

Crop Profile for Beans in New England 2003

Compiled for the New England Pest Management Network
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This profile is a comprehensive list of pests that may be encountered by New England bean growers, and the approved pesticides that may be used to control them. Only a few pests actually require treatment on an individual farm in a single year. For each pest all of the available effective options are listed. If treatment is needed, only one of those options would be used per application. Some pests require multiple applications for control; others only require a single application.

I. Production Facts

In New England, beans are produced by diversified fresh market vegetable producers. Growers reported managing an average of 2 acres of beans in 2002. Average yield for 2002-2006 was 2,900 pounds per acre. Of the farmers that responded, 72% of their crop was green beans. Other varieties included yellow beans, purple beans, lima beans, and to a lesser extent, fava, soy, romano, pole, haricot, and tiny french.

Most beans (71%) are grown for local retail fresh market; 17% are wholesaled, 4% are grown for pick-your-own markets; less than 1% for processing, and 8% are grown for other uses (home use, farm stands, senior farm share, etc.).

Pest management practices

Of farmers responding to our survey, 52% reported implementing IPM practices such as insect trapping and field sampling; 46% did their own scouting, 9% reported scouting by a farm employee or family member, and 3% used a private IPM scout or consultant.

When choosing pesticides for use on their farms, growers reported effectiveness, toxicity, potential environmental impacts, and phytotoxicity as the most important factors in their decision making.

When making pest management decisions, the most frequently used weather information was forecasts for next rain and wind speed. They frequently based irrigation scheduling on weather forecasts.

The following items received the highest rankings as “Very Important” sources for pest management decisions: New England Vegetable Guide (47%), other growers (41%), off-season educational meetings (39%), university/extension staff (38%), and newsletters (35%). Of the growers surveyed, 40% classified their farm practices as organic, 30% as conventional, and 19% as IPM.

Cultural Information

All beans (except lima) are relatively easy to grow in New England. They should be planted in well-drained soils to reduce chances of disease, and should not be repeatedly planted in the same field because of soilborne diseases. It is recommended that they be rotated every two to three years. Planting should commence only when soil temperatures have reached 60°F. Optimum seed germination occurs at soil temperatures between 70°F and 95°F for snap beans and between 70°F and 85°F for limas. Irrigation may be necessary at time of bloom in order to ensure maximum pod set under dry soil conditions. Temperatures above 90°F or below 50°F cause poor pod set.

New England growers reported using the following horticultural practices: overhead irrigation (42%), composted manure (40%), drip irrigation (19%), fresh manure (11%), and staking/trellising (7%). Other practices include: commercial fertilizer, non-manure compost, crop rotation, and plastic mulch. Spacing varies according to cultivar and type of culture used. Sixty-three percent of farmers reported using soil samples to determine fertilizer needs. Of those, 50% had samples taken once a year, 29% every other year and the remaining farmers every three years or more. Lime should be applied according to soil test to maintain soil pH at 6.5 to 6.8.

Worker Activities:

Worker activities that may occur during the growing season include mulching, weeding, scouting, mowing, irrigation, fertilizing, pesticide application and harvesting.

II. Insect and Mite Pests

Fifty percent of New England growers reported using insecticides on their bean crops. The remaining 50% of the growers reported using no pesticides for control of insect pests.

1. European Corn Borer, Corn Earworm

Type of Pest: Insect

Frequency of Occurrence: The European Corn Borer (ECB) and Corn Earworm (CEW) usually require routine annual treatment. 15% of growers surveyed reported routine problems with these pests.

Damage Caused: Corn borers cause problems in snap beans used for processing as larvae feeding on pods may show up in the finished product. In snap beans, corn borer larvae feed briefly on the leaves, but soon begin tunneling into the stems and pods. Since much of the pod damage is internal, with only a small entry hole visible on the outside, grading out infested pods is very difficult.

Beans are vulnerable to CEW larval feeding from bud stage to harvest. When the eggs hatch, the larvae begin feeding immediately. CEW can feed on the bean foliage, which results in holes. They also feed on the outside of the pod, which causes surface damage, and burrow into the pods to feed on seeds.

Regional Differences: None

Cultural Control Practices: Scouting, crop rotation, organic practices

Biological Control Practices: Conservation enhancement is very important.

