Rutgers Cooperative Extension at the New Jersey Agricultural Experiment Station

PLANT & PEST ADVISORY

Cranberry Edition $1.50 June 25, 2007

INSIDE

Insect Update

Cesar Rodriguez-Saona, Ph.D., Specialist in Entomology

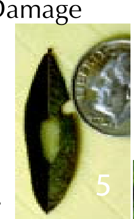
At the twilight meeting, several cranberry growers asked me for copies of the book "Cranberry Insects of the Northeast" by Anne Averill and Martha Sylvia. This book is very useful for identification of cranberry insect pests and information on their life cycles and management and I recommend all growers obtain a copy.

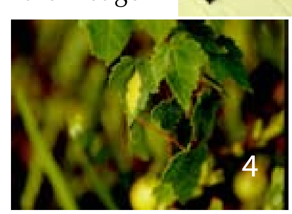
If you would like to buy a copy, you can send a $25 check (includes postage) made out to University of Massachusetts together with a request letter to:

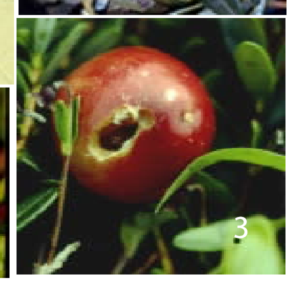
Deb Cannon
Cranberry Station
PO Box 569
East Wareham, MA 02538

The three insect pests to watch for after bloom are **spotted fireworm**, root-feeding insects (*Phyllophaga* spp.), and **cranberry fruitworm**.

Spotted fireworm. This insect is one of the most important pests in New Jersey. It becomes a problem in "weedy" beds because female moths lay their eggs predominantly on weeds. Keeping beds clean from weeds will keep this insect under control. Damage by this insect causes a characteristic browning of uprights. There are two generations a year. Larvae overwinter on the bog floor and continue to develop in April-May. Adults appear in early-June. Eggs from the first generation are laid late in June; I observed eggs in commercial cranberry beds last week. Larvae from this second generation will complete development and moths will emerge in early August and lay eggs. Eggs from the second generation will hatch in mid-August. Larvae will feed on berries in the second generation







Spotted Fireworm: 1.Larva, 2.Adult, 3.Damage to berry, 4-5.Egg masses

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(see picture) and overwinter. Previous studies reported high levels of parasitism, especially from the egg parasitoid *Trichogramma* spp. Parasitized eggs are black compared to the yellow-orange color of unparasitized eggs.

If found in high densities, I recommend the use of the growth regulators: Confirm 2F or Intrepid 2F, or use of SpinTor 4SC. These are very effective and selective against caterpillars. Growth regulators are most effective if targeted against young larvae.

White grubs, *Phyllophaga* spp. There are several species of white grubs that infest cranberries in New Jersey. Grubs are C-shaped and often found near bog margins. Adults are reddish brown and nocturnal. Grubs attack the cranberry roots; adults have not been reported to feed on cranberries. See pictures of grubs and grub damage in cranberries. The life cycles and abundance of white grub species in New Jersey is poorly known and a priority for future research. Most likely, *Phyllophaga* grubs have a 3-year life cycle (based on previous reports and my own observations). Eggs are laid in late-June and July, and will hatch in July. First instars can be found in late-July and August and turn into second instars by the end of August-September. The second instar grubs will overwinter. These grubs will feed the following year until June and molt to third instars, which will overwinter. The following year, the third instars will feed for some time and then begin to pupate in June. Pupation will take place in July-August. Adults will appear in the soil in August-September. Adults will remain in the soil and overwinter. They will emerge in June, mate, and begin to lay eggs, completing the cycle.

Phyllophaga grubs. 1.Damage, 2.Grubs

I recommend the use of Admire Pro to control white grubs. Admire Pro works best against early- (1st-2nd) instar grubs. If treatment is needed, Admire Pro should be used soon after bees are taken out of beds. Because of the 3-year life cycle, treatment should be continued for 2-3 consecutive years to ensure control.

