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NEW YORK STATE Integrated Pest Management PROGRAM

Cornell University Cooperative Extension

Elements of IPM for Apples in New York State

IPM Elements provide a basis for self-assessment of your apple IPM practices. **Practicing 80% of all the Apple IPM Elements qualify a crop as "IPM-grown" (excluding those not applicable (NA) to your orchard).** **Download the Worksheet for Apple Elements in Excel format.** **This page also includes: Major Pests of Apples and References**	
I. Site, Rootstock, Cultivars and Planting Systems	**Check if Done**
1. Select new orchard sites that have good air drainage or proximity to large bodies of water for frost protection.	
2. Site selection should consider non-point-source pollution from orchard-applied fertilizers and agrochemicals and how soil type, slope, watersheds, and groundwater relate to surface runoff, tile drainage, and persistence in and leaching through the soil profile.	
3. Whenever possible, avoid selecting sites near abandoned orchards where pests and diseases can be harbored.	
4. Remove abandoned orchards to reduce sources of pest infestations and disease inoculum in a manner that minimizes soils erosion.	
5. Do not plant new apple orchards immediately after old apple orchard removal. Practice crop rotation out of apples for at least one year, or plant a cover crop in the year before planting and incorporate into the soil to improve organic matter content, suppress replant disease, weeds, and, depending on cover crop species, reduce nematodes.	
6. New orchards should include size-controlling rootstocks to improve spray coverage and reduce amount of spray material applied per tree row volume.	
7. Select apple rootstocks that are adapted to local soil conditions and resistant to Phytophthora root and crown rot and fire blight. Plant disease resistant cultivars that have market-appeal, as soon as they are available.	
8. Plant single rows to promote light penetration, air circulation, optimal spray coverage, and rapid drying.	
9. Establish groundcover between rows quickly to prevent erosion and suppress weeds.	

II. Soil Management, Tree Nutrition and Irrigation	Check if Done
1. New orchard soils should have good tilth and fertility and adequate soil drainage should be provided to prevent root diseases and promote healthy root development.	
2. Before planting, chemically analyze new orchard soils and correct pH, phosphorus, and potassium.	
3. Chemically analyze soil and leaf tissue at appropriate regular intervals and add fertilizer, either to (1) maintain tree nutritional status or (2) correct a nutrient deficiency, based on the soil or leaf analysis results and Cornell Guidelines. Keep records.	
4. To maintain tree nutritional status, add fertilizer, based on soil and leaf analysis results, and do not exceed the yearly maximum amounts of 100 lb N/acre, 50 lb P2O5/acre, 150 lb K2O/acre, 50 lb MgO/acre and 4 lb B/acre.	
5. Apply all soil nitrogen in spring between bud break and 10 days after petal fall. Applications of more than 50 lb N/acre must be split into two or more applications, especially on soils with low cation exchange capacity.	
6. Balance nitrogen applications with tree growth to eliminate late summer and fall growth, to protect against the shoot blight phase of fire blight and winter injury.	
7. For irrigated orchards, use trickle or drip irrigation so that water quantity and placement minimizes disease development, optimizes water use, and minimizes erosion.	
III. Tree Training and Crop Management	
1. Prune annually during the dormant season to promote light penetration, air circulation, optimal spray coverage and rapid drying; chip and recycle prunings in orchard middles with flail mower or burn prunings where local regulations allow burning of brush.	
2. Whenever spray coverage and pest management suffers from dense canopies, summer prune densely foliated, vigorous trees in a manner that does not negatively impact fruit size or finish.	
3. Use appropriate fruit thinning to promote annual bearing and improve management of sooty blotch, fly speck, and obliquebanded leafroller.	
IV. Pest Monitoring, Forecasting, and Management	
1. Alternate hosts for apple insect and disease pests near commercial orchards should be removed as much as is feasibly possible and in a way that preserves the habitat of native wildlife and soil quality.	
2. Regularly monitor pests (weeds, insects, mites, diseases & vertebrates) and their damage to assess their levels. Use visual assessments, pheromone traps, sticky traps, etc.	
3. Keep records of all monitoring information, sampling dates, pest or damage levels, trap catches, thresholds used for each block, etc.	
4. Base pesticide treatments against pests on established thresholds, pest forecast models, weather conditions, established presence of the pest, and history of damage in the orchard or on fruit at harvest. Consult Cornell Guidelines.	

