

# New England Apple Pest Management Survey Summary

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The following is a summarization of a 90-question survey was distributed to 600 New England growers in the fall of 2004. Dillman survey methodology was used to design and conduct the survey. Percentages of growers were calculated using the 170 growers who responded to the survey as the denominator, not the number of growers responding to a particular question. Many questions allowed multiple answers, thus percentage responses may sum to more than 100%. Complete survey results and original survey are available at [www.pronewengland.org](http://www.pronewengland.org).

Preliminary card notice sent to over 600 growers	July 29, 2004
Apple survey sent to 570 growers in 5 states	August 3
Apple survey sent to 68 Growers in Vermont	August 16
Reminder card sent to 368 growers in 5 states	August 25
Reminder card sent to 51 growers in Vermont	August 30
Second apple survey sent to 352 growers in 5 states	August 30
Second apple survey sent to 46 Vermont growers	October 15

## New England Apple Pest Management Survey Returns

State	#Surveys Sent	#Surveys Returned	%Return	#Growing Apples	#Apple Acres
MA	178	122	69	68	1318.75
NH	147	92	63	23	1157.50
VT	68	28	41	12	785.3
CT	75	35	47	23	621.5
ME	111	56	50	37	609
RI	40	16	40	7	45.5
<b>Total</b>	<b>619</b>	<b>349</b>	<b>56</b>	<b>170</b>	<b>4537.55</b>

<sup>1</sup>Most percents in this document have been rounded for ease of reporting.

### Crop Information

Massachusetts led the reported apple acreage in 2003 with 1318.75 acres. Followed by New Hampshire with 157.50 acres, Vermont with 785.3 acres, Connecticut with 621.5 acres, Maine with 609 acres, and Rhode Island with 45.5 acres.

The majority of growers (147) throughout the region reported an average yield of 785 bushels per acre per year (4082 acres).

Fresh market wholesale accounted for 49% of the apple sales, followed by fresh market retail at 19%, and U-Pick and processing at 13% each.

## Horticultural Management

The majority of growers (94%) practiced **dormant pruning** while 47% practiced **summer pruning** and 21% used **growth regulators to suppress shoot growth**.

Twenty-four percent of the growers used **leaf tissue analysis** to determine fertilizer needs on an annual basis. Growers planted 40% of the apple acreage with fewer than 120 trees per acre, 40% of the apple acreage with 121 to 340 trees per acre, and only 11% of the apple acreage with more than 340 trees per acre.

## Apple Pest Management Overview

The average number of applications to control diseases in a year was 8.6 applications, followed by insecticides at 6.7 applications, miticides at 1.4, and herbicides with 1.2 applications. Forty-two percent of the growers used **tree row canopy volume** to determine pesticide application rates.

Growers ranked the frequency and occurrence of management of insect pests with 89% managing plum curculio and 84% managing apple maggot on an “annual” basis. Approximately 60% of the growers reported that European corn borers, climbing cutworms and pear thrips were “never a problem”.

Annual broadleaf weeds and grasses and perennial broadleaf weeds and grasses were an “annual” problem for 65% of the growers.

“Annual” vertebrate pest problems included voles for 58% of the growers, followed by deer at 56%, and rabbits at 13%.

## Insect Pest Management

Ninety-eight percent of the growers used one or more of these **practices** to control insects and/or mites in apples. *Orchard monitoring of pest and beneficial populations* was practiced by 48% of the growers but only 6% of the growers *released predatory mites and insects*. *Orchard floor groundcover/habitat management* was practiced by 38% of the growers and 20% of the growers *removed wild/alternate hosts and abandoned orchards*. Only 3% of the growers practiced row cropping and annual tillage of adjacent cropland. Twenty-nine percent of the growers used *traps*, 8% used *insecticide-treated traps*, and 6% used *mating disruption*. Twenty-one percent of the growers used *growing degree-day models to time applications* and 21% of the growers made *border row sprays rather than treating the entire orchard*.

