

# Core Eco Protocol

*Must also complete eco supplements for apple or stone fruit*

Deadlines for record submission

*Eco Stone Fruit: July 10, 2020*

*Eco Apple: July 24, 2020*

**2020 growing season v. 2.8 – 03/11/2020**

*See page 26 for list of revisions to this edition.*

**Changes to the 2020 protocols are highlighted in yellow**

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## Red Tomato Eco Programs

In partnership with farmers, scientists and other agricultural professionals, Red Tomato has developed this protocol to achieve measurable reductions in the use of high-toxicity pesticides. Through our work, we hope to contribute to a bountiful supply of quality, local foods with minimal pesticide residues, and to improve our soil and water resources, wildlife biodiversity, farmworker safety, farm stability and farmland preservation in the Northeastern USA.

Our protocol is based on a reduced-risk program developed by researchers, consultants and growers, and generally follows guidelines for Integrated Production by the International Organization for Biological and Integrated Control of Noxious Animals and Plants (IOBC).

Practices contained in this protocol are considerably more expensive than conventional programs that rely on highly toxic pesticides. Our project works to incorporate economic incentives for farmers to adopt reduced-risk methods. We recognize that reducing toxicity is an ongoing process. Our goal is to improve continuously as we learn more about reduced-risk alternatives and what it takes to implement them *and* grow high-quality apples.

Red Tomato is a nonprofit organization that helps family farmers survive and thrive by connecting them to customers who want high-quality produce, by developing new markets and managing all the logistics and promotion needed to ensure success in a supermarket environment and educating trade buyers and consumers to appreciate and seek out products that are ecologically grown by family farmers.

## Roles and Procedures

**Red Tomato** is the lead organization responsible for market approach and overseeing use of Red Tomato trademarks. Red Tomato also maintains ownership of the certification protocol. Decisions on program procedures and market approach will be made in concert with researchers, crop consultants, growers and others. Annually, Red Tomato and its partners will review and evaluate the *Core Eco Protocol* and project and make adjustments where needed to continue to achieve our goals.

**The IPM Institute of North America**, an independent non-profit organization, is responsible for maintenance of certification standards making final decisions on standards and approval of certification status to determine eligibility for use of Red Tomato trademarks. The Institute will coordinate inspection by third-party IPM professionals, review materials submitted by growers and inspectors, and make final determination on certification approvals.

**Third-party auditors or the IPM Institute** will contract directly with growers to provide an on-site inspection. This inspection verifies compliance with the standard and has a special emphasis on evaluating compliance to criteria that are not measurable through documentation and records submitted to the IPM Institute. The on-site audit will still include a review of these items as per auditing guidelines.

**Participating growers** will be evaluated based on practices implemented which meet the *Core Eco Protocol*. A current version of the *Core Eco Protocol*, crop supplements and Quick Guide is always available at [ipminstitute.org/ecoapple.htm](http://ipminstitute.org/ecoapple.htm).

To apply for and maintain certification; the following steps will be followed:

1. Complete this *Core Eco Protocol* and Eco crop supplement (apples or stone fruits). Growers certifying multiple crops only need to complete the *Core Eco Protocol* once. Submit completed assessments to the IPM Institute with required:
  - a. Scouting records, trap counts and weather data. Scouting records must include date, block(s), pest and result, e.g., captures per trap, mites per leaf, etc.
  - b. Pesticide, fertilizer, thinner and plant-growth regulator application records to the IPM Institute. Application records must be submitted electronically and include at least the date and time application started and ended, crop, block(s), acreage, trade name and formulation of material applied (with EPA registration number, active ingredient, target pest for pesticides and duration of Restricted-Entry Interval), rate per acre (oz., gal. or lb./acre), application method, air temperature, average wind speed and direction during application. Record keeping can be improved by using an electronic record-keeping spreadsheet, such as those offered by Penn State ([Penn State Spray Record-Keeping Spreadsheet](#)) or Cornell University ([TracApple](#)).
2. If these are not received by the posted date, the IPM Institute will assess late fees for each week certification materials are late. Note: The IPM Institute of North America maintains confidentiality of all grower records which include, but are not limited to: *Core Eco Protocol*, crop supplements, pest-monitoring records, weather data, and pesticide, fertilizer, thinner and plant-growth regulator application records.
3. The Institute will appoint an inspector during the first year of certification and every third year thereafter. The inspector will verify the information provided during an on-site audit and will be scheduled prior to marketing of certified fruit. Growers will be invoiced by the IPM Institute for the on-site audit and is separate from the annual fee paid for certification.

### **Provisions for emergencies**

Contact the IPM Institute immediately at the earliest indication that an emergency is developing that cannot be managed without violating the certification standards. The IPM Institute will investigate the concern and if necessary, consult with scientific advisors to aid in assessment of the problem and determine if an exception to the protocol is justified.

Participants may expect the following support from the IPM Institute and project advisors regarding handling requests in emergency situations:

1. IPM Institute will confirm receipt of requests for protocol exceptions within one business day.
2. A response to the request with proposed options and resolution will be completed within one to three business days. This time is needed to allow the IPM Institute to contact scientists and project advisors and investigate appropriate solutions.
3. Requests for a protocol exception after a violation has occurred will not be considered.

## Removal of blocks from Eco Programs

All blocks enrolled in Red Tomato Eco Programs should be listed on the Field/Block List on page six and seven of the *Core Eco Protocol*. These should be submitted with certification materials on the due date listed for the crop. This information is used during desk and on-farm audits and only certified blocks will be listed on eco certificates.

If a situation arises that requires a block to be removed from the program and occurs after certification materials have been submitted, please contact the IPM Institute and Red Tomato immediately and provide the following information:

1. The block name, variety and acreage being removed from the program.
2. The reason for removal from the program, e.g., crop loss due to weather, poor crop quality, application of prohibited pesticide.
3. If the reason for block removal was due to an application of a prohibited pesticide or violation of the pesticide-use restrictions, please provide the product trade name, active ingredient and formulation, application rate, variety and acres treated.

What you can expect from IPM Institute and Red Tomato:

1. The IPM Institute will follow up to confirm blocks that should be removed and discuss and address any questions or concerns relating to the block removal.
2. The IPM Institute will issue an updated certificate to the grower and Red Tomato.
3. Red Tomato will follow up with any questions and guidance relating to the use of Red Tomato eco trademarks and confirm/determine if any fruit from the removed block has entered the supply chain.

## Core Eco Protocol Cover Sheet

Grower name: \_\_\_\_\_

Business name: \_\_\_\_\_

Physical address: \_\_\_\_\_

Phone: ( ) \_\_\_\_\_ Fax: ( ) \_\_\_\_\_

Cell phone: ( ) \_\_\_\_\_

Email address: \_\_\_\_\_

Website: \_\_\_\_\_

**Field/Block List.** Print additional pages if enrolling more than twelve fields or blocks. List blocks covered by the *Core Eco Protocol* below. Blocks with the same management practices (that will earn same scores throughout this assessment) can be grouped together as one block. Attach additional pages if needed to list all blocks. **Important:** If differences in the way individual blocks are managed impacts a response on this Core protocol, they should be listed as separate blocks. For example, if apple maggot is controlled by trapping in only one block, list and score that block as a separate block.