Chemical Controls: Chemical controls that have provided excellent control for both insects include acephate (Orthene 97), bifenthrin (Capture 2EC), esfenvalerate (Asana XL), lambda-cyhalothrin (Warrior) and spinosads (Entrust and SpinTor 2SC).

Post-Harvest Control Practices: None

INSECTICIDES	TRADE NAME	PHI	RATES	REI
acephate	Orthene 97	14 days, snap or dry (0 days, succulent lima)	½ to 1 lb/A	24 hrs
bifenthrin	Capture 2EC	3 days (succulent only, not for dry)	2.1 to 6.4 oz/A	12 hrs
esfenvalerate	Asana XL	21 days (dry), 3 (snap), not for lima	5.8 to 9.6 oz/A	12 hrs
lambda-cyhalothrin	Warrior	21 days (dry), 7 days (succulent)	2.5 to 3.8 oz/A	24 hrs
methomyl	Lannate LV	3 days (succulent), 14 days (dry beans)	1 to 1.67 pt/A	48 hrs
methyl parathion	PennCap-M	15 days, dry bean only	2 to 4/A	48 hrs
spinosad	Entrust	3 days (succulent), 28 days (dry)	1 to 2 dry oz/A	4 hrs
spinosad	SpinTor 2 SC	3 days (succulent), 28 days (dry)	3 to 6 oz/A	4 hrs

2. Cutworms

Type of Pest: Insect

Frequency of Occurrence: Cutworms usually require routine annual control.

Damage Caused: Larval feeding damages both crops through reduced yield and quality. Damaged or "worm-chewed" beans are a significant quality factor for beans.

Regional Differences: None

Cultural Control Practices: Sanitation, scouting and weed management. Disturbing the soil by plowing or disking is thought to reduce overwintering larval survival.

Biological Control Practices: Ladybird beetle adults feed on both eggs and larvae up to the third instar.

Chemical Controls: acephate (Orthene 97), bifenthrin (Capture 2EC), carbaryl (Sevin XLR Plus), esfenvalerate (Asana XL), and lambda-cyhalothrin (Warrior).

Post-Harvest Control Practices: None

INSECTICIDES	TRADE NAME	PHI	RATES	REI
acephate	Orthene 97	14 days (snap & dry), 0 days (succulent lima)	½ to 1 lb/A	24 hrs
bifenthrin	Capture 2EC	3 days (not for dry, succulent only)	2.1 oz/A	12 hrs
carbaryl	Sevin XLR PLUS	3 days (snap), 21 (dry)	1 to 1-1/2 qt/A	12 hrs
esfenvalerate	Asana XL	21 days (dry) 3 (snap), not for lima	5.8 to 9.6 oz/A	12 hrs
lambda-cyhalothrin	Warrior	21 days (dry), 7 days (succulent)	2.5 to 3.8 oz/A	24 hrs

3. Two Spotted Spider Mite: (*Tetranychus spp.*)

Type of Pest: Mite

Frequency of Occurrence: The two spotted spider mite is a common species attacking beans. Only <1% of the growers report routine problems with this pest.

Damage Caused: In very warm, dry years spider mite populations can rapidly increase and cause widespread damage through soybean fields. Early infestations will kill soybeans, while later infestations cause premature senescence and reductions in yields up to 40%-50%.

Regional Differences: None

Cultural Control Practices: Proper irrigation to avoid drought stress is the key cultural practice for avoiding mite outbreaks.

Biological Control Practices: Predatory mites in greenhouses.

Chemical Controls: bifenthrin (Capture 2EC), dicofol (Kelthane MF), dimethoate (Dimethoate 4EC), oxydemeton-methyl (Metasystox-R).

Post-Harvest Control Practices: None

INSECTICIDES	TRADE NAME	PHI	RATES	REI
bifenthrin	Capture 2EC	3 days (succulent only, not for dry)	1 to 3 pt/A oz/A	12 hrs
dicofol	Kelthane MF	21 days	1 to 3 pt/A	12 hrs
dimethoate	Dimethoate 4EC	0 days	8 to 16 oz/A	48 hrs
oxydemeton- methyl	Metasystox-R	21 days (lima only)	1 qt/A	48 hrs

4. Aphid

Type of Pest: Insect

Frequency of Occurrence: 11% of grower reported this as a routine pest.