5. Keep records of pesticide applications, including: date, time, weather, operator, sprayer, field identification (farm, orchard, block, rows — as applicable), targeted pest, pesticide name and EPA number, formulation, REI, PHI, rate applied, and number of acres treated. Computer software, such as TracApple, can streamline record-keeping.	
6. Keep detailed records of tree row volume (TRV) calculations whenever pesticide sprays are applied on this basis.	
7. Use only pesticides registered in NewYork State and approved for the target pest and crop. Consult NYS current product registrations at PIMS.	
8. Among registered pesticides of comparable efficacy, base selection on the optimal combination of (1) being least toxic to humans, livestock, wildlife and the environment, (2) selectivity, having low toxicity to key natural enemies, (3) having shortest residual persistence in the environment, and (4) reasonable cost. A way to guide selection is to consider those with the lowest Environmental Impact Quotient EIQ (108k pdf file) value or to use the Natural Resources Conservation Service pesticide screening tool, WIN-PST software.	
9. Apply insecticides, miticides, fungicides, bactericides and herbicides in accordance with resistance management program guidelines when using pesticides at risk for pest resistance development.	
IV.A. Groundcover and Weed Management	
1. Manage groundcover in a manner to reduce soil erosion, nutrient runoff, and herbicide use.	
2. In the row middles, use close mowing to manage weeds.	
3. Eliminate broadleaf plants that harbor insect pests and virus diseases from sodded row middles by prudent use of selective, broadleaf herbicides.. .	
4. Maintain adequate weed suppression in the tree row in a strip <1/3rd the between row spacing or <1/4th in irrigated orchards.	
5. Base herbicide rates and selections on weed surveys. Keep records.	
6. Keep records of location and identity of difficult to manage weeds.	
IV.B. Insect and Mite Management Table of Specific Practices	
1. Arthropod monitoring methods and thresholds should conform to Cornell Cooperative Extension New York State IPM Program guidelines.	
2. Use pheromone traps and phenological developmental models to inform management decisions for problem insects as necessary, such as obliquebanded leafroller, codling moth, oriental fruit moth, plum curculio, spotted tentiform leafminer, San Jose scale, apple maggot, etc.	
3. When applicable, mating disruption is used as a management tactic.	
4. Release and conserve predatory insects or mites by using selective pesticide programs.	
5. Sample fruit at harvest from blocks to assess and record damage levels of direct-feeding pests and optimize future management programs.	
IV.C. Disease Management Table of Specific Practices	
1. Cultural practices for disease management, where practical, should include removal of overwintering inoculum, pruning and removing cankers, and weed and canopy management to promote air circulation and rapid drying.	

2. Disease management, monitoring methods and thresholds should conform to Cornell Cooperative Extension New York State IPM Program guidelines.	**Check if Done**
3. Use disease development and forecast models to inform management decisions for problem diseases as necessary, such as apple scab, fire blight, etc.	
4. Scout orchards for the shoot blight phase of fire blight. Prune out infections where practical and remove infected prunings and trees from the orchard.	
5. To preserve predatory mites, use EBDC fungicides (mancozeb, maneb, metiram, thiram and zineb) prior to bloom only or not at all.	
6. Sample fruit at harvest from blocks to assess and record disease levels and optimize future management programs.	
IV.D. Vertebrate Management Table of Specific Practices	
1. Use appropriate exclusion fencing (barrier, electric, invisible fencing with dogs), or exclusion netting, trunk guards, habitat manipulation, and orchard sanitation (eliminate dropped apples and brush) whenever possible.	
2. Reduce vole and rabbit populations with close and regular mowing of drive lanes, orchard middles, and surrounding fields to minimize available habitat and food sources. Eliminate unmowable areas within the orchard.	
3. Enhance natural predator populations (kestrels, owls, fox, etc.) by manipulating or providing habitat to assist with vertebrate management.	
4. Monitor for rodents to determine the need for rodenticides. When needed, apply rodenticides in bait stations, rather than broadcast treatments.	
5. Conduct vertebrate pest population reduction through shooting or trapping only as defined by New York State Department of Environmental Conservation regulations.	
V. Safe and Efficient Spray Application Methods	
1. Use drift-reducing sprayers (tunnel, sensor, tower) or sprayers modified to direct the air (towers, deflectors, angled fans, side baffle plate, air induction nozzles).	
2. Select nozzles that optimize droplet size and don't create too many fine droplets. Nozzles must point towards the target canopy.	
3. Use buffer zones near water, neighboring crops, properties and other sensitive locations.	
4. Spray only when wind, temperature and humidity conditions are suitable for spraying.	
5. Inspect, maintain, and calibrate crop and herbicide sprayers once per year, or more often if needed, to ensure mechanical reliability and accurate spray delivery. Keep records as described in the Orchard Spraying website.	
6 .Sprayers should only be operated by certified applicators, as defined by New York State Department of Environmental Conservation regulations, wearing appropriate personal protective equipment (PPE).	
7. Sprayer application records should include details of the sprayer such as nozzles fitted, pressure, forward speed and application rate.	
8. Thoroughly clean sprayers after use or between different product applications.	

