

Eco Apple Protocol Quick Guide V 5.3 – FOR 2009 SEASON – 04/6/09

This guide is designed for growers to quickly access information based on apple growth stages. **Other factors remain critically important.** These include scouting and trapping, monitoring weather and using a season-long approach. **It will not be necessary to take actions at every growth stage.** There may be other products available that are not listed here, and not all products listed here may be available in every state. **FOLLOW THE ECO APPLE PROTOCOL, YOUR STATE REGULATIONS AND ALL LABEL DIRECTIONS.**

CHANGES FOR 2009

1. Addition of Altacor, Delegate and Belt for codling moth, leafrollers and Oriental fruit moth.
2. Addition of Movento for San Jose Scale and aphids.
3. Addition of Indar for apple scab. Addition of high-rate EBDC option for apple scab.
4. Addition of Pristine as option for final fungicide application of the season.
5. Note: Asana is no longer permitted for any uses. Nova name has been changed to Rally.
6. Note: As of April 6, 2009, Altacor, Belt, Envidor, Indar and Movento are not registered in NY.

STAGE	PEST AND MATERIALS	AMOUNT
Dormant to Silver Tip	Fire blight	
	Copper	
	Kocide 2000 (copper hydroxide)	4 lb. per 100 gal.
	OR C-O-C-S (copper oxychloride).....	4 lb. per 100 gal.
	OR Cuprofix Disperss (complexed basic copper sulfate).....	6.6 lb per 100 gal.
	OR Champ Flowable (copper hydroxide).....	2 qt. per 100 gal.
	OR Bordeaux mix 8-8-100 plus oil.....	8 lb. copper sulfate 8 lb. spray lime
	Early-season copper may reduce inoculum of some other diseases. Maximum of two copper applications per season.	1 qt oil per 100 gal.

Green Tip **Fire blight**
Although late dormant or silver tip application of copper is preferable, if none was made it can be made at this time.

Apple scab

Copper offers limited protection from apple scab for 5 to 7 days in orchards with low inoculum, e.g., without significant scab the previous season. (For accurate determination of inoculum, use the Potential Ascospore Dose method in the Fall.) Copper is the **first choice for orchards with low inoculum.** See rates for Fire Blight above.

In orchards with significant scab the previous season, Vangard (cyprodinil) OR Syllit (dodine) OR CAPTAN are suggested as the **first choice.** Syllit should not be used where resistance is suspected. Do not use Captan within 10 days of an oil application. An EBDC may be used at this time as a **second choice.** Dithane, Manzate and Penncozeb are trade names for the EBDC mancozeb, and virtually the same, and are very similar to Polyram.

Syllit 65 WP	6 oz per 100 gal.
OR Vangard 75 WG	5 oz per acre
OR Captan 50WP	2 lb. per 100 gal.
OR Captan 80WP	1.25 lb. per 100 gal.
OR Captec or Captan 4L.....	1 qt. per 100 gal.

Note: Do not use Captan within 10 days of an oil application.

OR	EBDCs (for low risk blocks) Dithane/Maneb/Penncozeb 75DF/80WP	1 lb. per 100 gal. (up to 3.2 lb/A max)
OR	Polyram 80 DF	1 lb. per 100 gal. (up to 3.2 lb/A max)
OR	EBDCs (high rates for high risk blocks) Dithane/Maneb/Penncozeb 75DF/80WP	2 lb. per 100 gal. (up to 6.4 lb/A max)
OR	Polyram 80 DF	2 lb. per 100 gal. (up to 6.4 lb/A max)

**Half-inch
Green**

Apple scab

Options the same as at Green Tip, except DO NOT USE COPPER.

Mites, Scale

Oil 2 gal. per 100 gal.

Rosy Apple Aphid (timing is critical for effective control)

Esteem 35 WP 3-5 oz per acre

**Tight
Cluster**

Apple scab

When using Flint or an SI (Indar, Rally, Procure or Rubigan), be aware of resistance management limitations. Do not make back to back applications of Flint. Apply SI's with an EBDC or Captan. Do not use SI's two seasons in a row. Do not apply any SI's or Flint more than four times per season as per the Protocol. Do not apply SIs if the orchard has known SI resistance or previous control failure with SIs. Do not use Captan within 10 days of an oil application.

