brand name(s)	White Mold	Rust	Anthracnose
chlorothalonil	Bravo Ultrex 82 WDG	?	G	G
copper sulfate	Basicop 53Wp			G
coniothyrium	Contans WG	?		
cuprix hydroxide	Kocide 4.5 LF	?	?	?
iprodione	Rovral 50WP	G		
maneb	Manex	?	?	?
myclobutanil	Nova		G	
thiophanate-methyl	Topsin M	G		

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

Pesticide Efficacy for Weeds

Active ingredient	**Brand name(s)**	Stale Seed bed	Pre Plant	Post Emergence
glyphosate	Roundup	G/E		
paraquat	Gramoxone	G/E		
pelargonic acid	Scythe	F		
pendimethalin	Prowl		G	
metolachlor	Dual Magnum		G	
EPTC	Eptam		G	
trifluralin	Treflan		G	
DCPA	Dacthal		F	
halosulfuron	Sandea		G	
bentaxon	Basagran			G
pelargonic acid	Scythe			F
quizalofop	Assure			G
sethoxydim	Poast			G

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

V. Acknowledgements

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