Damage Caused: Congregating on lower leaf surfaces and on terminal buds, aphids extract plant sap. Leaves curl and pucker and seedling plants may become stunted and die. On lima bean, bean aphids attack terminal leaves, flower heads, and stems of pods. Infested plants develop yellow foliage, may become dwarfed and malformed, and lose vigor. A dark sooty mold often grows on the honeydew-coated surfaces of aphid-infested plants.

Regional Differences: None

Cultural Control Practices: Destroy crop residue immediately after harvest. Avoid other aphid-favored crops, such as lettuce, in adjacent, upwind fields. Intensify field monitoring for aphids when adjacent fields with aphid-favored crops are harvested. Other practices used by farmers surveyed included organic practices and homemade garlic-red pepper-fish solution.

Biological Control Practices: Lady beetles and their larvae, lacewing larvae, syrphid fly larvae, and stilt bugs all feed on aphids. During periods of high humidity, fungal diseases also reduce populations.

Chemical Controls: Products providing excellent to good control include acephate (Orthene 97), bifenthrin (Capture 2EC), dimethoate (Dimethoate 4EC), endosulfan (Thionex 50W), esfenvalerate (Asana XL), imidacloprid (Provado 1.6F0, lambda-cyhalothrin (Warrior), malathion (Malathion 57EC), methomyl (Lannate LV), and pyrethrin (PyGanic EC 5.0)

Post-Harvest Control Practices: None

INSECTICIDES	TRADE NAME	PHI	RATES	REI
acephate	Orthene 97	14 days (snap & dry), 0 days (lima)	½ to 1 lb/A	24 hrs
bifenthrin	Capture 2EC	3 days (succulent only, not for dry)	2.1 to 6.4 oz/A	12 hrs
dimethoate	Dimethoate 4EC	0 days	8 to 16 oz/A	48 hrs
endosulfan	Thionex 50W	3 days (not for lima beans)	1 to 2 lb/A	24 hrs
esfenvalerate	Asana XL	21 days (dry), 3 days (snap), not for lima	5.8 to 9.6 oz/A	12 hrs
imidacloprid	Provado 1.6F	7 days (not for dry)	3.5 oz/A	12 hrs
lambda-cyhalothrin	Warrior	21 days (dry), 7 days (snap)	2.5 to 3.8 oz/A	24 hrs
malathion	Malathion 57EC	1 day	2 to 2-1/2 pt/A	12 hrs
methomyl	Lannate LV	14 days (dry), 3 days (succulent)	1-1/2 to 3 pt/A	48 hrs
pyrethrin	PyGanic EC5.0	See label	4.5 to 18 oz/A	12 hrs

5. Leafhoppers:

Type of Pest: Insect

Frequency of Occurrence: 24% of farmers surveyed reported leafhoppers as a routine annual pest.

Damage Caused: Leafhoppers have piercing-sucking mouthparts with both adults and nymphs causing damage on beans. When they insert their mouthparts into the water and food conducting tissue of plants, they also inject saliva and create physical damage that plugs the vascular tissue. The first signs of feeding are pale leaf veins and curling leaves. Continued feeding results in most or all of the leaf curling, crinkling, and turning brown. Sometimes, the damage is a characteristic v-shaped brown area at the leaf tip that is called hopperburn. In addition, other damage symptoms include stunted growth, shortened internodes, and fewer flowers and pods.

Regional Differences: None

Cultural Control Practices: Weed control, stand establishment, and organic practices.

Biological Control Practices: Predators and parasites seldom give satisfactory control, especially where the LH is a disease carrier.

Chemical Controls: acephate (Orthene 97), bifenthrin (Capture 2EC), carbaryl (Sevin XLR Plus), dimethoate (Dimethoate 4EC), esfenvalerate (Asana XL), imidacloprid (Provado 1.6F), kaolin (Surround WP), lambda-cyhalothrin (Warrior), malathion (Malathion 57EC), methomyl (Lannate LV), pyrethrin (PyGanic EC5.0).