	Captan 50WP	2 lb. per 100 gal.
OR	Captan 80WP	1.25 lb. per 100 gal.
OR	Captec or Captan 4L	1 qt. per 100 gal.
OR	Flint 50WDG	0.8 oz per 100 gal.
OR	EBDCs (high rates for all blocks) Dithane/Maneb/Penncozeb 75DF/80WP	2 lb. per 100 gal. (up to 6.4 lb/A max)
OR	Polyram 80 DF	2 lb. per 100 gal. (up to 6.4 lb/A max)
OR A COMBINATION OF EITHER		
	Rally 40WSP	2 oz per 100 gal.
	or Indar 2F	6 - 8 oz per acre
	or Procure 50WS	4 oz per 100 gal.
	or Rubigan 1EC	4 fl. oz per 100 gal.
PLUS EITHER		
	Dithane/Maneb/Penncozeb 75DF/80WP	1 lb. per 100 gal.
	or Polyram 80 DF	1 lb. per 100 gal.
	or Captan 50WP	1 lb. per 100 gal.
	or Captan 80WP	0.625 lb. per 100 gal.
	or Captec or Captan 4L	1 pt. per 100 gal.

Mites or San Jose Scale

If needed

Oil 1 gal. per 100 gal.

OR FOR MITES ONLY IF OIL IS NOT USED

Envidor 2SC (limit one application per season, not avail in NY)... 16 – 18 oz per acre

OR Zeal 72 WDG (for mites only, limit one application per season)	2 – 3 oz per acre
OR FOR SCALE ONLY	
Esteem 35WP	4 – 5 fl oz per acre
Tarnished plant bug	
If over threshold on white rectangle traps	
Avaunt 30WDG	5 – 6 oz per acre
Rosy apple aphid	
Actara 25 WDG (Do not apply within 4 days of bloom).....	4.5 fl. oz per acre

Pink

Apple scab

Same as Tight Cluster

Mites

If needed, same as Tight Cluster (excluding oil, which can damage blossom buds)

Tarnished plant bug

If over threshold on white rectangle traps, same as Tight Cluster

Bloom

Apple scab

Same as Tight Cluster.

Fire blight

NOTE: Streptomycin must be applied for fire blight only according to a weather-based forecasting program such as Maryblyt or Cougarblight.

BLOSSOM BLIGHT

Streptomycin

Agrimycin 17WP 0.5 lb. per 100 gal.

OR Firewall 17WP..... 0.5 lb. per 100 gal.

OR A COMBINATION OF

Agrimycin 17WP 0.25 lb. per 100 gal.

or Firewall 17WP..... 0.25 pt. per 100 gal.

PLUS Regulaid (spreader/activator)..... 1 pt. per 100 gal. actual spray (do not concentrate)

If in 2 – 4 days a second application is needed

Serenade Max 12.9 oz per 100 gal.

If in 2 – 4 days a third application is needed, repeat streptomycin

(Agrimycin, Firewall or Streptol, see rates above)

SHOOT BLIGHT (late bloom or early petal fall)

Trees > 5 years old

Apogee 27.5DF* 6 oz per 100 gal.

Trees < 5 years old

Apogee 27.5DF..... 3 oz per 100 gal.

*To be effective, Apogee must be applied well before shoot blight will first appear. Therefore Apogee should be used only if blossom infections are severe or if a history of fire blight in the block the

previous year suggests a high risk of shoot blight.

NOTE: After bloom, applications of streptomycin for fire blight must be made only in the event of hail or high wind damage in orchards with existing infections.