VI. Harvest and Fruit Storage	Check if Done
1. Bins of harvested fruit should not be left in the orchard overnight.	
2. Remove any soil and sod stuck to bin runners prior to stacking bins of fruit.	
3. Use a sanitation system to kill bacteria, yeasts, and fungal spores in water flumes.	
4. As bins are emptied on the packing line, any decayed fruit left inside the bins are removed and trashed.	
5. Remove empty bins from the packing area as soon as possible to prevent their contamination with airborne spores.	
6. Remove culled fruit and other debris from the packing area and from the packing house floors daily.	
VII. Post Harvest Treatments	
1. Use postharvest drench treatments only when such treatments are essential for controlling superficial scald or carbon dioxide injury.	
2. Whenever possible, apply calcium treatments as field sprays rather than as postharvest treatments.	
3. Fit drencher reservoir tanks with appropriate agitation systems to keep postharvest treatment chemicals in suspension and regularly change solutions as per the chemical label.	
4. Remove all solid residues from the bottom of the drencher reservoir tank before the tank is refilled.	
VIII. Education of Growers and Employees	
1. Attend two or more regional or national tree fruit meetings or conferences.	
2. Maintain membership in an appropriate grower association and in a local county Cornell Cooperative Extension Association.	
3. Have access to the current year's copy of the Cornell Pest Management Guidelines for Commercial Tree-Fruit Production.	
4. Participate in an IPM extension/research project.	

MAJOR PESTS OF APPLE		
Insects	**Diseases**	**Weeds**
American plum borer	Apple rusts	Annual broadleaves
Apple aphid	Apple scab	Annual grasses
Apple maggot	Bitter rot	Nutsedge
Apple rust mite	Black rot	Perennial broadleaves
Codling moth	Blister spot	Perennial grasses
Comstock mealybug	Blossom end rot	Woody perennials
Cutworm	Crown & collar rot, Phytophthora	
Dogwood borer	Fire blight	
European apple sawfly	Nematodes	
European corn borer	Powdery mildew	
European red mite	Sooty blotch & flyspeck	
Green fruitworms	Senescent breakdown	
Internal lepidopterans	Storage rots	
Lesser appleworm	White rot	
Mullein plant bug		
Oriental fruit moth		
Oystershell scale		
Plum curculio		
Potato leafhopper		
Rosy apple aphid		
San Jose scale		
Sparganothis fruitworm		
Spirea aphid		
Spotted tentiform leafminer		
Tarnished plant bug		
Two spotted spider mite		
Variegated leafroller		
White apple leafhopper		
Woolly apple aphid		

TO LEARN MORE...

Apple IPM — A Guide for Sampling and Managing Major Apple Pests in New York State. 1999. A. Agnello, J. Kovach, J. Nyrop, H. Reissig, D. Rosenberger, and W. Wilcox. New York State Integrated Pest Management Program, Number 207, Cornell University, Ithaca.

Cornell Pest Management Guidelines for Commercial Tree-Fruit Production. A. Agnello, A. Landers, W. Turechek, D. Rosenberger, T. Robinson, J Schupp, J. Carroll, L. Cheng, P. Curtis, D. Breth, and S. Hoying. Cornell Cooperative Extension, Cornell University, Ithaca.