1. Crop: \_\_\_\_\_ Block name(s): \_\_\_\_\_

cultivar(s): \_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_

2. Crop: \_\_\_\_\_ Block name(s): \_\_\_\_\_

cultivar(s): \_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_

3. Crop: \_\_\_\_\_ Block name(s): \_\_\_\_\_

cultivar(s): \_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_

4. Crop: \_\_\_\_\_ Block name (s): \_\_\_\_\_

cultivars: \_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_

**Field Block List**

5. Crop: \_\_\_\_\_ Block name(s): \_\_\_\_\_

cultivar(s): \_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_

6. Crop: \_\_\_\_\_ Block name(s): \_\_\_\_\_

cultivar(s): \_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_

7. Crop: \_\_\_\_\_ Block name(s): \_\_\_\_\_

cultivar(s): \_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_

8. Crop: \_\_\_\_\_ Block name (s): \_\_\_\_\_

cultivars: \_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_

9. Crop: \_\_\_\_\_ Block name(s): \_\_\_\_\_

cultivar(s): \_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_

10. Crop: \_\_\_\_\_ Block name (s): \_\_\_\_\_

cultivars: \_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_

11. Crop: \_\_\_\_\_ Block name (s): \_\_\_\_\_

cultivars: \_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_

12. Crop: \_\_\_\_\_ Block name (s): \_\_\_\_\_

cultivars: \_\_\_\_\_

acres and estimated annual production (bu.): \_\_\_\_\_

## Core Eco Protocol

<b>1. Operations and Management</b>	
Audit guidance: Grower can describe how their organizational structure, record keeping, communication practices, and continuous-improvement efforts facilitate successful Eco Fruit production.	
<b>A. Minimum Requirements</b>	<b>Pass, Fail or N/A</b>
1. Please select all of the following audits or inspections that occurred on your farm from third parties, the state or federal government: a) Good Agricultural Practices (GAP) b) Food Safety (non-GAP) c) Worker Housing d) Occupational Safety and Health Administration (OSHA) e) Worker Protection Standard (WPS) f) Other(s) (Please list):	
2. Are all applicable local, state and national laws, codes and regulations met which govern all aspects of applications of pesticides, nutrients, amendments, irrigation and other inputs? <sup>S</sup>	
3. Pesticides no longer used or no longer registered for use are returned to dealer or disposed of at the next collection. While in storage, obsolete pesticides are clearly marked and separated from pesticides in current use. <sup>S</sup>	
4. Grower has attended one or more educational meetings within the last year. <sup>D</sup> List meetings:	
5. Application records include at least the date and time application started and ended, crop, block(s), acreage, trade name and formulation of material applied (with EPA registration number, active ingredient, target pest for pesticides and duration of Restricted-Entry Interval), rate per acre, application method, air temperature, wind speed and direction. <sup>D</sup>	
6. Grower belongs to state and/or regional grower organization(s), in addition to participation in Red Tomato programs. <sup>D</sup> List organizations:	

<b>B. Advanced Practices</b>	<b>Points eligible</b>	<b>Points earned</b>
1. Pesticide costs per acre are documented for all applications. <sup>D</sup>	1	
2. Workers handling or applying pesticides receive an annual medical examination or physical to ensure fitness for job duties. <sup>S</sup>  Note: Acceptable documentation includes a list of workers who participated in a medical exam. Workers and physicians must sign off documenting the exam occurred. Individual exam records do not need to be kept on file or shared in accordance with HIPAA privacy rules.	2	
3. Grower has hosted a field day or other production-related educational meeting within the last three years. <sup>D</sup> List date and name/description of event(s):	3	
4. Grower has conducted on-farm research using control (untreated) trees for comparison within the last three years. Describe each experiment, its purpose and dates. <sup>D</sup> Attach additional pages if necessary:	4	
5. Orchard is represented on 50% or more of the monthly Eco Apple conference calls.	1	
<b>Operations and Management: Total points eligible</b>	11	
<b>Total points earned</b>		

Superscripts indicate practice-verification process. Reference the following throughout entire document:

<sup>D</sup> Verified during desk audit via submitted paperwork

<sup>S</sup> Verified during site audit

## 2. Ecosystem, Soil and Water Conservation

**Audit guidance:** The grower can explain their rationale for implementing practices which maintain and improve soil health, monitor/regulate irrigation, monitor tree health, and minimize or mitigate soil erosion, by describing the observed benefits, and how the practice is implemented and maintained.

A. Minimum Requirements			Pass, Fail or N/A
<p>1. Results from soil and/or foliar analyses are used to calculate nutrient application rates, minimize excess nutrient use and limit potential for nutrient pollution. Timing of any applications is consistent with available Extension or University guidelines. <sup>S</sup></p> <p>Note: Soil testing results are available for inspection and is completed at least once every three years and includes soil organic matter, pH, nitrogen, phosphorous, potassium, calcium and magnesium.</p>			
<p>2. Visibly eroded areas are not present and corrected in a timely manner, if they occur. Please select all erosion mitigation strategies that are implemented: <sup>S</sup></p> <p>A. Culvert(s)            B. Water diversion            C. Retention pond(s)            D. Other(s) (Please list):</p> <p>Note: Applicable to all enrolled acres, including adjoining roads and farmstead.</p>			
<p>3. A vegetated buffer separates surface water from edge of crop by at least 50 feet. <sup>S</sup></p>			
<p>4. Pesticide mixing is at least 120 feet from well heads. <sup>S</sup></p> <p>Note: Some states may require pesticide mixing to be further than 120 feet from well heads.</p>			
B. Advanced Practices	Points eligible	Points earned (all blocks)	Blocks not scored
<p>Note: Please list block ID, for any blocks not earning points.</p>			
<p>1. No irrigation is used. <sup>S</sup></p> <p>Note: If earning this point, skip to question 9 below. Do not enter points for questions 2-8.</p>	1		
<p>2. If irrigation is used, drip or trickle is installed to ensure adequate water supply and minimize water use and foliage wetness. <sup>S</sup></p>	1		
<p>3. If irrigation is used, automated shutoff devices are used. <sup>S</sup></p>	1		
<p>4. If overhead irrigation is used, applications are timed to minimize risk of spreading plant pathogens. <sup>S</sup></p> <p>Note: Overhead irrigation may be used for frost protection.</p>	1		

<b>B. Advanced Practices (continued)</b> <b>Note: Please list block ID, for any blocks not earning points.</b>	<b>Points eligible</b>	<b>Points earned</b>	<b>Blocks not scored</b>
5. Irrigation is determined by crop need, using systematic and science-based measures, e.g., monitoring soil moisture and visual assessment of plant stress. <sup>S</sup>  <b>Note: Monitoring data are available for inspection, e.g., weather station data, NEWA data, documented precipitation events.</b>  <b>Note: Grower can describe the decision-making processes for determining when and where irrigation is necessary.</b>	1		
6. Rainwater or snowmelt is captured through retention ponds or keylines for irrigation. <sup>S</sup>	1		
7. Irrigation use efficiency is calculated. <sup>S</sup>	2		
8. Tile drainage is installed and maintained in poorly drained soils, or trees are not planted in poorly drained soils. <sup>S</sup>	2		
9. A water conservation plan is in place which addresses water uses for irrigation, washing and cooling. The plan should also outline staff training on minimizing water use in farm activities and practices and/or uses of technology to increase use efficiency. <sup>S</sup>  <b>Note: Water conservation plan is available for site auditor to review.</b>	3		
10. Rows are planted along contours on slopes with high risk for erosion, e.g., slopes greater than 10% or hydrologic soil classes with high-erosion potential. <sup>S</sup>	1		
11. <b>On non-paved roads where erosion occurs, water bars are installed to reduce erosion.</b> <sup>S</sup>  <b>Note: Grower can describe how often water bars are maintained and where they are located.</b>	1		
12. On sites at risk of wind-eroded soil, windbreaks are installed and maintained. <sup>S</sup>	1		
13. An NRCS IPM Conservation Activity Plan (activity code 114 or 154) for the farm has been developed or implemented (activity code 595), to identify and reduce environmental and human health risks, and improve crop yield and quality. <sup>S</sup>  Note: Additional information is available online from NRCS, <a href="https://nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/eqip/?cid=nrcseprd1354058">nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/eqip/?cid=nrcseprd1354058</a>	3		