Pesticide applications were applied to 96% of the apple acreage to manage **plum curculio**. Growers (66%) used Imidan on 56% of the acreage. Guthion was used on 53% of the acreage, followed by Danitol on 15%, Asana on 10%, Sevin on 8% and Avaunt on 5%. Several other

products were applied to less than 2% of the acreage. The majority of growers reported “excellent” or “good” control with these products. Digion EC and Dimate EC were not used by any growers to control plum curculio.

Pesticide applications were applied to 94% of the apple acreage to manage **apple maggot**. Growers (76%) used Imidan on 67% of the acreage. Guthion was used on 29%, on Danitol on 21%, Sevin on 18 % and Asana on 3%. Other pesticides were used on less than 2% of the acreage. The majority of the growers reported “excellent” and “good” control with these products. Some growers (4%) also reported using trapping as a management strategy on 4% of the acreage.

Pesticide applications were applied to 85% of the apple acreage for the control of **European apple saw fly**. The majority of growers used Imidan on 43% of the acreage. Guthion was used on 31% of the acreage, followed by Asana on 15 %, Danitol on 14%, and Sevin on 7%, Pounce on 4% and Dipel on 3%, and other pesticides on less than 2%. Diazinon and Sniper were not used by growers for control of European apple saw fly.

**European red mite** was managed on 84% of the apple acreage. Oil was used on 74% of the acreage, followed by Danitol on 32%, Pyramite on 26%, Agrimek on 21%, Savey on 14% and Acramite on 11%. Other pesticides were used on less than 4% of the acreage. Four growers used natural predators as a control strategy for the European red mite on 17% of the acreage.

**Tarnished plant bug** was managed on 75% of the acreage. Thirty-seven percent of the acreage was treated with Imidan, followed by Asana on 34%, Guthion on 18%, Pounce on 13 % and Danitol on 12%. The majority of the growers reported “good” control with these products. Aza-Direct, Digion EC, Dimate EC, Lannate, Phaser, Rotenone, Sniper and Vydate were not used by growers to control tarnished plant bug.

Pesticide applications were applied to 62% of the apple acreage to control **codling moth**. Growers used Imidan on 43% of the acreage, Guthion on 15%, Asana on 14% and Danitol on 11%. Additional pesticides were used on less than 4% of the acreage. Growers reported “excellent” control using these products.

Pesticide applications were applied to 61% of the apple acreage to manage **San Jose scale**. Growers (32%) used oil on 27% of the acreage. Guthion was used on 7% of the acreage, followed by Imidan on 6%, and Lorsban on 5%. Other pesticides were used on less than 3 % of the acreage. The majority of growers reported “excellent” or “good” control with these products.

**Apple blotch and spotted tentiform leafminer** was managed on 61% of the apple acreage. Asana was used on 30% of the acreage, followed by Danitol on 14%, Provado on 10%, Thiodan on 8% and Agrimek on 5%. Other pesticides were used on less than 2% of the acreage. Growers reported that these products provided “excellent” control.

Pesticide applications were applied to 53% of the apple acreage to manage **twospotted spider mite**. Growers (32%) used Oil on 30% of the acreage. Danitol was used on 15% of the acreage,

followed by Pyramite and Agrimek on 5%. Other pesticides were used on less than 4 % of the acreage. The majority of growers reported “good” control with these products.

**Obliquebanded leafroller** was managed on 51% of the acreage. Twenty-nine percent of the acreage was treated with Imidan, followed by Guthion on 17%, Asana on 14%, and Danitol on 12%. *Bacillus thuringiensis* was used on 6% of the acreage. The majority of the growers reported “good” control with these products. Several other products were used on less than 2% of the acreage.

Pest applications were applied to 47% of the apple acreage to manage **redbanded leafroller**. Growers (24%) used Imidan on 27% of the acreage, followed by Guthion on 17%, Danitol on 6%, and Asana on 5%. The majority of the growers reported “good” control with these products. Several other products were used on less than 2% of the acreage.