Cranberry fruitworm. Although it is a major pest in blueberries, this insect has not been considered a pest in cranberries in New Jersey. It is, however, the most destructive cranberry pest in Massachusetts. We need to prevent this insect from establishing in cranberries in New Jersey. Larvae (see picture) commonly web together berries. Berries turn red prematurely and become filled with frass. There is a single generation a year. The larvae overwinter in a hibernaculum. Pupation occurs inside the hibernaculum around June (this may vary depending on when the winter flood is removed). Moths emerge in mid- to late-June. Eggs are placed on young fruit (at the calyx). Newly-hatched larvae will bore into the fruit, entering close to the stem. A larva may eat through 3-8 berries. Larvae will complete development and drop to the bog floor to form the hibernaculum. Adults often fly from wooded areas; thus, most eggs can be found along bog margins.

Cranberry fruitworm larvae feed only inside the berries

Once the larvae enter the fruit, control is not possible. Therefore, insecticide sprays should be timed just prior to egg hatch, targeting the newly-hatched larvae. The sex pheromone is available and can be used to monitor male flight. However, trap captures do not often correlate with oviposition or number of infested berries. A more accurate, but labor-intensive, monitoring technique is to inspect berries for eggs. Berries should be collected near bog ditches.

In blueberries, we use pheromone traps to monitor male flight and time insecticide spray. Even with its limitations, this is the best technique available to time insecticide sprays (we are working in conjunction with Michigan State University and the University of Massachusetts on finding better monitoring techniques). In blueberries, insecticide spray is recommended 5-7 days after peak pheromone catch (male flight peaked last week in New Jersey cranberries). Even though there is no threshold established, treatment is recommended if trap catches are unusually high (30 moths of higher) or if there is a history of high cranberry fruitworm infestation. I recommend the use of the growth regulators Confirm or Intrepid. These compounds can be used when bees are still present. ❑

Resistance to Pesticides

Reprinted from Wisconsin Cranberry Crop Management Newsletter, June 20, 2007

Pesticide resistance is the inherited ability of a pest to tolerate the toxic effects of a particular pesticide. As resistance becomes more widespread in a population, you have to apply more pesticide more often to control the pest. Over time that pest may not be controlled with applications of that particular pesticide. Once that happens, that pesticide is no longer a useful tool. Hundreds of pest species, mostly insects, have become resistant to one or more pesticides.

Where does pesticide resistance come from? When organisms reproduce, the offspring receive copies of the parent genetic material. However, the copies are not always perfect. Mistakes appear. These are called mutations. Many times the mistakes are of no consequence or are lethal. Sometimes, however, a mutation benefits an organism. An example is a mutation that confers pesticide resistance. Because pest populations are large, it is likely that within a population there will be a small percentage that are resistant to a particular pesticide along with a small percentage that are extremely susceptible. Resistant individuals survive pesticide applications and are able to pass along this resistance to at least a portion of their offspring. Because the pesticide kills most of the non-resistant individuals, the resistant individuals begin to make up a larger percentage of the surviving population. As this continues, eventually most of the population is resistant.

In many cases, pest populations that become resistant to one pesticide in a group also become resistant to other related pesticides. This is called cross-resistance. Cross-resistance happens because closely related pesticides kill pests in the same way; (all organophosphates inhibit cholinesterase) if a pest can resist the toxic action of one pesticide, it can usually resist other pesticides that act in the same manner.

Given that pesticide resistance is an ever present threat, you need to understand what influences its development. In this way you can manage pests to minimize the chances for resistance to develop. The most important factors that influence the development of resistance are:

- The frequency of resistance in the pest population before using the pesticide of interest. Resistance may be entirely absent from a pest population, or it may be present in relatively few individuals. Obviously, no resistance is best.
- The chemical diversity of the pesticides used. If you always use the same pesticide or the same group or family of pesticides you won't be killing pests that are resistant to that pesticide or family of pesticide. When this happens the proportion of resistant individuals will increase more rapidly in the population.
- Persistence and frequency of use of a given pesticide. Resistance is more likely to develop against pesticides that have greater persistence ad that you apply often during a treatment season. These factors are less important for herbicides than for insecticides and fungicides. Even short lived herbicides can provide season-long weed control, and normally you apply the same herbicide only once per season.
- The proportion of the population exposed to the pesticide. Insect life cycles are generally very predictable, and you usually apply a pesticide when most of the insects are at the same susceptible stage. Thus, most non-resistant individuals are killed, which

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Upcoming Events

August 16, 2007 – American Cranberry Growers Association (ACGA) Summer Meeting, PE Marucci Center, Chatsworth NJ

October 1-3, 2007 –North American Cranberry Research and Extension Workers (NACREW) Meeting, Tuscany House, Renault Winery, Egg Harbor City NJ

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increases the proportion of resistant individuals in the surviving population. On the other hand, insects that migrate in from non-treated areas dilute this population.

