RAMP 2010 – Final Report, New York

1. Outputs:
- 2007-2009: A full-season Reduced Risk (RR) pest management program was implemented on 5 (6 in 2007) grower participants' farms, consisting of sampling and monitoring-based decision making together with the use of selective pesticides to control arthropod pests (one employing mating disruption in 2007 in addition to RR pesticides) committing a total of 216 acres, 113 acres of which constituted the entire farms for 2 of the growers. Pheromone traps were maintained for key insect pest species, fruits and foliage were sampled for infestation by pest and predator insects and mites, and fruits were inspected for disease and insect damage at harvest.
- 2008: A large-plot obliquebanded leafroller (OBLR) study was conducted on 6 additional grower participants' farms. Portions of the orchards having a historically high infestation pressure were inspected weekly for foliar and fruit damage by OBLR larvae; the growers agreed to withhold pesticide treatments against this pest's summer generation unless fruit damage was detected during the sampling sessions; the remainder of the orchards were sprayed according to the growers' standard management program. Fruit damage at harvest was compared between the two management systems.
- 2007-2008: A full-season mating disruption trial was conducted in 5–25-acre plots on 3 (2007) or 4 (2008) farms, to assess: 2007 – the efficacy of three different multi-species pheromone products against codling moth (CM), oriental fruit moth (OFM), and lesser appleworm (LAW): Isomate CM/OFM TT ties; Checkmate CM/OFM Duel membranes; and Suterra CM/OFM Puffers; and 2008 – the efficacy of two different mechanically applied multi-species pheromone products against these same species: ISCA Tech SPLAT sprayable, and Suterra CM/OFM Puffers. Pheromone treatments were used as a complement to the growers' normal insecticide programs. Pheromone traps were maintained for all target insect pest species, fruits were sampled weekly for larval damage throughout the season, and fruits were inspected for surface and internal damage at harvest.
- 2009-2010: A predictive Apple pest management website was validated by a group of 16 apple growers located in all the major production areas. At each site, a 10-20A planting of apples was monitored for crop and pest status throughout the season, and a nearby weather station provided daily temperature data for crop and pest developmental predictions. Degree day information based on historical records or user-entered biofix data included: start, peak, or progress of the oviposition or egg hatch period; start, peak or end of the pest's 1st, 2nd, etc., flight; first occurrence of adult or larval feeding, foliar or fruit damage, or mines. Insect traps were checked weekly to monitor flights, and weekly fruit inspections starting in July assessed larval feeding damage by leafrollers or internal feeding caterpillars. Insect monitoring results were reported weekly to the grower or consultant for their use in determining appropriate reduced-risk management decisions in the blocks. Web predictions were compared with population trends observed in the field for as many of the pest species as was possible.

2. Outcomes/Impacts:
- 2007-2009: The full-season RR program implemented on growers' farms gave clean fruit levels of: 2007, 92.0–98.0%; 2008, 93.5–98.7%; and 2009, 93.9–97.9%; late-season OBLR accounted for the largest category of insect damage each year (2007, 1.2–6.2%; 2008, 1.0–2.8%; 2009, 1.0–1.3%), and smaller amounts of damage being caused by plum curculio, tarnished plant bug, and rosy apple aphid. Where available, clean fruit grown on the same farms using conventional

practices ranged from: 2007, 92.9–98.2%; 2008, 94.4–98.2%; and 2009, 91.4–98.9%. In 2009, apple scab was problematic in all cases (4.0% max in the RR plots; 8.4% max in the Standards).
- 2008 Large-Plot OBLR Study: Levels of fruit damage at harvest were not appreciably different between the sampling-based vs. standard management programs. Damaged fruits did not begin to be seen in the weekly on-tree inspections until the last week of July or the first week of August, and the procedure used was easy to implement and capable of detecting low levels of infestation at their start.
- 2007 Mating disruption trial: All three dispenser technologies suppressed adult catches of OFM and LAW to near-zero levels for the entire season, but at two of the sites, some or all of the treatments allowed some breakthrough of CM in late June. Weekly on-tree fruit inspections detected very few damaged fruits until mid-August. Total fruit damage at harvest ranged from 0–7% across all sites and pheromone treatments (compared with 1–8.4% in the nondisrupted grower standards). The Duel plot had lower total damage than the nondisrupted plot at all three sites, as did the Isomate plot at one site. At one site, both of these treatments had lower total damage than in the Puffer plot.
- 2008 Mating disruption trial: Both dispenser technologies suppressed adult catches of OFM and LAW to near-zero levels for the entire season, but some or all of the treatment plots allowed some breakthrough of codling moths at various times during the summer. Weekly on-tree fruit inspections detected very few damaged fruits until late July; as much as 5% damage was observed in one of the SPLAT treatment plots. Total fruit damage at harvest ranged from 0–1.9% across all sites and pheromone treatments (compared with 0–12.8% in the nondisrupted grower standards).
- General accuracy of the website's prediction of first catches, 2009: The observed first trap capture occurred within the period predicted by the website (AM and OBLR, although predicted range was broad) or overlapped the ends of the prediction period (OFM and CM). In 2010: Observed first trap capture occurred within or after the period predicted by the website; prediction periods were more uniform and narrower, and biofixes were determined more accurately. Increased effort will be made in the coming year to provide dynamic pest predictions (by running DD development models in real time) and to investigate the use of digital virtual weather data for improved site specificity.