Codling moth: Pheromones for mating disruption

- Isomate CTT 200 ties per acre
- OR Checkmate CM-F..... 2.4 - 4.8 fl oz per acre

Apply pheromone mating disruption before initiation of moth flight (e.g., bloom for first generation, by late June for second generation); supplemental insecticide sprays timed to coincide with egg hatch will likely also be needed and may include border sprays in blocks adjacent to sources of adult immigration or other high-pressure situations.

Obliquebanded leafroller: If needed, based on >3% infested blossom clusters.

- Dipel 10.3DF..... 0.5 – 2.0 lb per acre
- OR Agree WG 3.8WS..... 1 – 2 lb per acre
- OR Intrepid 2F..... 8 – 16 fl oz per acre

Petal Fall **Apple scab:** Same as bloom EXCEPT DO NOT USE EBDCs AFTER BLOOM if you use miticides other than oil. Avoiding EBDCs after bloom will preserve predators. DO NOT USE the HIGH RATE EBDC PROGRAM AFTER BLOOM.

Mites: Make no more than two post-bloom miticide applications per season (except for oil).

- Oil (e.g., Stylet-Oil, Omni, PureSpray, Damoil)..... 0.5 – 2 gal. per 100 gal.
- OR Envidor 2SC (limit one application per season, not avail in NY) 16 – 18 oz per acre
- OR Zeal 72 WDG (limit one application per season) 2 – 18 oz per acre
- OR Acramite 50WS (limit one application per season) 31 fl. oz per acre
- OR Kanemite 15SC (limit two applications per season)..... 12 – 16 oz per acre

(Acramite and Kanemite are effective adulticides and thus may be best reserved for later in the season)

Plum curculio, European apple sawfly: If needed

- Avaunt 30WDG 5 – 6 oz per acre
- OR Calypso 4F..... 6 - 8 oz per acre
- Actara 25WDG (do not apply within four days of bloom) 4.5-5.5 oz per acre

Note: Sevin applied as a thinner may also have some benefit for Plum Curculio control but must not be applied unless for thinning purposes.

Obliquebanded leafroller: If needed based on \geq 3% infested blossom clusters (Only if not treated at bloom.)

- Altacor 35WDG 2.5-4.5 oz per acre
- OR Delegate 25WG 4.5-7.0 oz per acre
- OR Belt 480SC 3.0-5.0 oz per acre

(For these three products, make no more than three applications per product per season. Use for one generation of the target pest only.)

OR Proclaim 5SG	3.2 – 4.8 oz per acre
OR Intrepid 2F	12-16 fl. oz per acre
OR Agree WG 3.8WS.....	1 – 2 lb per acre
OR Dipel 10.3DF.....	0.5 – 2 lb per acre

Rosy apple aphid

Provado 1.6 Flowable	8.0 fl. oz per acre
OR Assail 30SG.....	4.0 – 6.0 oz per acre
OR Calypso	4.0 – 6.0 oz per acre

First Cover

Apple scab: Same as Petal Fall

Plum curculio: Same as Petal Fall, except after the 1st application for plum curculio, base any additional treatment decisions on scouting for fresh injury and/or a degree-day based oviposition model. After the first application for plum curculio, use perimeter row sprays rather than whole block treatments. *Note: For trees less than 7 ft. in height, or where scouting indicates fresh injury in the interior of a block, full block applications may be made.*

Codling moth: If needed based on block or region history.

Altacor 35WDG.....	2.5 - 4.5 oz per acre
OR Delegate 25WG.....	4.5 - 7.0 oz per acre
OR Belt 480SC	3 - 5 oz per acre

For these three products, apply first treatments just prior to egg hatch (250 degree days, base 50, after the first sustained pheromone trap catch (biofix)) followed by a second at 10-14-day interval. For these three products, make no more than three applications per product per season. Use for one generation of the target pest only.e.g., use an alternative material for the other codling moth generation.

OR Assail 30SG.....	6 – 8 oz per acre
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First treatment applied at 250 degree days (base 50) after the first sustained pheromone trap catch (biofix). If pressure is severe as indicated by pheromone traps or fruit damage, an additional application may be made 10-14 days later.