- The length of the pest's life cycle. As with any other inherited trait, pesticide resistance will increase more rapidly if the pest has a short life cycle and many generations in a single season. This largely explains why insect populations become resistant faster than weed populations.

In the past we responded to resistance by switching to different chemistry. New products became available regularly. Unfortunately, this is no longer the case. Today's new pesticides are more complex, difficult to synthesize and more expensive to develop and use. Even these products are subject to development of resistance. Obviously, switching products is no longer enough.

In developing your pest management program you should assume that pests can (and will) develop resistance to any pesticide you use against them. This means placing greater emphasis on resistance management. This may be more work in the short run, but will pay dividends in the long run as effective chemistry can be maintained.

Resistance management includes reducing frequency of application of any material, utilizing non chemical approaches (BT's, nematodes), and population monitoring. This is part of the "integration" of integrated pest management.

Adapted from: Pest management principles for the commercial applicator: Fruit Crops, 3rd edition. UWEX, Madison.

Submitted by Cesar Rodriguez-Saona, Ph.D., Specialist in Entomology. ❑

Weekly Weather Summary

Keith Arnesen, Ph.D., Agricultural Meteorologist

Temperatures averaged slightly below normal, averaging 68 degrees north, 69 degrees central and 71 degrees south. Extremes were 92 degrees at Flemington and Trenton on the 20th, and 45 degrees at Charlotteburg on the 24th. Weekly rainfall averaged 1.00 inches north, 1.10 inches central, and 0.49 inches south. The heaviest 24 hour total reported was 0.89 inches at Flemington on the 19th to 20th. Estimated soil moisture, in percent of field capacity, this past week averaged 89 percent north, 84 percent central and 62 percent south. Four inch soil temperatures averaged 68 degrees north, 69 degrees central and 70 degrees south.

Weather Summary for the Week Ending 8 am Monday 6/25/ 7

	RAINFALL			TEMPERATURE				GDD BASE50		MON
WEATHER STATIONS	WEEK	TOTAL	DEP	MX	MN	AVG	DEP	TOT	DEP	%FC
CANOE BROOK	.82	24.36	8.62	88	48	70.	0	1048	310	90
CHARLOTTEBURG	.91	17.70	1.82	86	45	66.	-1	898	327	80
FLEMINGTON	1.14	22.02	7.00	92	46	69.	-1	982	216	88
NEWTON	1.14	13.80	-.49	87	46	67.	-1	873	228	87
FREEHOLD	1.14	18.07	3.30	87	46	68.	-3	1141	286	91
LONG BRANCH	1.37	17.90	3.04	82	52	69.	-1	936	149	81
NEW BRUNSWICK	1.22	23.96	9.53	87	49	70.	-3	1059	153	93
TOMS RIVER	.56	15.20	.52	84	47	68.	-3	991	209	58
TRENTON	1.19	19.08	5.66	92	51	71.	-2	1108	151	75
CAPE MAY COURT HOUSE	.21	10.35	-2.68	82	51	70.	-1	992	131	52
DOWNSTOWN	.19	15.18	1.89	89	49	70.	-2	1106	130	51
GLASSBORO	.79	17.28	2.91	90	50	73.	1	1258	303	62
HAMMONTON	.38	15.01	1.02	87	50	70.	-3	1143	195	52
POMONA	.24	15.23	2.52	84	51	69.	-2	1086	219	49
SEABROOK	1.14	16.36	3.65	91	52	72.	-1	1261	278	81
SOUTH HARRISON	.24	16.65	1.48	90	53	72	NA	1209	NA	NA

WES KLINE -- GDD BASE 40 PINEY HOLLOW
LAST WEEK 199 (Ending 6/18/07)
THIS WEEK 209 (Ending 6/25/07)

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Pesticide User Responsibility: Use pesticides safely and follow instructions on labels. The pesticide user is reponsible for proper use, storage and disposal, residues on crops, and damage caused by drift. For specific labels, special local-needs label 24(c) registration, or section 18 exemption, contact RCE in your County.
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