**White apple and rose leafhoppers** were managed on 45% of the acreage. Twenty-seven percent of the acreage was treated with Sevin, followed by Provado and Danitol on 8%, and Thiodan on 5%. The majority of the growers reported “excellent” control with these products. Several other products were used on less than 3% of the acreage.

Pesticide applications were applied to 42% of the apple acreage to manage **apple aphid**. Growers (23%) used Imidan on 14% of the acreage, followed by Thiodan on 9%, Provado and Asana on 8%, Pounce and Lannate on 6%, and Sevin on 5%. The majority of growers reported “good” control with these products. Several other products were used on less than 1% of the acreage. Five other growers used natural predators on 13% of the acreage.

**Green fruitworms** were managed on 39% of the acreage. Twenty-six percent of the acreage was treated with Imidan, followed by Danitol on 7%, and Guthion on 6%. The majority of the growers reported “excellent” control with these products. Several other products were used on less than 2% of the acreage.

Pesticide applications were applied to 30% of the apple acreage to manage **rosy apple aphid**. Growers (7%) used Danitol on 10% of the acreage, followed by Imidan, oil, and Asana on 8%, Lorsban on 5%, and Thiodan and Sevin on 3%. The majority of growers reported “good” control with these products. Several other products were used on less than 2% of the acreage.

**Potato leafhopper** was managed on 20% of the acreage. Six percent of the acreage was treated with Sevin and Provado, followed by Thiodan on 5%, and Danitol on 4%. The majority of growers reported “excellent” control with these products. Several other products were used on less than 2% of the acreage.

Pesticide applications were applied to 16% of the apple acreage to manage **mullein plant bug**. Growers (5%) used Asana on 11% of the acreage, followed by Imidan and Actara on 2%. The majority of growers reported “excellent” control with these products. Several other products were used on less than 1% of the acreage.

**Dogwood borer and roundheaded apple tree borer** were managed on 15% of the acreage. Eleven percent of the acreage was treated with Lorsban with oil, followed by Thiodan on 7%, and Lorsban on 2%. The majority of growers reported “excellent” control with these products. Several other products were used on less than 1% of the acreage.

Pesticide applications were applied to 11% of the apple acreage to manage **woolly apple aphid**. Growers (10%) used Thiodan on 6% of the acreage. The majority of growers reported “excellent” control with this product. Several other products were used on less than 1% of the acreage.

**Climbing cutworms** were managed on 2% of the acreage. Two percent of the acreage was treated with Lorsban. Growers reported “excellent” results with the product. Other products were used on less than 1% of the acreage.

## Disease Management

Ninety-four percent of the growers used one or more of the **cultural practices** to control diseases in apples. *Annual pruning to open tree canopies and promote air circulation* was used by 84% of growers, while *pruning out cankered limbs and branches during the dormant season* was used by 66% of growers, *pruning out blighted shoots as soon as they appear in the early summer* was used by 34% of growers, *pruning systems and nitrogen fertilization practices that avoid excessive and prolonged shoot growth* was used by 30% of growers.

*Mowing of grass middles and within-row weed management* was used by 80% of growers, *flailing or elimination of leaves* was used by 34% of growers, *removing wild/alternative hosts and abandoned orchards* was used by 27% of growers, and *the removal of hedgerows or surrounding woodlots* was used by 12% of growers. *Spring/Summer monitoring of scab maturity and infection periods* was used by 74% of growers and *autumn assessment of potential inoculum levels* was used by 22% of growers.

*Proper fruit thinning* was used by 58% of growers and *application of urea* was used by 15%. The *use of scab resistant cultivators* was used by 19% of growers and 12% used *avoiding highly susceptible cultivators and rootstocks as a disease management practice*.