3. Publications:

Agnello, A. 2009. Evaluations of low-labor pheromones for mating disruption of tree fruit pests. Pages 31-33 In Proc. 2009 Empire State Fruit & Vegetable Expo, Syracuse, NY.

Agnello, A. M., A. Atanassov, J. C. Bergh, D. J. Biddinger, L. J. Gut, J. K. Harper, M. J. Haas, H. W. Hogmire, L. A. Hull, L. F. Kime, G. Krawczyk, P. S. McGhee, J. P. Nyrop, W. H. Reissig, P. W. Shearer, R. W. Straub, R. T. Villanueva, and J. J. Walgenbach. 2009. Reduced-risk pest management programs for eastern U.S. apple and peach orchards: A 4-year regional project. Am. Entomol. 55: 184-197.

Agnello, A., and H. Reissig. 2009. Mechanically applied pheromone products for mating disruption of codling moth and oriental fruit moth in apples. NY Fruit Quarterly 17: 3-8.

Agnello, A. M., and H. Reissig. 2010. Development and validation of a "Real-Time" Apple IPM Website for New York. NY Fruit Quarterly 18 (2): 25–28.

Agnello, A., and H. Reissig. 2010. Development and validation of a “Real-Time” Apple IPM website for NY. Proc. 85th Cumberland-Shenandoah Fruit Workers Conf., Winchester, VA. 1-4.

Agnello, A., W. H. Reissig, and J. P. Nyrop. 2008. Whole-farm assays of obliquebanded leafroller management straegies. Proc. 83rd Cumberland-Shenandoah Fruit Workers Conf., Winchester, VA. 61-65.

Reissig, H., and A. Agnello. 2008. Potential new management techniques for obliquebanded leafroller: Large plot treatments and monitoring for fruit damage. N.Y. Fruit Quarterly 16 (2): 15-21.

4. Participants:

A) PIs – **W. H. Reissig**, oversaw setup and maintenance of large-plot OBLR trials, including fruit and foliar inspections and (for all main output areas) harvest damage assessments
A. M. Agnello, oversaw setup and maintenance of full-season RR trial and mating disruption trials, including trapping, monitoring/sampling, and (for all main output areas) fruit harvest damage evaluations.

B) Other workers – D. Aguilera, A. Blackburn, K. Fello, N. Gottschall, J. Mattick, C. Sekulic, J. Watt, K. Wentworth: provided technical field and lab support, including plot setup, trap maintenance, foliar and fruit sampling, harvest evaluations, data entry.

5. Collaborators: Consultants: J. Alicandro, N. Rose, NY; P. Babcock, Rochester, NY; J. Eve, Naples, NY; J. Misiti, Lyndonville, NY

Cornell Cooperative Extension: D. Breth, Regional Fruit Specialist, Albion, NY; K. Iungerman, Regional Fruit Specialist, Ballston Spa, NY.

Grower Cooperators: W. Blackler, Lafayette, NY; E. Brown, Waterport, NY; J. Burch, Hilton, NY; G. Craft, Macedon, NY; R. DeBadts, Sodus, NY; R. Endres, Sodus, NY; M. Forrence, Peru, NY; T. Furber, Sodus, NY; T. Green, Chazy, NY; C. Hance, Pultneyville, NY; J. Knight, Burnt Hills, NY; M. Maloney, Sodus, NY; D. Oakes, Lyndonville, NY; A. Sullivan, Peru, NY; P. Ten Eyck, Altamont, NY; D. VanFleet, Wolcott, NY.

6. Training or professional development: N/A

7. Target Audiences: NY tree-fruit industry, including growers, consultants, Cornell Cooperative Extension, packers, and distributors; crop protectants manufacturers; fruit marketers and consumers

8. Efforts:

Development of an interactive Apple IPM Website that uses local weather data to predict apple crop and pest development and provide users information on the best sampling, monitoring, and reduced-risk pesticide inputs available to make management decisions on their farms.

Improved and updated information and new knowledge was delivered to target audiences through printed and online resources (university guidelines, newsletters, trade journal articles, web-based decision support products), grower fruit schools, field day presentations and twilight meetings, and personal consultation and farm visits.