<b>B. Advanced Practices (continued)</b> <b>Note: Please list block ID, for any blocks not earning points.</b>	<b>Points eligible</b>	<b>Points earned</b>	<b>Blocks not scored</b>										
<p>14. Soil health is quantitatively assessed once every five years or before orchard renovation using at least five of the following: <sup>S</sup></p> <table border="0"> <tr> <td>Aggregate stability <sup>1,2</sup></td> <td>Micronutrients <sup>1</sup></td> </tr> <tr> <td>Available water capacity <sup>1</sup></td> <td>Soil compaction <sup>1,2</sup></td> </tr> <tr> <td>Bulk density <sup>2</sup></td> <td>Soil food web <sup>3</sup></td> </tr> <tr> <td>Earthworm count <sup>2</sup></td> <td>Soil nitrates <sup>2</sup></td> </tr> <tr> <td>Infiltration rate <sup>2</sup></td> <td></td> </tr> </table> <p><sup>1</sup> The USDA-NRCS Soil Quality Test Kit Guide describes procedures and an interpretive section for each test, <a href="https://nrcs.usda.gov/wps/portal/nrcs/detail/soils/health/assessment/?cid=nrcs142p2_053873">nrcs.usda.gov/wps/portal/nrcs/detail/soils/health/assessment/?cid=nrcs142p2_053873</a>.</p> <p><sup>2</sup> Available with the Cornell Comprehensive Assessment of Soil Health - Standard Soil Health Analysis Package, <a href="https://soilhealth.cals.cornell.edu/testing-services/comprehensive-soil-health-assessment/">soilhealth.cals.cornell.edu/testing-services/comprehensive-soil-health-assessment/</a>.</p> <p><sup>3</sup> Testing available at Harrington's Organic Land Care, <a href="http://harringtonsorganic.com/organic-land-care-services-hartford-county-connecticut/soil-testing/#lightbox/1/">http://harringtonsorganic.com/organic-land-care-services-hartford-county-connecticut/soil-testing/#lightbox/1/</a>.</p> <p><b>Note: Test results are available for review during site audit.</b></p>	Aggregate stability <sup>1,2</sup>	Micronutrients <sup>1</sup>	Available water capacity <sup>1</sup>	Soil compaction <sup>1,2</sup>	Bulk density <sup>2</sup>	Soil food web <sup>3</sup>	Earthworm count <sup>2</sup>	Soil nitrates <sup>2</sup>	Infiltration rate <sup>2</sup>		2		
Aggregate stability <sup>1,2</sup>	Micronutrients <sup>1</sup>												
Available water capacity <sup>1</sup>	Soil compaction <sup>1,2</sup>												
Bulk density <sup>2</sup>	Soil food web <sup>3</sup>												
Earthworm count <sup>2</sup>	Soil nitrates <sup>2</sup>												
Infiltration rate <sup>2</sup>													
<b>Ecosystem, Soil and Water Conservation: Total points eligible</b>	<b>21</b>												
<b>Total points earned</b>													

Superscripts indicate practice-verification process. Reference the following throughout entire document:

<sup>D</sup> Verified during desk audit via submitted paperwork

<sup>S</sup> Verified during site audit

**Note:** List the block ID for any instances where the scored advanced practice does not apply to the site. Total points for each block may be reflected in the final score card on page 23.

### 3. Pesticide-Risk Reduction

Audit guidance: The grower can explain potential sources of pesticide risk on the farm and how non-chemical practices, cultural/horticultural practices, pest-management decisions and pesticide-application methods are implemented and maintained to minimize pesticide risk.

A. Minimum Requirements	Pass, Fail or N/A
<p>1. Plant and tree canopies are maintained to allow penetration of light, air and spray material using pruning or plant growth regulators, e.g., Apogee (prohexadione calcium).<sup>S</sup></p>	
<p>2. Pesticide and nutrient application equipment is calibrated at least annually. Records are maintained and include name of person completing calibration, date of calibration, equipment description and procedures, results and adjustments from calibration.<sup>D</sup></p> <p>Calibration for airblast sprayer:  <a href="http://extension.psu.edu/sprayer-calibration-information">extension.psu.edu/sprayer-calibration-information</a>  <a href="http://sprayers101.com/airblast-output">sprayers101.com/airblast-output</a>  <a href="http://sprayers101.com/how-to-calibrate-an-airblast-sprayer-operator">sprayers101.com/how-to-calibrate-an-airblast-sprayer-operator</a></p> <p>Calibration for boom sprayer:  <a href="http://extension.colostate.edu/docs/pubs/farmmgmt/05003.pdf">extension.colostate.edu/docs/pubs/farmmgmt/05003.pdf</a></p> <p>Calibration for rotary spreader:  <a href="http://pesticidestewardship.org/calibration/Pages/RotarySpreader.aspx">pesticidestewardship.org/calibration/Pages/RotarySpreader.aspx</a></p> <p>Calibration for a drop spreader:  <a href="http://pesticidestewardship.org/homeowner/how-to-calibrate-a-drop-spreader">pesticidestewardship.org/homeowner/how-to-calibrate-a-drop-spreader</a></p> <p>Note: Where rented equipment is used, follow supplied instructions for operation. Tractor ground speed needs to be calibrated if travel speed influences application rate.</p> <p>Mark with 'Yes' if rented sprayers or spreaders are used: _____.</p>	
<p>3. Pesticide drift is minimized by monitoring current wind direction and speed using (Please select all that apply)<sup>S</sup>:</p> <ul style="list-style-type: none"> <li>A. Hand-held monitor</li> <li>B. Weather station</li> <li>C. Online resources with real time wind-speed data</li> </ul> <p>Pesticide drift resources: <a href="http://pesticidestewardship.org/drift/Pages/default.aspx">pesticidestewardship.org/drift/Pages/default.aspx</a></p>	
<p>4. If grain-based rodenticides (corn, oats) are used, they are applied in bait stations or burrows only.<sup>D</sup></p> <p>Note: Rodenticide applications are included on spray records and include date and blocks treated. Including a rate per acre is not necessary.</p>	

### 3. Pesticide-Risk Reduction

<b>B. Advanced Practices</b> <b>Note: Please list block ID, for any blocks not earning points.</b>	<b>Points eligible</b>	<b>Points earned (all blocks)</b>	<b>Blocks not scored</b>
1. Lower-risk pesticides are identified and used based on outcome from the Pesticide Risk Tool pesticide risk analysis. <sup>S</sup>  <b>Note: Grower can describe what high-risk pesticide was used the previous season and what lower-risk pesticide replaced the application.</b>	1		
2. A full-block application is replaced by a partial-block pesticide application. <sup>D</sup>  <b>Note: One point per application may be scored for a maximum of two points.</b>  <b>Note: Partial blocks may be documented by listing acres treated compared to total acres of block, e.g., 6/10 acres treated or listing varieties treated.</b>	1 or 2		
3. A full-block pesticide application is replaced by an application to block perimeter. <sup>D</sup>  <b>Note: One point per application may be scored for a maximum of two points.</b>  <b>Note: Spray records clearly identify which perimeter of a block was treated.</b>  Note: Perimeter sprays include both sides of a tree row up to the first four rows or up to 50 feet from the orchard edge. Applications to perimeter rows meet label restrictions on number of applications to the crop and total amount of active ingredient applied.	1 or 2		
4. A full-block pesticide application is replaced by an alternate-row-middle (ARM) application. <sup>D</sup>  <b>Note: One point per application may be scored for a maximum of two points.</b>  <b>Note: Indicate on spray record when an ARM application is made.</b>  Note: Additional ARM sprays should target opposite row from previous treatment. ARM sprays may count as half of one application. Pesticide records must document which rows were treated. For considerations on ARM sprays visit, <a href="http://sprayers101.com/alternate-row-middle-spraying">sprayers101.com/alternate-row-middle-spraying</a> .	1 or 2		
6. No organophosphates are used as insecticides. <sup>D</sup>	1		
7. No synthetic pyrethroids are used as insecticides. <sup>D</sup>	1		
8. Tractor cabs plus required personal protective equipment are used to protect applicators during pesticide applications. <sup>S</sup>	2		
9. No 'DANGER' labeled pesticides are used. <sup>D</sup>	1		
10. No 'WARNING' labeled pesticides are used. <sup>D</sup>	1		