Pesticide applications were applied to 98% of the apple acreage to manage **apple scab**. Growers (84%) used Captan on 90% of the acreage. Topsin was used on 61% of the acreage, followed by Flint on 43%, Polyram on 38%, Penncozeb on 34%, Syllit on 31%, Nova on 30%, Rubigan on 29%, Dithane on 26%, Sovran on 22%, COCS and Dithane Rainshield on 15%, Basic Copper on 11%, Kocide and Manzate on 7%, Sulfur on 6%, Maneb and Blue Shield on 4%, and Ferbam Granuflo and Manex on 3%. The majority of growers reported “excellent” control with these products. Other products were used on less than 2% of acreage. Another strategy used by 11 growers was elimination of wild trees on 6% of acreage. Fourteen growers used the leaf mulching strategy on 4% of the acreage and six growers used ground urea spray on 2% of acreage.

**Flyspeck and sooty blotch** was managed by 86% of the growers on 92% of the apple acreage. Growers (70%) used Captan on 72% of the acreage. Topsin was used on 64% of the acreage, followed by Flint on 23%, Sovran on 9%, Ziram on 4%, and Penncozeb on 3%. The majority of growers reported “good” control with these products. Other products were used on less than 2% of the acreage. Nineteen growers used summer pruning as another strategy to control fly speck and sooty blotch on 23% of the acreage. Four growers used eliminating alternative hosts for control on 3% of the acreage.

Pesticide applications were applied to 44% of the apple acreage to manage **bitter rot**. Growers (27%) used Captan on 35% of the acreage. Topsin was used on 17% of the acreage, followed by Flint on 12%, Dithane Rainshield and Penncozeb on 6%, and Polyram on 4% of acreage. The majority of growers reported “good” control with these products. Other products were used on less than 1% of the acreage.

**Powdery mildew** was managed by 40% of growers on 41% of the apple acreage. Growers (14%) used Flint on 23% of the acreage. Nova was used on 14% of the acreage, followed by Topsin on 10%, and Rubigan on 8%. The majority of growers reported “excellent” control with these products. Other products were used on less than 1% of acreage.

Pesticide applications were applied to 33% of apple acreage to manage **black rot**. Growers (35%) used Captan on 24% of the acreage, followed by Topsin on 9%, Dithane Rainshield on 3%. Sovran, Syllit, and Penncozeb were used on 2% of the acreage. Growers reported “good” control with these products. Other products were used on less than 1% of the acreage.

**Cedar apple rust** was managed by 36% of growers on 25% of the apple acreage. Growers (19%) used Captan on 15% of the acreage. Rubigan was used on 5% of the acreage, followed by Dithane Rainshield on 4%. Flint, Syllit, Nova, and Penncozeb were used on 3% of the acreage. Polyram, Manzate, Sovran, and Dithane were used on 2% of the acreage. Growers reported “excellent” and “good” control with these products. Other products were used on less than 1% of the acreage.

Pesticide applications were applied to 13% of apple acreage to manage **fire blight**. Growers (8%) used COCS on 7% of the acreage. AgriMycin, Kocide, and Basic Copper were used on 3% of the acreage. Growers reported “good” control with these products. Other products were used on less than 1% of the acreage.

**Phytophthora crown, collar, and root rot** were diseases managed by 9% of growers on 3% of the apple acreage. Growers (2%) used COCS on 1% of the acreage with “good” control. Other products were used on less than 1% of the acreage.

## **Weed Management**

One hundred and sixty-three growers (96%) reported using **mowing** to manage weeds.

Fifty-seven percent of the apple acreage received **post-emergence grass** herbicide applications. Roundup was applied to 49% of the acreage, followed by Glyphomax on 28%, Sinbar on 6%, Gramoxone on 3%, and Touchdown and Rely on 2%. Growers reported “excellent” control with these products. Other herbicides were used on less than 1% of the acreage.

**Post-emergence broadleaf weeds** were controlled with herbicide applications on 56% of the apple acreage. Roundup was applied to 40% of the acreage, followed by Gramoxone on 29%, Amine on 11%, Glyphomax on 5%, and Rely on 4%. Growers reported “excellent” control from these products. Other products were used on less than 1% of the acreage.

Thirty-seven percent of the apple acreage received **post-emergence woody weed** herbicide applications. Roundup was applied to 32% of the acreage, followed by Rely and Amine on 4%, Glyphomax on 3%. Growers reported “excellent” and “good” control with these products. Other products were used on less than 1% of the acreage.