Post-Harvest Control Practices: None

INSECTICIDES	TRADE NAME	PHI	RATE	REI
acephate	Orthene 97	14 days (snap & dry), 0 days (lima)	½ to 1 lb/A	24 hrs
bifenthrin	Capture 2EC	3 days (succulent only, not for dry)	1.6 to 6.4 oz/A	12 hrs
carbaryl	Sevin XLR PLUS	3 days (snap), 21 days (dry)	1 lb/A	12 hrs
dimethoate	Dimethoate 4EC	0 days	8 to 16 oz/A	48 hrs
esfenvalerate	Asana XL	21 days (dry), 3 (snap), not for lima	2.9 to 9.6 oz/A	12 hrs
imidacloprid	Provado 1.6F	7 days (not for dry beans)	3.5 oz/A	12 hrs
kaolin	Surround WP	0 day	12-1/2 to 25 lb/A	4 hrs
lambda-cyhalothrin	Warrior	21 days (dry), 7 days (snap)	2.5 to 3.8 oz/A	24 hrs
malathion	Malathion 57EC	1 day	1-1/2 to 2-1/2 pt/A	12 hrs
methomyl	Lannate LV	14 days (dry), 3 days (succulent)	12 to 48 oz/A	48 hrs
pyrethrin	PyGanic EC5.0	See label	4.5 to 18 oz/A	12 hrs

6. Mexican Bean Beetle:

Type of Pest: Insect

Frequency of Occurrence: Twenty-five percent of farmers surveyed reported treating crop annually for this pest.

Damage Caused: The Mexican bean beetle is the most injurious pest of beans (snap, lima, pole, kidney, pinto, navy, bush). If overwintering populations are high, seedling damage may occur, though economic damage usually does not occur before August. Both larvae and adults feed on leaves, leaving the upper surface intact. Damaged plants have a characteristic lace-like (skeletonized) appearance. These remaining tissues die in about 2 days and turn brown, often giving the entire field a "burnt" cast. Pods and stems are often attacked, and shredded plants may die before any crop is matured.

Regional Differences: None

Cultural Control Practices: Crop rotation, crop residue destruction, handpicking, and row cover

Biological Control Practices: a parasitic wasp, *Pediobius foveolatus*

Chemical Controls: acephate (Orthene 97), dimethoate (Dimethoate 4EC), endosulfan (Thionex 50W), esfenvalerate (Asana XL), kaolin (Surround WP), lambda-cyhalothrin (Warrior), malathion (Malathion 57EC), methomyl (Lannate LV), pyrethrin (PyGanic EC5.0).

Post-Harvest Control Practices: None

INSECTICIDES	TRADE NAME	PHI	RATE	REI
acephate	Orthene 97	14 days (snap & dry), 0 days (lima)	½ to 1 lb/A	24 hrs
dimethoate	Dimethoate 4EC	0 days	8 to 16 oz/A	48 hrs
endosulfan	Thionex 50W	3 days	1 to 2 lb/A	24 hrs
esfenvalerate	Asana XL	21days (dry), 3 snap), not for lima	2.9 to 5.8 oz/A	12 hrs
kaolin	Surround WP	0 day	12-1/2 to 25 lb/A	4 hrs
lambda-cyhalothrin	Warrior	21 days (dry), 7 days (snap)	2.5 to 3.8 oz/A	24 hrs
malathion	Malathion 57EC	1 day	1-1/2 to 2-1/2 pt/A	12 hrs
methomyl	Lannate LV	14 days (dry), 3 days (succulent)	12 to 48 oz/A	48 hrs
pyrethrin	PyGanic EC5.0	See label	4.5 to 18 oz/A	12 hrs

7. Seedcorn Maggot:

Type of Pest: Insect

Frequency of Occurrence: 3% of grower reported this as a routine pest and treated crop annually for it.

Damage Caused: The seed corn maggot burrows into seeds in the soil. Damage is greater in cold, wet weather and when the seed is deeply planted. Seeds and developing seedlings attacked by the seed corn maggot fail to sprout vigorously enough to establish a plant; or if the plant does start, it is very weak and sickly.

Regional Differences: None

Cultural Control Practices: Seed Treatment, plant in high organic matter

Biological Control Practices: None

Chemical Controls: phorate (Thimet 20-G)

INSECTICIDES	TRADE NAME	PHI	RATE	REI
phorate	Thimet 20-G	60 days	4.5 to 7 oz/1000 ft of row	48 hrs

8. Tarnished Plant Bug:

Type of Pest: Insect

Frequency of Occurrence: 8% of grower reported this as a routine pest and treat crop annually for it..