OR Carpovirusine 0.99SC (for codling moth only).....	0.5 – 1 pt per acre
OR Cyd-X 0.06SC (for codling moth only).....	3 fl oz per acre

These two products contain granulosis virus which specifically attacks codling moth larvae and work well in combination with mating disruption. They must be applied starting at first egg hatch and every 7-8 days during the moth flight, or about 4 applications per generation. Multiple applications at low rates are preferred.

San Jose scale: If needed based on block history. Make first application at 500 degree days (base 50) from March 1 and a second 14 days later. If pressure is severe as indicated by pheromone traps or fruit damage, an additional treatment against second generation crawlers at 1450 degree days from March 1 (in late July to August) with a second application 14 days later.

Esteem 35WP	4 – 5 fl oz per acre
OR Movento 2SC.....	6 - 9 oz per acre

(Maximum of 25 oz of Movento per season.)
 OR Provado 1.6F..... 6 – 8 oz per acre

Second Cover

Sooty blotch and flyspeck: Do not treat unless need is indicated by previous history and/or weather monitoring for wetting hours. Do not apply fungicides for summer disease until 270 wetting hours have accumulated since petal fall, or if wetting data are not available, early-July may be used as an estimated date.

Flint 50WG..... 0.67 oz per 100 gal.
 OR Captan 50WP..... 1 lb. per 100 gal.
 OR Captan 80WP..... 0.625 lb. (10 oz) per per 100 gal.
 OR Captec OR Captan 4L..... 1 pt. per 100 gal.

OR A COMBINATION OF
 Topsin M 70WP OR Topsin M 70WDG OR T-Methyl 70W* 4 oz per 100 gal.
 OR T-Methyl 4.5F* 3 oz per 100 gal.

PLUS EITHER

Captan 50WP..... 1 lb. per 100 gal.
 or Captan 80WP..... 0.625 lb. (10 oz) per 100 gal.
 or Captan 4L 1 pt. per 100 gal.

* NOTE: Use Topsin M or T-Methyl only where summer disease pressure is heavy indicated by block history. Use no more than 4 lb. per acre per year.

Plum curculio: See First Cover

Codling moth/Oriental fruit moth: See First Cover for insecticide options

Pheromone disruption (including Oriental Fruit Moth): For best results, make applications before the start of summer generation moth flights

Isomate-M 100 (oriental fruit moth)..... 100 ties per acre
 OR Isomate-C TT (codling moth)..... 200 ties per acre
 OR Isomate-CM/OFM TT (both species)..... 200 ties per acre
 OR Checkmate OFM-F (oriental fruit moth)..... 1.3 – 2.9 fl oz per acre
 OR Checkmate CM-F (codling moth)..... 2.4 – 4.8 fl oz per acre
 OR Checkmate CM-OFM Duel (both species)..... 150–175 disp per acre

Japanese beetle

Assail 30SG..... 5 - 8 oz per acre
 OR Provado 1.6F..... 8 fl. oz per acre

Multiple applications may be needed. Spot treatments should be considered where activity is limited within the orchard. Applications limited to the top of the canopy where feeding is occurring may be effective. Sample to determine if broad spectrum insecticides (Assail, Avaunt, Calypso) applied for other pests, e.g., apple maggot, codling moth, reduce or eliminate the need to apply an insecticide for Japanese beetle.

San Jose scale: See First Cover.

Third

Sooty blotch and flyspeck: After the first application for summer

Cover

disease (see Second Cover), do not make additional applications closer than intervals listed in Table A below.

- Captan 50WP..... 1 lb. per 100 gal.
- OR Captan 80WP..... 0.625 lb. (10 oz) per 100 gal.
- OR Captan 4L 1 pt. per 100 gal.

OR A COMBINATION OF

Topsin M 70WP* 3 oz per 100 gal.

PLUS EITHER

- Captan 50WP..... 1 lb. per 100 gal.
- or Captan 80WP..... 0.625 lb. (10 oz) per 100 gal.
- or Captan 4L 1 pt. per 100 gal.

*Use Topsin M only where heavy apple scab or summer disease pressure are indicated by scab severity or block history of summer diseases.