<b>3. Pesticide-Risk Reduction</b>			
<b>B. Advanced Practices (continued)</b> <b>Note: Please list block ID, for any blocks not earning points.</b>	<b>Points eligible</b>	<b>Points earned</b>	<b>Blocks not scored</b>
11. Herbicides are not used in alleyways/drive rows. <sup>D</sup>	1		
12. Spray pattern for pesticide application equipment is evaluated and adjusted by assessing droplet size and coverage using water-sensitive cards or dyes, <a href="http://sprayers101.com/confirm-coverage-with-water-sensitive-paper">sprayers101.com/confirm-coverage-with-water-sensitive-paper</a> . <sup>S</sup>  Note: Results are available for review, including changes made to the sprayer or canopy management, as a result of the test.	2		
13. Spray-control system is used to regulate pesticide application rates. <sup>S</sup>	1		
14. A pre-harvest damage assessment is completed on all Eco blocks prior to the start of harvest. <sup>S</sup>  Note: A pre-harvest damage assessment is a sampling of a known quantity of fruit from each block. Each incidence of pest injury is documented and is used to make improvements in management the following season. A pre-harvest damage assessment can provide a more accurate representation of percent injury compared to a pack-out report that may be skewed if pickers are not harvesting damaged or low-quality fruit.	1		
15. On-site Network for Environment and Weather Applications (NEWA) station is used for pest and disease management, <a href="http://newa.cornell.edu">newa.cornell.edu</a> . <sup>D</sup>	3		
<b>Pesticide-Risk Reduction: Total points eligible</b>	<b>21</b>		
<b>Total points earned</b>			

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<sup>D</sup> Verified during desk audit via submitted paperwork

<sup>S</sup> Verified during site audit

**Note:** List the block ID for any instances where the scored advanced practice does not apply to the site. Total points for each block may be reflected in the final score card on page 23.

#### 4. Pollinator Protection

Audit guidance: The grower understands and can describe the impacts of pesticide exposure and habitat loss on pollinator health; the benefits of pollinator-habitat conservation; practices which mitigate pesticide exposure and other practices which support healthy and abundant pollinator populations and relate this understanding to how the practices are implemented and maintained.

A. Minimum Requirements	Pass, Fail or N/A		
1. Existing habitat for pollinators and nesting sites are identified and protected from drift. <sup>S</sup>  Note: Grower must be able to show or describe the pollinator habitat location. The Xerces Society recommends pollinator habitat should be, at a minimum, 125 feet from crops treated with neonicotinoids and 60 feet from all pesticides applied with an airblast sprayer, <a href="http://xerces.org/wp-content/uploads/2016/10/ProtectingHabitatFromPesticideContamination_oct2016-02.pdf">xerces.org/wp-content/uploads/2016/10/ProtectingHabitatFromPesticideContamination_oct2016-02.pdf</a> .			
2. Pesticides with an EPA pollinator toxicity advisory box on the label are not applied between pink and end of crop bloom, <a href="http://pesticidestewardship.org/wp-content/uploads/sites/4/2016/07/bee-label-info-graphic.pdf">pesticidestewardship.org/wp-content/uploads/sites/4/2016/07/bee-label-info-graphic.pdf</a> . <sup>D</sup>  Note: Information on selecting pesticides least toxic to pollinators is available through Oregon State Extension, <a href="http://catalog.extension.oregonstate.edu/sites/catalog.extension.oregonstate.edu/files/project/pdf/pnw591.pdf">catalog.extension.oregonstate.edu/sites/catalog.extension.oregonstate.edu/files/project/pdf/pnw591.pdf</a> .			
<b>B. Advanced Practices</b> <b>Note: Please list block ID, for any blocks not earning points.</b>	Points eligible	Points earned (all blocks)	Blocks not scored
1. Non-blooming buffers of ≥ 60 feet are maintained around all field borders where pesticides toxic to pollinators are applied. <sup>S</sup>	1		
2. If managed beehives reside on the farm year-round, they are monitored for health, their diseases are controlled and documentation of monitoring is available for review, e.g., date and description of monitoring activities. <sup>S</sup>	2		
3. Supplemental forage which provides season-long bloom, e.g., designated pollinator habitat, is provided when crop is not in bloom. <sup>S</sup>	1		
4. Honey bee apiaries resident on the farm are located at least 0.5 mile away from designated wildlife habitat, e.g., state or national wildlife refuges, natural areas or parks. <sup>S</sup>	2		
5. Commercially produced bumblebee hives are not used for open pollination. <sup>S</sup>	1		
6. Pollination is accomplished exclusively with native bees. <sup>S</sup>	2		
7. Pollinator activity is monitored during bloom through participation in the Northeast Pollinator Partnership, <a href="http://northeastpollinatorpartnership.org/">northeastpollinatorpartnership.org/</a> . <sup>S</sup>	1		
<b>Pollinator Protection: Total points eligible</b>	<b>10</b>		
<b>Total points earned</b>			

**Note:** List the block ID for any instances where the scored advanced practice does not apply to the site. Total points for each block may be reflected in the final score card on page 23.

## 5. Orchard Floor Management

Audit guidance: The grower can explain their rationale for implementing cultural/horticultural practices which minimize excess herbicide use; describe how insect and disease management is improved through orchard floor management; and describe their integrated approach to weed management which best suits the site and weed pressure on the farm.

A. Minimum Requirements	Pass, Fail or N/A		
1. To suppress insect pest and disease inoculum, pruning debris remaining in the field is (Please select all that apply) <sup>S</sup> : A. Flail chopped B. Mowed C. Removed			
2. Weed-free areas in planting rows do not extend into the row middles or aisles. <sup>S</sup>			
3. Herbicide mode of action is rotated between each application (during and between seasons). <sup>D</sup>			
4. No more than three applications of an herbicide are made per season to the same application site. A fourth spot-treatment may be made if desired control is not achieved and must be supported with documentation which identifies weed species not controlled during previous applications. <sup>D</sup>			
5. Row middles or aisles (drive rows) are (Please select all that apply) <sup>S</sup> : A. Sod B. Mulch covered C. Cover cropped year-round.			
B. Advanced Practices Note: Please list block ID, for any blocks not earning points.	Points eligible	Points earned (all blocks)	Blocks not scored
1. Weeds targeted with herbicide applications are scouted at least once per season and weed species present and location, e.g., tree row or row middle, are documented. <sup>D</sup>	1		
2. To suppress weeds, improve organic content and soil health prior to replanting, at least one of the following is used (Please select all that apply) <sup>S</sup> : A. Cover crop(s) (please list cover crop(s) used): B. Compost C. Crop rotation D. Green manure  Note: Practice receives the same number of points regardless of how many practices are selected. Note: Grower can describe the methods including what and where cover crops were/are used, time of application(s), benefits to soil health, etc.	1		