Damage Caused: Damage to beans from TPB nymphs and adults is confined generally to flowers and fruit. Flower abortion may occur when TPB sting the flowers. Damage to bean pods consists of pin-point injury surrounded by a white halo. This damage, if severe, can make the beans unmarketable or of a lower grade. The TPB feeding toxin may also distort the shape of the bean pod.

Regional Differences: None

Cultural Control Practices: Organic practices, scouting, removal of weeds and the elimination of trash and other debris in areas that could provide overwintering sites.

Biological Controls: Bigeyed bugs, *Geocoris* spp., damsel bugs, *Nabis* spp., minute pirate bugs, *Orius tristicolor*, and several species of spiders.

Chemical Controls: acephate(Orthene 97), bifenthrin (Capture 2EC), dimethoate (Dimethoate 4EC) , methomyl (Lannate LV)

Post-Harvest Control Practices: None

INSECTICIDES	TRADE NAME	PHI	RATES	REI
acephate	Orthene 97	14 days (snap & dry), 0 days (lima)	½ to 1 lb/A	24 hrs
bifenthrin	Capture 2EC	3 days (succulent only, not for dry)	2.1 to 6.4 oz/A	12 hrs
dimethoate	Dimethoate 4EC	0 days 14 days (dry), 3 days	8 to 16 oz/A	48 hrs
methomyl	Lannate LV	9succulent0	1-1/2 to 3 pt/A	48 hrs

III. Diseases and nematodes

Seventeen percent of New England growers reported using chemical controls for disease and viruses each year. The remaining 83% of the growers reported using no chemical control.

Over forty percent of growers surveyed reduced the incidence of diseases by using cultural practices: crop rotation (17%), weed control (8%), cultivation (7%), wider spacing (6%), mulch (4%), raised beds (3%), sandy loam (1%), cover crop (1%), and burning (1%). Of farmers surveyed, the primary viruses and diseases reported as routine pests or occasional problems are: White Mold (38%), Rust (36%), Downy Mildew (27%), Seed Decay (22%), Bacterial Blights (19%), Anthracnose (14%), Bean Common Mosaic Virus (11%), and Bean Yellow Mosaic Virus (9%).

FUNGICIDE	PHI	RATE	REI
chlorothalonil, (Bravo Ultrex 82 WDG)	7 days	1.25 to 2.5 lbs/A	12 hours
copper sulfate (Basicop 53WP)	0 days	2 lbs/A	24 hours
coniothyrium (Contans WG)	See label	1 to 4 lb/A	4 hrs
cupric hydroxide (Kocide 4.5 LF)	0 days	0.6 to 2 pts/A	24 hours
iprodione (Rovral 50WP)	0 days	1-1/2 to 2 lbs/A	24 hrs
maneb (Manex, Maneb 80 WP)	30 days	1.5 to 2 lb/A	24 hours
myclobutanil (Nova)	0 days	4 to 5 oz/A	24 hrs
thiophanate-methyl (Topsin-M 70W)	14(snap), 28(lima)	1 to 1.5 lb/A	12 hrs

1. White Mold (*Sclerotinia*)

Type of Pest: Fungus

Frequency of Occurrence: Seven percent of farmers surveyed treat crop for this fungus annually.

Damage Caused: White mold is first observed as wet, soft spots or lesions on infected leaves, branches, stems and pods. These lesions enlarge into a watery, rotten mass of tissue that is covered by a white moldy growth. Infection of stems and branches will cause affected plant parts to wilt and later die, taking on a bleached and dried appearance.

Regional Differences: None

Cultural Control Practices: Spacing, weed management, rotation, damping off, removal of infected plants.

Biological Control Practices: none

Chemical Controls: chlorothalonil, (Bravo Ultrex 82 WDG), copper sulfate (Basicop 53WP), and maneb (Manex, Maneb 80 WP).

2. Rust (*Uromyces*)

Type of Pest: Fungus

Frequency of Occurrence: Seven percent of growers reported treating for this problem annually.