A Method to Measure the Environmental Impact of Pesticides. 1992. New York Food and Life Sciences Bulletin Number 139, Cornell University, Geneva

IPM Fact Sheets for Tree Fruit

The above reference material can be obtained from county Cornell Cooperative Extension offices or by contacting The Resource Center, Cornell University, PO Box 3884, Ithaca, NY 14852-3884, 607-255-2080; email resctr@cornell.edu

Cornell Fruit Resources - Fruit Trees

Tree Fruit and Berry Pathology - Pome Fruit

Natural Resources Conservation Service pesticide screening tool WIN-PST software

New York State Current Product Registrations at PIMS

Trac Software

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Elements of IPM for Apples in New York State: Cover Crops and Rotational Crops Useful in Orchard Site Preparation

Information on Apple IPM Practices for Specific Pests				
Cover or Rotation Crop	**Organic Matter**	**Nematode Suppression**	**Weed Suppression**	**Areas of Concern**
Sudan grass	Yes	Yes	Yes	When mature, tough to plow down.
Buckwheat	Yes	No	Yes	Mow or plow down before seed production.
Oilseed rape & other mustards	Yes	Only if tilled under green	Yes	Only certain varieties suppress nematodes and/or other pathogens.
Winter rye	Yes	No	Yes	Plow down or kill before it seeds.
Turfgrass	Yes	No	Yes	Preplant establishment can be useful.
Clovers, vetches, other legumes	Yes	No	Yes	Good for green manure N source, plow down before it produces seeds.
Corn	No	No	Yes	Herbicide carryover could injure trees.

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Elements of IPM for Apples in New York State: Insect & Mite Forecasting and Monitoring

Information on Apple IPM Practices for Specific Pests		
Pest	**Activity**	**Suggested Action Threshold**
Apple Maggot (AM)	Volatile-baited sphere traps used to determine need for sprays. Monitoring AM is warranted primarily in orchard blocks without a reliable history of either very light or very heavy AM pressure, or where the likelihood of economic infestation is variable from year to year. In such blocks, monitoring the edge adjacent to the most likely source of immigrating flies is recommended. Place 2 to 3 baited red sticky spheres in each block to be monitored (about 10 to 15 acres in size). Traps have a short range of 10 to 15 meters and AM is unevenly distributed among orchards. Apply an appropriate insecticide within 2 days when an average of 5 flies per trap are exceeded. Resume checking traps 10-14 days after insecticide application.	Avg. 5 adults / trap. Apple Maggot Monitoring Form 189k pdf file
Codling Moth (CM)	Pheromone traps used to monitor 1st generation flight. Biofix reached on date of first sustained trap catch. Daily max and min temperatures are monitored from biofix date forward and the 50°F DD model is used to time sprays for 1st and 2nd generations. Weather data and DD calculations are available from NYS IPM NEWA.	1st gen: 250 to 360 DD base 50°F after 1st catch biofix. 2nd gen: 1260 to 1370 DD.
European Red Mite (ERM)	Monitor for and maintain knowledge of predatory mite populations and past history of ERM. Spurs examined for overwintered eggs. In summer, from mid June to mid August, leaves sampled for motiles. Record the number of motiles per leaf.	Overwinter: 10% spurs with eggs. Summer: 2.5 to 7.5 motiles / leaf. June 1—30: 2.5 Mites/ Leaf 276k pdf file July 1—31: 5.0 Mites/ Leaf 292k pdf file August 1—15: 7.5 Mites/ Leaf 304k pdf file

Green Apple Aphids (GAA)	Terminals inspected for infestations and predators during the growing season. Record the percent infested terminals and the percent of infested terminals with aphid predators.	30 to 40% infested, or 50% infested and <20% with predators.
Mullein Plant Bug	Flower-bearing shoots tapped over beating tray for nymphs.	10 nymphs / 40 limbs.
Obliquebanded Leafroller (OBLR)	Pheromone traps used to monitor 1st summer generation flight. Biofix reached on date of first sustained trap catch. Daily max and min temperatures are monitored from biofix date forward and the 43°F DD model used to time sprays. OBLR sprays for summer brood can be based on past history of fruit damage. In low-risk blockswith no prior history of OBLR damage, inspect fruit clusters or expanding terminals for 3rd instar larvae approximately 600 DD base 43°F after biofix. Record the percent of clusters infested with live larvae. In high-risk blockswith past history of OBLR damage, time sprays for egg hatch at 360 DD base 43°F after biofix date. Weather data and DD calculations are available from NYS IPM NEWA.	Low risk blocks: 3% infested. OBLR 3% Sampling Form. 192k pdf file High risk blocks: 360 DD base 43°F after 1st catch biofix.
Oriental Fruit Moth	Pheromone traps used to monitor 1st generation flight. Biofix reached on date of first sustained trap catch. Daily max and min temperatures are monitored from biofix date forward and the 45°F DD model used to time sprays for the 1st and 2nd generations. Routinely monitor traps for moths and orchards for damage (OFM 45°F DD model in research-mode). Weather data and DD calculations are available from NYS IPM NEWA.	1st gen: 350 to 375 DD base 45°F after first catch biofix. 2nd gen: 1450 to 1500 DD.
Plum Curculio	Classify blocks for plum curculio (PC) risk based on past history of fruit infestation. In low-risk blocks, apply a single spray at petal fall. In high-risk blocks, protect fruit at petal fall and apply subsequent sprays to maintain protection until 340 DD base 50°F after the petal fall date.50°F degree day model used to terminate sprays. Weather data and DD calculations are available from NYS IPM NEWA.	Stop sprays 340DD, base 50°F, after petal fall date.
Rosy Apple Aphid	Fruit clusters examined at pink for RAA nymphs.	1% infested clusters.
San Jose Scale	Daily max and min temperatures are monitored from March 1 forward and the 50°F DD model used to time monitoring or sprays against crawlers. Monitor with sticky tape around limb. Weather data and DD calculations are available from NYS IPM NEWA.	1st gen: 500 DD base 50°F after March 1. 2nd gen: 1451 DD. 1-2 crawlers / trap.