<b>B. Advanced Practices (Continued)</b> <b>Note: Please list block ID, for any blocks not earning points.</b>	<b>Points eligible</b>	<b>Points earned (all blocks)</b>	<b>Blocks not scored</b>
3. Invasive weeds attractive to pollinators are removed from orchard and field borders. <sup>S</sup>	1		
4. Herbicides are not used in planted rows; weeds are managed by the following non-chemical method(s) (Please select all that apply) <sup>D</sup> : A. Cultivation B. Aeration C. Over-seeding D. Avoiding compaction.  Note: Practice receives the same number of points regardless of how many practices are selected.	1		
5. Groundcover is managed to eliminate alternate hosts for plant bugs, e.g., winter-annual weeds, chickweeds, dandelion, clovers, vetch and other legumes. <sup>S</sup>	1		
6. Foraging pollinators are protected by reducing blooming groundcover and broadleaf weeds using mowing or herbicide applications which target drive rows and row middles. <sup>S</sup>  Note: Grower should be able to describe the location and how often or what conditions would trigger mowing, e.g., is it timed before or after sprays, etc.	1		
7. Alternate-row mowing is done to preserve beneficials. Please describe when this practice is implemented: <sup>S</sup>	1		
<b>Orchard Floor Management: Total points eligible</b>	<b>7</b>		
<b>Total points earned</b>			

Superscripts indicate practice-verification process. Reference the following throughout entire document:

<sup>D</sup> Verified during desk audit via submitted paperwork

<sup>S</sup> Verified during site audit

**Note:** List the block ID for any instances where the scored advanced practice does not apply to the site. Total points for each block may be reflected in the final score card on page 23.

## 6. Food Safety and Product Quality

Audit guidance: The grower can describe the farms culture of food safety and how they implement and maintain their food-safety practices. When possible, auditors should use results for current food-safety audit or food safety-license governed by third parties, local, state or federal agencies by reviewing valid certificates or results from the most recent audit/inspection. Any practice not addressed in an existing food safety license or certification should be audited.

A. Minimum Requirements	Pass, Fail or N/A
1. Only fruit of sound internal and external quality are labeled and sold under Red Tomato trademarks. <sup>S</sup> <input type="checkbox"/> Check if addressed in food safety audit.	
2. Fruit is harvested at correct maturity according to firmness, brix or other accepted measures. <sup>S</sup> <input type="checkbox"/> Check if addressed in food safety audit.  Note: Pick-your-own varieties are not opened to public until fruit has reached correct maturity.	
3. Fruit that has fallen to the ground (drops) are not labeled and sold under Red Tomato trademarks. <sup>S</sup> <input type="checkbox"/> Check if addressed in food safety audit.	
4. Clean toilet and hand-washing facilities are available to field, harvest and packing house staff. <sup>S</sup> <input type="checkbox"/> Check if addressed in food safety audit.  Note: Soap must be available at all hand-washing facilities. Hand sanitizer may also be present, but is not an adequate substitute.	
5. Manure is not applied to sites where fruit will be harvested within 120 days of harvest. <sup>S</sup> <input type="checkbox"/> Check if addressed in food safety audit.	
6. Grazing of livestock or poultry to manage pests and weeds on bearing sites may only be done in compliance with the National Organic Standards. Livestock is not allowed within 90 days of harvest, for crops not touching the ground. <sup>S</sup> <input type="checkbox"/> Check if addressed in food safety audit.	
7. Access roads between production sites and packing/storage facilities are inspected for ruts, bumps or rocks and are repaired prior to harvest to minimize fruit damage. <sup>S</sup> <input type="checkbox"/> Check if addressed in food safety audit.	
8. Fruit bins and boxes are sound and cleaned as needed to remove soil, plant or animal debris prior to use. <sup>S</sup> <input type="checkbox"/> Check if addressed in food safety audit.	
9. Filled harvest containers are not stored outside or left in the field and are immediately transported to packing or storage facilities. <sup>S</sup> <input type="checkbox"/> Check if addressed in food safety audit.	

<b>6. Food Safety and Product Quality</b>		
<b>B. Advanced Practices</b>	<b>Points eligible</b>	<b>Points earned</b>
1. Clean plastic bins are used to store fruit. <sup>S</sup> <input type="checkbox"/> Check if addressed in food safety audit.	1	
2. Harvesting bins, storage rooms and packinghouses are sanitized annually after storage and packing are completed. <sup>S</sup> <input type="checkbox"/> Check if addressed in food safety audit.	2	
3. Cider production facility (if any) has a written HACCP plan. <sup>S</sup> <input type="checkbox"/> Check if addressed in food safety audit.	2	
4. Packing facility has a written Standard Sanitary Operating Procedures plan. <sup>S</sup> <input type="checkbox"/> Check if addressed in food safety audit.  Note: May be required by USDA for farms with packing facilities.	2	
5. Packing line water flumes are chlorinated or otherwise treated to reduce potential for post-harvest diseases. <sup>S</sup> <input type="checkbox"/> Check if addressed in GAP plan and audit.	1	
6. Farm is third-party certified for USDA Good Agricultural Practices (GAP) or similar Global Food Safety Initiative recognized food safety scheme, e.g., GLOBAL G.A.P., PrimusGFS. <sup>S</sup>	3	
7. Farm has a written Food Safety Plan which meets either USDA GAP, GLOBAL G.A.P., or PrimusGFS. <sup>S</sup>	2	
<b>Food Safety and Product Quality: Total points eligible</b>	13	
<b>Total points earned</b>		

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<sup>S</sup> Verified during site audit

## 7. Energy and Waste Management

Audit guidance: The grower can describe how they manage energy consumption and waste generated, to reduce soil, water and air pollution; conserve energy; minimize waste to landfills and quantify energy use on the farm.

A. Minimum Requirements	Pass, Fail or N/A	
1. Open burning complies with local ordinances and is limited to yard waste, wood, pruning debris and paper-based products. Pesticide containers (including paper), plastics, rubber or industrial products may not be disposed of by burning. <sup>S</sup>		
2. Buildings which are heated or cooled are insulated. <sup>S</sup>		
3. Disposal of lead-acid batteries, used oil, industrial chemicals and other hazardous materials meet state and federal guidelines, i.e., lead-acid batteries are disposed by taking to approved recycling drop-off locations, e.g., auto-service centers, municipal recycling facilities, etc. <sup>S</sup>		
B. Advanced Practices	Points eligible	Points earned
1. Energy-efficient lighting is used in office, packing and storage facilities, e.g., compact fluorescent or LED lighting. <sup>S</sup>	1	
2. Solar or wind are used to meet electricity needs: One point if >10%, two points if >30%, three points if >50%. <sup>S</sup> List:	1, 2 or 3	
3. Biodiesel or ethanol, are used to meet fuel needs. One point if >10%, two points if >30%, three points if >50%. <sup>S</sup> List:	1, 2, or 3	
4. New energy conservation measures have been implemented in storage facilities. <sup>D</sup> List:  <b>Note: May claim for points during entire period of cost recovery on investment plus an additional three years.</b>	1	
5. Employees are trained on how to minimize energy consumption for farm activities. <sup>S</sup>  <b>Note: Outline of training content is available or signage around farm which encourages energy conservation is evident to serve as reminders for employees.</b>	1	
6. Tractors and other motorized equipment are used efficiently and effectively to reduce overall fuel consumption, e.g., do not let diesel engines idle longer than 5-10 minutes; tractors operated at optimum RPM to maximize fuel efficiency. <sup>S</sup>	1	
7. Tractor are operated in economy mode when appropriate, e.g., spraying, mowing. <sup>S</sup>  Note: Economy modes reduce engine operating RPM while maintaining the PTO at 540 RPM.	2	