Damage Caused: Rust symptoms initially appear as small yellow or white slightly raised spots on upper and/or lower surfaces of leaves. These spots enlarge and form reddish-brown or rust-colored pustules that are about 1/8 inch in diameter. Severe infection may cause leaves to curl upwards, dry up, turn brown and drop prematurely. A severely damaged bean field often looks like it has been scorched. Pod set, pod fill and seed size can be reduced if early infection is severe. Green pods, and occasionally stems and branches, also may become infected and develop typical rust pustules. However, bean rust is not seedborne.

Regional Differences: None

Cultural Control Practices: Plant spacing, crop rotation, plant in well-drained soil

Chemical Controls: chlorothalonil, (Bravo Ultrex 82 WDG), myclobutanil (Nova).

3. Downey Mildew

Type of Pest: Fungus

Frequency of Occurrence: Five percent of farmers surveyed reported treating for this fungus.

Damage Caused: Lesions can be seen as pale circular blotches, about the size of a pea, which frequently run out to one margin of the leaf. A grey mold can be seen growing on the underside of the leaf.

Cultural Control Practices: Scouting, crop rotation, deep plowing, spacing.

Chemical Controls: chlorothalonil, (Bravo Ultrex 82 WDG), copper sulfate (Basicop 53WP), maneb (Manex, Maneb 80 WP)

4. Bacterial Blights:

Type of Pest: Bacterial disease

Frequency of Occurrence: Three percent of growers surveyed treat crops annually for these diseases.

Damage Caused: As these blights develop, the infected leaves become brittle and will drop prematurely. Infected plants may lose their leaves a week or two earlier than healthy plants. In severe cases, the small veins and midrib will turn a reddish color. Leaves infected with halo blight will curl and the younger leaves become yellow, having no noticeable halos or dead spots. Symptoms on the pods also begin as round, water-soaked lesions with a yellow or cream-colored mass of bacteria in the centre of these spots. Over time, these pod lesions become sunken and dry with a reddish-brown border surrounding the yellow centre. The earlier the

infection occurs on the pods, the greater the impact on seed quality. Seed is often shriveled and, in the case of common bacterial blight, it may yellow. Planting infected seed produces plants that have a stem girdling or joint rot. The plant is weakened and may fall over.

Regional Differences: None.

Cultural Control Practices: Crop rotation, don't cultivate when foliage is wet, deep plowing.

Biological Control Practices: None

Chemical Controls: cupric hydroxide (Kocide 4.5 LF)

5. Anthracnose:

Type of Pest: Fungus

Frequency of Occurrence: Five percent of growers surveyed treat crops annually for this fungus.

Damage Caused: Seedlings grown from infected seeds often have dark brown- to black sunken lesions on the cotyledons and stems. Severely infected cotyledons senesce prematurely, and growth of the plants is stunted. Diseased areas may girdle the stem and kill the seedling. Severely infected pods may shrivel, and the seeds they carry are usually infected. Infected seeds have brown to black blemishes and sunken lesions.

Regional Differences: None.

Cultural Control Practices: Don't cultivate or spray when plants are wet, crop rotation, resistant varieties.

Biological Control Practices: None

Chemical Controls: chlorothalonil, (Bravo Ultrex 82 WDG), copper sulfate (Basicop 53WP), maneb (Manex, Maneb 80 WP)

6. Bean Common Mosaic Virus:

Damage Caused: Virus is seedborne. Spread by at least 12 species of aphids in a non-persistent manner. Lesions on foliage, blackened roots.

Regional Differences: None.

Cultural Control Practices: resistant varieties

Biological Control Practices: None

Chemical Controls: Insecticides of little value

7. Bean Yellow Mosaic Virus:

Frequency of Occurrence:

Damage Caused: Virus is not seedborne. Spread by over 30 species of aphids in a persistent manner. Damage results in substantial yield loss.

Regional Differences: None.

Cultural Control Practices: Plant resistant varieties, plant at least 800 feet away from clover and vetch.

Biological Control Practices: None

Chemical Controls: Insecticides applied early will reduce spread.