**Pre-emergence Annual Grasses** herbicide applications were applied to 29% of the apple acreage. Princep was applied to 14% of the acreage, followed by Simazine on 9%, Surflan and Sinbar on 7%, Karmex and Solicam on 5%, Prowl on 3%, and Direx on 2%. Growers reported “good” control from these products.

Twenty-six percent of the apple acreage received **pre-emergence broadleaf weeds** herbicide applications. Princep was applied to 12% of the acreage, followed by Simazine on 8%, Sinbar on 7%, Direx on 4%, and Karmex and Casoron on 2%. Growers reported “good” control from these products.

## **Vertebrate Pest Management**

Eighty-seven percent of the apple acreage was treated for **voles** by 89% of growers. The most frequently used strategies included: frequent mowing (74% acres), broadcasting zinc phosphide oat or pellet baits (65%), herbicide tree row strips (54%), physical barriers (48%), removing drops from orchard floor (36%), bait station with zinc phosphide (14%), and broadcasting zinc phosphide bait (12%). Broadcasting anticoagulant bait was used on 6% of the acreage, bait station anticoagulant bait on 5%, and vole predator habitat enhancement was used on 4%. Growers reported “good” and “excellent” control with these practices. Other reported strategies include coyotes (3% acres) and cats (1% acres). These strategies were reported as “good” by growers.

**Deer** were managed on 48% of acres by 68% of growers. A well maintained eight foot metal wire fence was used on 19% of acres, followed by a 3+ wire electric fence used on 4% acres. Orchard resident dogs and other wire fences were used on 3% acres while a single wire fence was used on 2% of the acres. These practices were reported by growers as “excellent.” Other strategies used by nine growers included hunting and shooting (20% acres) and fourteen growers used soap (8% acres). These strategies were reported by growers as “good.”

**Other vertebrate pests** included turkeys, porcupines, woodchucks, squirrels, moose, and raccoons. Three growers reported “excellent” results with shooting turkeys, while another three

growers reported “poor” results using noise makers. Porcupines were shot by four growers with “good” results. Woodchucks were shot by two growers with mixed results. Woodchucks were also trapped by a grower while another used coyotes, hawks, and owls; both reported “excellent” results. Crows were hunted and shot by three growers with mixed results.

## **Information for Pest Management Decisions**

Ninety-two percent of the growers surveyed reported using **pest monitoring for pest management decisions**. Forty-one percent of growers relied on *field visits made for the purpose of pest observations, but not using a standard procedure and threshold*. Thirty-nine percent of growers used *sampling according to standard procedures or traps, and comparing observations to pest threshold*. Twenty-three percent used *pest forecasts, tracking models and equipment to determine need or adjust timing for sampling or control measures*. Eighteen percent of growers used *informal observations to influence decisions, but no special field visits for pest observations*.

For the growers who use sampling procedures, reported that the people **who collect the information** were 64% growers, 19% private IPM scout/consultant, 13% farm employee, and 4% other (University/Extension scout).

Factors there were “very important” in choosing a pesticide were **effectiveness** (69%), **toxicity** (64%), and **impacts on beneficials** (63%), **label restrictions** (59%), **customer relations** (56%), and **cost per treatment** (49%).

Growers were asked what weather forecasting information they used to help them in making pest management decisions. Growers “frequently” used **forecasts for next rain** (92%), **wind speed** (75%), **rainfall totals** (69%), **humidity and/or leaf wetness** (56%) and **temperature** (44%).

Growers ranked the following sources information as being “very important” in making their pest management decisions – **New England Pest Management Guide** (75%), **University/Extension staff** (64%), **newsletters** (63%), **off-season education meetings** (42%), **Twilight meetings** (36%), **web sites** (32%), **other growers** (32%), **suppliers/ dealers** (28%), **trade publications** (19%).

Of those growers who describe their crop production, 68% reported **IPM**, 32% **conventional** and 4% **organic**.

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