## 7. Energy and Waste Management Continued

B. Advanced requirements for energy conservation continued	Points eligible	Points earned
8. Tractors are maintained to maximize efficiency by doing all the following: <sup>S</sup> <ol style="list-style-type: none"> <li>Manufacturer intervals for oil and filter changes are followed.</li> <li>Tire selection, configuration and inflation are matched to load requirements and manufacturer specifications.</li> <li>Tractor ballast and weight distribution is optimized.</li> </ol> <p>Note: More information on this practices is explained in, “<i>Farm Practices to Improve Energy Efficiency</i>”, University of Wisconsin Extension, <a href="https://blogs.extension.org/encon1/files/2012/12/ENCON2.pdf">blogs.extension.org/encon1/files/2012/12/ENCON2.pdf</a>.</p>	2	
9. A third-party energy audit of facilities has been completed within the last six years. <sup>S</sup>	3	
10. The following materials are recycled: <sup>S</sup>		
<ol style="list-style-type: none"> <li>Paper and cardboard</li> </ol>	.25	
<ol style="list-style-type: none"> <li>Plastic</li> </ol>	.25	
<ol style="list-style-type: none"> <li>Aluminum</li> </ol>	.25	
<ol style="list-style-type: none"> <li>Glass</li> </ol>	.25	
<ol style="list-style-type: none"> <li>Used pesticide containers where consistent with regulations</li> </ol>	.25	
<ol style="list-style-type: none"> <li>Batteries (excludes lead-acid batteries)</li> </ol>	.25	
<ol style="list-style-type: none"> <li>Computers and other recyclable office equipment</li> </ol>	.25	
11. Energy use efficiency is monitored using the Stewardship Index for Specialty Crops, <a href="https://stewardshipindex.org/working_metrics.php">stewardshipindex.org/working_metrics.php</a> . <sup>S</sup>	3	
12. A pesticide mixing and loading facility is used to catch and retain pesticide rinsate. <sup>S</sup>	3	
<b>Energy and Waste Management: Total points eligible</b>	<b>24.75</b>	
<b>Total points earned</b>		

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<sup>S</sup> Verified during site audit

<b>Score Card</b>														
<b>Points Required</b>				<b>Points Eligible</b>	<b>Points Earned per Block</b>									
Years of Participation	Core Eco Protocol	Apple Supplement	Stone Fruit Supplement		Print additional pages of score card if more than ten blocks are enrolled.									
1-3 years	25	4	3		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
> 3 years	30	8	6											
<b>CORE ECO PROTOCOL</b>														
<b>Operations and Management</b>				11										
<b>Ecosystems, Soil and Water Conservation</b>				21										
<b>Pesticide-Risk Reduction</b>				21										
<b>Pollinator Protection</b>				10										
<b>Orchard Floor Management</b>				7										
<b>Food Safety and Product Quality</b>				13										
<b>Energy and Waste Management</b>				24.75										
<b>Total-Points Possible</b>				<b>107.75</b>										
<b>Total Points Earned</b>														
<b>ECO CROP SUPPLEMENTS</b>														
<b>Eco Apple</b>				56										
<b>Eco Stone Fruit</b>				25										
<b>Total Points Earned</b>														

## Participating Grower Affidavit and Agreement

1. Participating grower certifies that the attached *Core Eco Protocol* and records represents a complete and accurate account of grower practices on acres to be certified at the time the *Core Eco Protocol* is completed and reviewed by the inspector and the IPM Institute for the purposes of certifying participating production.
2. Participating grower agrees to allow access to farm and records for scheduled and unannounced inspections to verify compliance with program requirements including information provided on the *Core Eco Protocol* and use of Red Tomato trademarked packaging and promotional materials.
3. Participating grower agrees that eco certification is approved solely by the IPM Institute of North America, Inc. and if granted, is for one season only and only for product from participating production units reported in this *Core Eco Protocol* and certified by the IPM Institute.
4. Participating grower agrees not to market any product under Red Tomato eco trademarks, including use of Red Tomato eco packaging or other Red Tomato eco promotional materials or identification, until eco certification for the product is approved in writing by the IPM Institute. Participant further agrees that if certification is not approved, no product will be marketed under the Red Tomato eco trademarks and no eco packaging or promotional materials bearing Red Tomato eco trademarks will be used. Participant agrees to bear any costs associated with denial of certification including the cost of Red Tomato eco trademark packaging and promotional materials purchased by the grower.
5. Participating grower acknowledges that participation does not constitute or imply an endorsement by the IPM Institute of North America or Red Tomato of the participating grower or operation.

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Participating Grower Name

Signature

Date

## Submission Checklist

- \_\_\_ a. Completed Eco Core Protocol
- \_\_\_ b. Completed Eco crop supplements
- \_\_\_ c. Pesticide, fertilizer, thinner and plant-growth regulator application records for blocks to be certified. See page 4 for required information.

The IPM Institute can digitize spray records not submitted in an electronic format. This service will be charged based on an hourly rate for time required for digitization and a final copy of the electronic record will be sent to the grower.

- \_\_\_ d. Scouting records for blocks to be certified. See page 4 for required information.
- \_\_\_ e. Certification fee. The annual-certification fee is based on the total number of acres enrolled in the program and does not cover costs of on-site audits required every three years. Fees for on-site audits are payable directly to the auditor.

0 – 9 acres	\$450
10 – 24 acres	\$550
25 – 49 acres	\$700
50 – 99 acres	\$800
100 – 149 acres	\$1,000
150 – 199 acres	\$1,200
200 – 299 acres	\$1,500
≥ 300 acres	\$2,000

\*Additional fee of \$100 when enrolling in Eco Stone Fruit and Eco Apple.

## Deadlines for Record Submission

- a. Eco Stone Fruit: **July 10, 2020**
- b. Eco Apple: **July 24, 2020**

## Fees

Annual certification fee \$\_\_\_\_\_ with the 2020 Eco Core Protocol, pesticide application and scouting records are due by the posted date. Final application and scouting records are due by **December 4, 2020**. Payment is accepted by check or credit card. To pay by credit card please visit our secure website, [ipminstitute.org/projects/northeast-eco-apple/online-payment/](http://ipminstitute.org/projects/northeast-eco-apple/online-payment/), or call 608 232-1410.

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## Revisions to 2020 Edition

Protocol revisions include new notes and formats, i.e., multiple choice, to provide more clarification to growers and auditors. Several practices were taken out due to redundancy or zero use in recent years.

Note: Changes to the protocol are written in italics.

### 1. Operations Management

- An explanation for audit guidance was added, p.8.  
*Audit Guidance: Grower can describe how their organizational structure, record keeping, communication practices, and continuous-improvement efforts facilitate successful Eco Fruit production.*
  
- **1.A.1:** New practice: *Please select all of the following audits or inspections that occurred on your farm from third parties, the state or federal government.:*, p.8.
  - *Good Agricultural Practices (GAP)*
  - *Food Safety (non-GAP)*
  - *Worker Housing*
  - *Occupational Safety and Health Administration (OSHA)*
  - *Worker Protection Standard (WPS)*
  - *Other(s):*  
  - *Note: This information will help prioritize the on-farm audit.*
  
- **1.B.2:** Workers handling or applying pesticides receive an annual medical examination or physical to ensure fitness for job duties <sup>S</sup>, pg. 9  
*Note: Acceptable documentation includes a list of workers who participated in a medical exam. Workers and physicians must sign off documenting the exam occurred. Individual exam records do not need to be kept on file or shared in accordance with HIPAA privacy rules.*

### 2. Ecosystem, Soil and Water Conservation

- An explanation for audit guidance was added, p.10.  
*Audit Guidance: The grower can explain their rationale for implementing practices which maintain and improve soil health, monitor/regulate irrigation, monitor tree health, and minimize or mitigate soil erosion, by describing the observed benefits, and how the practice is implemented and maintained.*
  