Spotted Tentiform Leafminer	For 1st generation, examine fruit cluster leaves for eggs or sap-feeding larvae. For 2nd generation, starting in July, examine mature terminal leaves for sap-feeding larvae. Alternatively, start sampling for 2nd generation based on 43°F DD model. Use pheromone traps to monitor 2nd generation flight. Biofix reached on date of first sustained trap catch. Daily max and min temperatures are monitored from biofix date forward and the 43°F DD model used to time start of 2nd gen sampling.	1st gen: 2 eggs per leaf, or1 mine per leaf. STLM Pink Sampling Form 179k pdf file STLM Petal Fall Sampling Form 192k pdf file 2nd gen: 2 mines per leaf. STLM Summer Sampling Form 266k pdf file Start sampling 690 DDbase 43°F.
White Apple Leafhopper	Fruit cluster or terminal leaves inspected for nymphs. (also rose leafhopper)	1 nymph per leaf.

DD — degree days

Consult Cornell Pest Management Guidelines for Commercial Tree-Fruit Production for further information.

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Elements of IPM for Apples in New York State: Disease Forecasting and Monitoring

Information on Apple IPM Practices for Specific Pests	
Disease	**Activity**
Apple scab	Give special attention to protecting trees from the first significant infection period. Time sprays based on modified Mills table & weather, rain forecasts, tree phenology and ascospore maturity (squash mounts or the 32°F DD model). Time subsequent sprays ahead of rains to control primary scab until 2 wks after petal fall. Weather data and DD calculations are available from NYS IPM NEWA. Record spray dates and infection periods. Scout regularly for primary scab, base further sprays on scouting results. Conduct PAD counts, if below threshold consider a delayed spray program. To reduce over-wintering inoculum, flail mow &/or treat with urea to degrade leaf litter.
Powdery mildew	Time mildewcide* at tight cluster if history of powdery mildew, highly-susceptible varieties, mild winters &/or flag shoots. Only apply sprays targeted specifically for powdery mildew from tight cluster until the cessation of terminal growth. Strobilurin fungicides preferred for prebloom sprays. Scout susceptible varieties routinely to monitor spread and the need for treatment. Record the date of cessation of terminal growth.
Fire blight	Apply copper at green tip if history of fire blight &/or highly susceptible varieties. Time streptomycin sprays for the blossom blight phase of fire blight using MARYBLYT©, Cougar Blight, or CCE or advisor alerts. Weather data are available from NYS IPM NEWA. Scout after bloom and prune out infected shoots. After bloom, streptomycin is only applied after a summer hailstorm and only in orchards where fire blight is present or is present in nearby blocks. Choose fire blight resistant varieties and rootstocks as soon as available.
Apple rusts	If history of apple rust, time sprays to cover infection events from pink until 2 to 3 wks after petal fall. If practical and where disease pressure is high, remove nearby Juniperus spp. (red cedars, junipers) alternate hosts.
Sooty blotch and flyspeck	These diseases develop gradually during periods of high humidity. Prune, train, and thin to open tree canopy and fruit clusters. Where feasible, remove wild Rubus spp. (blackberry, raspberry) alternate hosts from orchard perimeters. Begin sprays after 300 hr of accumulated leaf wetting counted from petal fall. Maintain coverage to within 30 days of harvest whenever disease pressure is high and weather is humid, rainy and cloudy.