IV. Weeds

Thirty-two percent of New England growers reported using chemical controls for weeds each year. The remaining 68% of the growers reported using no chemical control. Over 80% of farmers reported using cultural practices to control weeds. These include: cultivation, hoe/hand weeding, mowing, rototilling, flaming, crop rotation, and mulching. The most frequently used practices are cultivation (78% of farmers used this method) and hand weeding (72%). Growers reported having routine annual problems with annual broadleaf weeds (79% surveyed reported problems) and annual grasses (70 % of farmers surveyed). Fifty percent of farmers reported perennial broadleaf weeds and perennial grasses as a routine annual problem.

1. Stale Seed Bed

Six percent of farmers surveyed reported treating bean crop with stale seed bed applications.

PRODUCT	TRADE NAMES	PHI	RATE	REI
glyphosate	Roundup	14 days	1 to 5 qt/A	12 hrs
paraquat	Gramoxone Max 3S	7 days (not for use on dry beans)	1.5 to 2.7 pts/A	12 hrs
pelargonic acid	Scythe 4.3	See label	3 to 10 pal/A	24 hrs

2. Preplant Incorporated -Transplants

Thirteen percent of farmers surveyed reported treating bean crop with preplant incorporated applications.

PRODUCT	TRADE NAMES	PHI	RATE	REI
EPTC	Eptam 7E	60 days (snap and dry only, not for lima)	3-1/2 pt/A	12 hrs
EPTC (Eptam 7E) plus trifluralin	Eptam 7E (not for lima), Treflan 4E	60 days	2-21/2 to 3-1/2 pt plus 1-1/2 pt/A	12 hrs
metolachlor	Dual Magnum	60 days	1 to 2 pt/A	12 hrs
pendimethalin	Prowl 4EC	See label	1 to 3 pt/A	12 hrs
trifluralin	Treflan 4E	See label	1 to 1-1/2 pt/A	12 hrs
ethafluralin	Sonalan HFP	See label (dry beans only)	1-1/2 to 3 pt/A	12 hrs
dimethenamid	Frontier 6.0	70 days (dry beans only, not for use on snap or lima)	16 to 32 oz/A	12 hrs

3. At Planting

Seven percent of farmers surveyed reported crop treated with at planting applications.

PRODUCT	TRADE NAMES	PHI	RATE	REI
DCPA	Dacthal 75WP	See label	6 to 14 lb/A	24 hrs
halosulfuron	Sandea 75 WSG	30 day (lima, snap, dry only)	0.5 to 1 oz/A	12 hrs

4. Post Emergence

Thirteen percent of farmers surveyed reported treating crop with post emergence applications.

PRODUCT	TRADE NAMES	PHI	RATE	REI
bentazon	Basagran 4E	30 days	¾ qt/A	48 hrs
pelargonic acid	Scythe 4.2	See label	3% to 10% annual weeds	24 hrs
quizalofop	Assure II 0.88 EC	30 days (dry), 15 days (succulent), not for use on lima	5 to 12 oz/A	12 hrs
sethoxydim	Poast 1.53EC	30 days (dry), 15 days (succulent)	1 to 1.2 pt/A	12 hrs

V. Vertebrate Pests

1. Birds

Type of Pest: Vertebrate

Frequency of Occurrence: constant pressure

Damage Caused: Severe damage to crops.

Vertebrate pests are significant in New England.

Timing of Control: when damage is noticed.

Regional Differences: each farm differs.

Cultural Control Practices: Scare eye balloons reported by 8% growers, flash tape (8%), netting (3%), owls (2%), distress calls (1%), other tactics: cat, shoot, and over plant.

Chemical Controls: Bird toxicants

2. Deer

Type of Pest: Vertebrate

Damage Caused: 36% of growers report deer damage was common on farms.

Regional Differences: each farm differs in pressure from deer.

Cultural Control Practices: Control tactics include the use of fencing, predator urine, hunting, shooting, hair and soap, talk radio, flash tape, hot pepper, scarecrow, and mothballs. Electric fencing works well but is expensive.

3. Woodchuck

Type of Pest: Vertebrate

Frequency of Occurrence: occasional pressure

Damage Caused: 14% of the growers reported woodchucks as important pests.

Regional Differences: each area differs.

Cultural Control Practices: shoot, trap, gas, dogs, and smoke bomb

4. Minor Vertebrate Pests:

Groundhogs, raccoons, mice/voles, coyotes, turkeys

VI. Acknowledgements:

References:

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