- **2.A.2:** Existing practice converted to multiple choice: *Visibly eroded areas are not present and corrected in a timely manner, if they occur. Please select all erosion mitigation strategies that are implemented.:*, pg. 10
  - A. *Culvert*
  - B. *Water diversion*
  - C. *Retention pond*
  - D. *Other(s):*
    - *Note: Applicable to all enrolled acres, including adjoining roads and farmstead.* <sup>S</sup>

- **2.B.5:** Irrigation is determined by crop need, using systematic and science-based measures, e.g., monitoring soil moisture and visual assessment of plant stress <sup>S</sup>, pg. 11.
  - *Note: Monitoring data are available for inspection, e.g., weather station data, NEWA data, documented precipitation events.*
  - *Note: Grower can describe the decision-making processes for determining when and where irrigation is necessary.*
- **2.B.9:** A water conservation plan is in place which addresses water uses for irrigation, washing and cooling. The plan should also outline staff training on minimizing water use in farm activities and practices and/or uses of technology to increase use efficiency <sup>S</sup>, pg. 11.
  - *Note: Water conservation plan is available for site auditor to review.*
  - Points increased points from 2 to 3.
- **2.B.11:** On non-paved roads *where erosion occurs*, water bars are installed to reduce erosion <sup>S</sup>, pg. 11.
  - *Note: Grower can describe how often they are maintained and where they are located.*
  - Practice eliminated 10% slope requirement, since erosion can occur on lesser slopes.
- **2.B.14:** Soil health is quantitatively assessed once every five years or before orchard renovation using at least five of the following: <sup>S</sup>, pg. 12.
  - *Note: Test results are available for review during site audit.*

### 3. Pesticide Risk Reduction

- *Audit guidance: The grower can explain potential sources of pesticide risk on the farm and how non-chemical practices, cultural/horticultural practices, pest-management decisions and pesticide-application methods are implemented and maintained to minimize pesticide risk*, pg. 13.
- **3.A.1:** Plant and tree canopies are maintained to allow penetration of light, air and spray material using pruning *or plant growth regulators, e.g., Apogee (prohexadione calcium)*, pg. 13.
- **3.A.3:** Existing practice converted to multiple choice: *Pesticide drift is minimized by monitoring current wind direction and speed using: (Please select all that apply) <sup>S</sup>, pg. 13*
  - A. *Hand-held monitor*
  - B. *Weather station*
  - C. *Online resources with real time wind-speed data.*
- **3.A.4 (5.A.2 in 2019 protocol):** If grain-based rodenticides (corn, oats) are used, they are applied in bait stations or burrows only <sup>D</sup>, pg. 13.
  - *Note: Rodenticide applications are included on spray records and include date and blocks treated. Including a rate per acre is not necessary.*

- **3.B.1:** Lower-risk pesticides are identified and used based on outcome from the Pesticide Risk Tool pesticide risk analysis, <sup>S</sup>, pg. 14:
  - *Note: Grower can describe what high-risk pesticide was used the previous season and what lower-risk pesticide replaced the application.*
- **3.B.2:** A full-block application is replaced by a partial-block pesticide application <sup>D</sup>, pg. 14.
  - *Note: One point per application may be scored for a maximum of two points.*
  - *Note: Partial blocks may be documented by listing acres treated compared to total acres of block, e.g., 6/10 acres treated or listing varieties treated.*
- **3.B.3:** A full-block pesticide application is replaced by an application to block perimeter <sup>D</sup>, pg. 14.
  - *Note: One point per application may be scored for a maximum of two points.*
  - *Note: Spray records clearly identify which perimeter of a block was treated.*
- **3.B.4:** A full-block pesticide application is replaced by an alternate-row-middle (ARM) application <sup>D</sup>, pg. 14.
  - *Note: One point per application may be scored for a maximum of two points.*
  - *Note: Indicate on spray record when an ARM application is made.*
- **3.B.12:** Spray pattern for pesticide application equipment is evaluated and adjusted by assessing droplet size and coverage using water-sensitive cards or dyes <sup>S</sup>, pg.15.
  - *Note: Results are available for review, including changes made to sprayer or canopy management as a result of the test.*
- **3.B.14 (5.B.2 in 2019 protocol):** A pre-harvest damage assessment is completed on all Eco blocks prior to the start of harvest <sup>S</sup>, pg. 15.
- Practice removed due to zero adoption: Pesticide Risk Tool is used to evaluate risk.
- Practice removed. Pesticide Risk Tool does not explicitly identify mitigation strategies for high-risk applications: Mitigation strategies are identified and implemented for all pesticide applications identified as high risk by the Pesticide Risk Tool.

#### 4. Pollinator Protection

- *Audit guidance: The grower understands and can describe the impacts of pesticide exposure and habitat loss on pollinator health; the benefits of pollinator-habitat conservation; practices which mitigate pesticide exposure and other practices which support healthy and abundant pollinator populations and relate this to how the practices are implemented and maintained, pg. 16.*
- **4.A.1:** Existing habitat for pollinators and nesting sites are identified and protected from drift <sup>S</sup>, pg. 16.
  - *Note: Grower must be able to show or describe the pollinator habitat location. The Xerces Society recommends pollinator habitat should be, at a minimum, 125 feet from crops treated with neonicotinoids and 60 feet from all pesticides applied with an airblast sprayer.*

- **4.B.2:** Practice reworded: If managed beehives reside on the farm year-round, they are monitored for health, their diseases are controlled and *documentation of monitoring is available for review, e.g., date and description of monitoring activities*,<sup>S</sup>, pg. 16..
- **4.B.3:** Practice reworded: Supplemental forage *which provides season-long bloom*, e.g., designated pollinator habitat, is provided when orchard is not in bloom.<sup>S</sup>, pg. 16

## 5. Orchard Floor Management (New section)

- **Audit guidance:** *Audit guidance: The grower can explain their rationale for implementing cultural/horticultural practices which minimize excess herbicide use; describe how insect and disease management is improved through orchard floor management; and describe their integrated approach to weed management which best suits the site and weed pressure on the farm*, pg. 17.
- **5.A.1:** This practice moved to audit guidance section for the Apple and Stone Fruit supplement: Systematic sampling and monitoring are completed for all pests requiring management as per Extension recommendations.
- **5.A.1 (3.A.2 in 2019 protocol):** Existing practice converted to multiple choice: *To suppress insect pest and disease inoculum, pruning debris remaining in the field is (Please select all that apply)*<sup>S</sup>; pg. 17.
  - A. Flail chopped
  - B. Mowed
  - C. Removed
- **5.A.5 (originally 2.A.5 in 2019 protocol):** Existing practice converted to multiple choice: *Row middles or aisles (drive rows) are (Please select all that apply)*<sup>S</sup>; p.17.
  - A. Sod
  - B. Mulch covered
  - C. Cover cropped year round
- **5.B.2 (2.B.14 in 2019 protocol):** Existing practice converted to multiple choice: *To suppress weeds, improve organic content and soil health prior to replanting, at least one of the following is used (Please select all that apply)*<sup>S</sup>; p.17
  - A. Cover crop(s) (please list cover crop(s) used):
  - B. Compost
  - C. Crop rotation
  - D. Green manure
  - Note: Grower should be able to describe the methods including what and where cover crops were/are used, time of application(s), benefits to soil health, etc.
  - Note: Practice receives the same number of points regardless of how many practices are selected.
- **5.B.3 (4.B.2 in 2019 protocol):** Invasive weeds attractive to pollinators are removed from orchard and field borders<sup>S</sup>, pg. 18.