Frog-eye leaf spot Black rot on fruit	Most scab sprays are effective against frog-eye leaf spot. For black rot on fruit and when disease pressure is high, apply effective fungicides during the 2-6 wk period after petal fall and during the preharvest ripening period, especially in wet years. Fungicides are ineffective on canker phase of disease; prune out cankers to minimize spread of the disease to leaves, fruit and shoots.
White rot	Like black rot, critical periods for preventing white rot fruit infections are the 2-6 wk period after petal fall and the preharvest ripening period.
Phytophthora root rot	Establish orchards on well-drained sites and on resistant rootstocks. Avoid moderately to highly susceptible rootstocks (e.g. MM.106). In very wet years &/or in high risk orchards, scout in summer when trees are stressed and treat symptomatic trees.
Bitter rot	Scout for infection mid to late summer, especially following unusually hot, wet weather. If infections are found and wet, warm weather is forecast, apply captan at highest labeled rate before rain.
Storage decays	Sanitize field bins, storage rooms, and packinghouses at the end of each storage season. With good sanitation, no postharvest fungicide needed after harvest if fruit is kept dry. If fruit wetted in recycling solutions of DPA, an effective fungicide should be included in the solution. On the packing line, water flumes should be chlorinated to prevent dissemination of spores.

* Apple scab resistance to DMI fungicides such as Nova, Procure, or Rubigan, applied for powdery mildew, is known to occur in New York. Therefore, it may be necessary to tank mix a fungicide with a different mode of action for control of apple scab, particularly during critical timings such as tight cluster and pink.

DD — degree days

Consult Cornell Pest Management Guidelines for Commercial Tree-Fruit Production for further information.

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Elements of IPM for Apples in New York State: Vertebrate Damage Mitigation Practices

Information on Apple IPM Practices for Specific Pests	
Animal Pest	**Preferred Practices Under IFP**
Beaver	Wire trunk guards, exclusion drift fencing
Birds	Netting; visual scare device (eye-spot balloons, silhouettes, reflective tape); auditory frightening device (recorded alarm calls, pyrotectics, propane cannon).
Rabbits	Exclusion fencing (individual wire guards or 2 ft. (60 cm) high area exclusion fencing); habitat manipulations including removal of brush piles & protective cover within orchards.
Raccoons	Electrified exclusion fencing.
Voles	Wire trunk guards; close mowing of orchard middles; vegetation reductions (<40% ground cover) under trees; removal of dropped apples and prunings; habitat manipulations including elimination of unmowable areas within orchards; monitor to determine the need for rodenticides.
White-Tailed Deer	Exclusion fencing (8 ft. (244 cm) high-tensile woven wire or 5 to 6 ft. (152 to 183 cm) electric exclusion fencing; peanut-butter baited electric fences; invisible fencing with dogs); habitat manipulation including elimination of protective cover within orchards.
Woodchucks	Exclusion fencing (individual wire guards or electrified exclusion fencing); habitat manipulation including removal of brush piles within orchards.
Animal Pest	Practices where Restrictions and Caution Apply*
Beaver	Population reduction through trapping by licensed trapper or licensed nuisance wildlife control agent.
Birds	Population reduction through shooting by licensed hunter of permitted species in appropriate season (crows, turkeys); or unprotected species (European starlings, English sparrows, pigeons).
Rabbits	Population reduction through shooting by licensed hunters or landowners in appropriate seasons; through trapping by landowner or by licensed nuisance wildlife control agent.
Raccoons	Population reduction through shooting by licensed hunters or landowners in appropriate seasons; through trapping by landowner, by licensed trapper, or by licensed nuisance wildlife control agent.
Voles	Population control through trapping by landowner.

White-Tailed Deer	Population reduction through shooting by licensed hunters, landowners or their agents with nuisance deer permits.
Woodchucks	Population reduction through shooting by licensed hunters or landowners; through trapping by landowner or by licensed nuisance wildlife control agent.

* Conduct shooting and trapping only as defined by New York State Department of Environmental Conservation regulations. Shooting for nuisance wildlife control is allowed only when neighboring occupied buildings are >500 ft. distant; shooting when neighboring buildings are less than 500 ft. distant requires neighbor permission. Also check local ordinances, as shooting and trapping are prohibited in some areas.

Consult Cornell Pest Management Guidelines for Commercial Tree-Fruit Production for further information.