Table A. Activity of fungicides against summer diseases

Fungicide	Rate per 100 gal.	Minimum interval (days)	Maximum rainfall (in.) during interval
Topsin M <i>plus</i> Captan 50WP	3 oz 1.0 lb	21	2.5
Captan 50WP	1 lb	14	2.0
Flint 50 WDG	0.67 oz	21	2.5

Adapted from D.A. Rosenberger, Cornell University

Obliquebanded leafroller: Base application timing on trap catches and DD model (360 DD base 43F after first adult catch)

- Agree WG 3.8WS..... 1 – 2 lb. per acre
- OR Altacor 35WDG..... 2.5 - 4.5 oz per acre
- OR Delegate 25WG..... 4.5 - 7.0 oz per acre
- OR Belt 480SC 3 - 5 oz per acre

(For these three products, make no more than three applications per product per season. Use for one generation of the target pest only.)

- OR Dipel 10.3DF..... 0.5 – 2 lb. per acre
- OR Spintor 2SC..... 7 – 8 oz per acre
- OR Proclaim 5SG..... 3.2 – 4.8 oz per acre

Follow-up sprays are recommended 10-14 days later to ensure contacting most larvae of the 1st summer generation.

After Third Cover

Sooty blotch and flyspeck: Same as Third Cover except that a third summer disease application may be made only as per Table A above.

Summer and storage diseases: Use as final fungicide pre-harvest.

- Pristine 14.5 to 18.5 oz per acre

Apple Maggot: Base applications on monitoring traps (threshold of ≥ 1 for unbaited spheres or ≥ 5 for baited spheres) or use trap-out spheres

- Assail 30SG..... 8 oz per acre

OR Avaunt 30WDG	5 – 6 oz per acre
OR Surround WP [Frequent applications (7-10-day intervals) and maximal coverage (minimum of 100 gal/A are advised while there is active foliar growth)].....	25 – 50 lb per acre

Codling moth and Oriental fruit moth: Base applications on trap catch (1st adult flight biofix) and DD developmental models (CM: 250 DD base 50F from biofix; OFM: 170 DD base 45F from biofix), plus follow-up application 10-14 days later for each brood.

Altacor 35 WDG	2.5 - 4.5 oz per acre
OR Delegate 25WG	4.5 - 7.0 oz per acre
OR Belt 480SC	3 - 5 oz per acre

(Note: These three products are limited to no more than three applications per product per season. Use for one generation of the target pest only.)

OR Assail 30SG.....	8 oz per acre
OR Avaunt 30WDG	5 – 6 oz per acre
OR Intrepid 2F.....	12 – 16 oz per acre
OR Carpovirusine 0.99SC (for codling moth only).....	0.5 – 1 pt per acre
OR Cyd-X 0.06SC (for codling moth only).....	3 fl oz per acre

Mites: Make no more than two post-bloom miticide applications per season.

Acramite 50WS (limited to 1 application per season).....	0.75 – 1 lb per acre
OR Envidor 2 SC (limit one application per season)	16 – 18 oz per acre
OR Kanemite 15SC (limited to 2 applications per season).....	31 fl oz per acre
OR Zeal 72WS (limited to 1 application per season).....	2 – 3 oz per acre

White apple leafhopper:

Assail 30SG.....	2.5 – 4 oz per acre
OR Avaunt 30WDG	5 – 6 oz per acre
OR Provado 1.6F.....	2.0 – 4.0 oz per acre

Woolly apple aphid:

Assail 30SG.....	4 – 8 oz per acre
OR Movento.....	6 – 9 oz per acre

(Apply Movento early if over threshold, not effective against established high populations.)

ADDITIONAL NOTES: If lesser appleworm is a problem indicated by block history or monitoring, Delegate or Belt may be applied just prior to egg hatch followed by a second 10-14 days later. Any codling moth applications are also likely to control lesser appleworm, thus in orchards treating for codling moth, applications specifically for lesser appleworm are not likely to be needed.