- **5.B.4 (3.B.13 in 2019 protocol):** Practice was converted to multiple: Herbicides are not used in planted rows; weeds are managed *by the following non-chemical method(s) (Please select all that apply)*<sup>D</sup>: pg. 18.
  - A. Cultivation
  - B. Aeration
  - C. Over-seeding
  - D. Avoiding compaction
 – Note: Practice receives the same number of points regardless of how many practices are selected.
- **5.B.5 (3.B.15 in 2019 protocol):** Groundcover is managed to eliminate alternate hosts for plant bugs, e.g., winter-annual weeds, chickweeds, dandelion, clovers, vetch and other legumes.<sup>S</sup>, pg. 18
- **5.B.6 (4.B.8 in 2019 protocol):** Foraging pollinators are protected by reducing blooming groundcover and broadleaf weeds using mowing or herbicide applications which target drive rows and row middles.<sup>S</sup>, pg. 18.
  - Note: Grower should be able to describe the location and how often or what conditions would trigger mowing, e.g., is it timed before or after sprays, etc.
- **5.B.7 (3.B.5 in 2019 protocol):** Alternate row mowing is done to preserve beneficials. *Please describe when this practice is implemented:*<sup>S</sup>

## 6. Food Safety and Product Quality

- *Audit guidance: The grower can describe the farms culture of food safety and how they implement and maintain food-safety practices. When possible, auditors should use results for current food-safety audit or food safety-license governed by third parties, local, state or federal agencies by reviewing valid certificates or results from the most recent audit/inspection. Any practice not addressed in an existing food safety license or certification should be audited, pg. 19.*
- A checkbox was added to each practice stating: “Check if addressed in GAP plan and audit.”
- **6.A.4:** Clean toilet and hand-washing facilities are available to field, harvest and packing house staff<sup>S</sup>, p.19.
  - Note: Soap must be available at all hand-washing facilities. Hand sanitizer may also be present but is not an adequate substitute per FSMA requirements.

## 7. Energy and Waste Management

- *Audit guidance: The grower can describe how they manage energy consumption and waste generated, to reduce soil, water and air pollution; conserve energy; minimize waste to landfills and quantify energy use on the farm, pg. 21.*
- **7.B.4:** New energy conservation measures have been implemented in storage facilities.<sup>D</sup>, pg. 21.
  - Note: May claim for points during entire period of cost recovery on investment plus an additional six years.

- **7.B.5:** Employees are trained on how to minimize energy consumption for farm activities. <sup>s</sup>, pg. 21.
  - *Note: Outline of training content is available or signage around farm which encourages energy conservation is evident to serve as reminders for employees.*
- **7.B.9:** A third-party energy audit of facilities has been completed *within the last six years.* <sup>s</sup>, pg. 22.
  - Increased points from 2 to 3.
- **7.B.11:** Energy use efficiency is monitored using the Stewardship Index for Specialty Crops. <sup>s</sup>, pg. 22.

## Acknowledgements and References

Contributing growers, scientists and other advisors to the development of the Red Tomato Eco Apple Protocol and Grower Self-Assessment are thanked for their previous work, which has been incorporated into this new *Core Eco Protocol*.

Art Agnello, Extension entomologist, Cornell University  
Juliet Carroll, Extension fruit IPM coordinator and plant pathologist, Cornell University  
Aaron Clark, Clark Brothers Orchards  
Dan Cooley, plant pathologist, UMass  
Sue Futrell, communications director, Red Tomato  
Rob Koch, Apple Leaf, crop consultant  
Kerik Cox, Extension plant pathologist, Cornell University  
Greg Krawczyk, Extension entomologist, Penn State University  
Barney Hodges Sr., Barney Hodges Jr., Christiana Hodges and Dee Hodges, Sunrise Orchards  
Tracy Leskey, research entomologist, USDA ARS  
Mary Concklin, Associate Extension Educator - Fruit Production & IPM, University of Connecticut  
Richard Cowles, Valley Laboratory, Connecticut Agricultural Experiment Station  
John Lyman, Lyman Orchards  
Harvey Reissig, Extension entomologist, Cornell University (retired)  
John Rogers and Greg Parzych, Rogers Orchards  
Michael Rozyne, Evangelist and founder, Red Tomato  
Peter Ten Eyck, Indian Ladder Farms  
Arthur Tuttle, Extension IPM field leader, plant pathology  
Jon Clements, Extension educator, UMass

The following funders have supported this work:

US EPA Strategic Agricultural Initiative, Region I  
USDA NIFA Northeastern IPM Center  
USDA NRCS Conservation Innovation Program  
USDA NIFA Crops at Risk Program  
W. K. Kellogg Foundation  
Whole Foods Market  
An anonymous foundation and many generous individuals

### References:

Agnello, A. M., Gardner, R., Helms, M., Landers, A., Rosenberger, D., Cox K., Hoying S. 2018 Cornell Cooperative Extension. Ithaca NY: *2018 Pest Management Guidelines for Commercial Tree-Fruit Production*.

[https://cropandpestguides.cce.cornell.edu/Preview/2018/Tree\\_Fruit\\_PROMO.PDF](https://cropandpestguides.cce.cornell.edu/Preview/2018/Tree_Fruit_PROMO.PDF).

Boerboom, C., and Owen, M. 2006. Purdue Extension *The Glyphosate, Weeds, and Crops Series: Facts About Glyphosate-Resistant Weeds*. [extension.purdue.edu/extmedia/gwc/gwc-1.pdf](http://extension.purdue.edu/extmedia/gwc/gwc-1.pdf).

Boller, E. F., Avilla, J., Joerg, E., Malavolta, C., Wijnands, F. G., and Esbjerg, P. 2004. International Organization for Biological and Integrated Control of Noxious Animals and Plants *Integrated Production Principles and Technical Guidelines, Third Edition*. [iobc-global.org](http://iobc-global.org).

Carroll, J. E. (Ed.). 2004. NYS IPM Program *Elements of IPM for Apples in New York State*. [ecommons.cornell.edu/handle/1813/42717](https://ecommons.cornell.edu/handle/1813/42717).

Carroll, J.E, and Robinson, T.L. 2006. New York State Agricultural Experiment Station. *New York Integrated Fruit Production Protocol for Apples* (New York's Food and Life Sciences Bulletin 158). [hdl.handle.net/1813/5219](https://hdl.handle.net/1813/5219).

*Guidelines for Integrated Production of Pome Fruits: IOBC Technical Guidelines III, Third Edition*. International Organization for Biological and Integrated Control of Noxious Animals and Plants. 2003. [iobc-global.org](http://iobc-global.org).

*Index of tree fruit insects and diseases*. Kearneysville Tree Fruit Research and Education Center. [davis.wvu.edu/about-davis-college/learning-launch-points/kearneysville-tree-fruit-research-and-education-center](https://davis.wvu.edu/about-davis-college/learning-launch-points/kearneysville-tree-fruit-research-and-education-center).

*Integrated Fruit Production Guidelines for Apple Orchards in Canada*. Canadian Horticultural Council. 2003. [hortcouncil.ca/wp-content/uploads/2016/01/IFP\\_Guidelines\\_Eng.pdf](https://hortcouncil.ca/wp-content/uploads/2016/01/IFP_Guidelines_Eng.pdf).

Krawczyk, G., Crassweller, R.M., Schupp, J.R, Hull, L.A, Biddinger, D.J., Frazier, M... Jung, C. 2010. University Park PA: Pennsylvania State University. *Pennsylvania Tree Fruit Production Guide 2010-2015 Edition*.

*LIVE Technical Guidelines*. Low Input Viticulture & Enology Inc. Viewed on November 6, 2004. [livecertified.org/standards](https://livecertified.org/standards).