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THE OHIO STATE UNIVERSITY Newsletter Extension

Fruit ICM News

Volume 8, No. 24
July 8, 2004

In This Issue:

European Red Mite

Reference: Common Tree Fruit Pests, Angus Howitt, 1993, NCR 63, Michigan State University

In the animal kingdom, few of the larger orders can be mentioned about which less is known than the Acarina, popularly known as mites. The almost universal lack of knowledge of this group is undoubtedly explained by the minute size of its members, their obscure habits, and the comparatively few forms that are of economic importance. The common European red mite occurs throughout the world and is probably the species of greatest economic importance among the plant-feeding mites. The European red mite began to appear in various parts of eastern North America early in the 20th century. It was reported in Ontario, Canada in 1912 and in Geneva, NY in 1915.

Life Stages

Egg: The egg is lenticular, flattened at the poles, and distinctly grooved. A stalk about as long as the diameter of the egg arises from the center, tapering gradually from the tip, which is somewhat bent or curved. When first deposited, the egg is bright red, but it soon changes to a deep orange. Shortly before hatching, it becomes somewhat translucent, like an empty eggshell. The empty eggshells are whitish. The transverse diameter of summer eggs averages 0.132 mm. The winter eggs are very similar to the summer eggs, except they are a deeper, richer red and are somewhat larger. The transverse diameter of the winter eggs averages 0.148 mm.

Larva: The newly hatched larva is lemon-yellow to light orange, but after feeding it becomes darker, changing more or less to a reddish brown, depending on the quantity of chlorophyll it has taken with its food. The cephalothorax and the legs and palpi remain largely semi-transparent. The larva does not have the conspicuous whitish spots at the base of the dorsal bristles that occur in the adults. It has only six legs, which readily distinguish it from the other instars. The average length of larvae is about 0.15 mm.

Protonymph: The protonymph, or second instar mite, differs primarily from the larva in that it has eight legs instead of six. It is also somewhat larger and has a deeper, richer color. The size of the protonymph depends greatly on the length of time elapsing after its transformation from the larval stage. The length of protonymphs ranges from 0.20 to 0.25 mm.

Deutonymph: There is less difference between the deutonymph and the protonymph than between any of the other stages. There is so little difference that it is often difficult to distinguish these two stages. The deutonymph is slightly richer in color and somewhat larger. In the latter part of this stage, the sexes can be distinguished. The male deutonymph is smaller and more slender than the female. The length of deutonymphs is 0.25 to 0.30 mm.

Adult: A newly molted adult female is dark velvety brown, velvety green, or brownish green, somewhat resembling the deutonymph. After a day or more, the color changes to dark velvety red or brownish red. White spots at the bases of the dorsal bristles are conspicuous. The adult male is much smaller than the female, measuring 0.26 mm long to the female's length of 0.40 mm. The abdomen is pointed, and the color is straw yellow to reddish yellow, never red.

Host Range

The European red mite is a pest of deciduous fruit worldwide in the United States, Canada, Europe, Argentina, Uruguay, Chile, New Zealand, and Australia. The favorite food plants of the European red mite are the common deciduous fruits, particularly apple, plum, and pear. It has also been found on cherry, peach, grapes, raspberries, and roses.

Injury or Damage

European red mite injury to deciduous fruit trees is difficult to measure and varies greatly with different varieties of fruits and different conditions. Apple, pear, and plum are the most seriously affected by the mites. Cherries are affected to a lesser degree, and peaches and apricots seem to be comparatively free from attack. Among apples, thin-leaved varieties are most susceptible, but no variety has been observed to be particularly immune. Mites seem to favor Delicious, Northern Spy, and Rome. Winesap is not seriously affected. No particular difference has been observed in the varieties of pears and susceptibility of plums.

The mites feed by inserting their mouth-parts into the leaf cells and withdrawing the contents, including the chlorophyll. The leaves can recover if the mites are destroyed before the leaves are badly damaged. If much of the chlorophyll has been withdrawn, however, the plant seems to be unable to replace it rapidly, and it is never entirely replaced during the life of the leaves.

Apple foliage usually becomes bronzed or brown as a result of mite attacks. Bronzing over the leaf is followed by a quick decline in population. This decline is not due to debris and dust on the leaves but to two factors: the larval stylets are not long enough to penetrate to the remaining healthy cells, and density of the leaf cuticle and epidermal layer make it difficult for the stylets of the mite to penetrate.

In irrigated orchards, the leaves seldom drop; the abundance of moisture evidently prevents this. In non-irrigated orchards, severe mite infestations can cause partial defoliation. Pears and apples are similarly affected. The trees and fruit are also affected by infestations of mites, but these effects are not so easily seen. The mites do not feed on the fruit itself to any great extent, but the fruit is indirectly affected.

Because the trees manufacture their food supply largely in their leaves, any foliage injury will reduce the

vitality of the tree and, consequently, the size of the fruit, if it does not drop off. The most serious injury occurs in early summer, when trees are producing fruit and buds for the following season. Bronzing on moderately to heavily infested trees (30 mites or more per leaf) causes trees to produce fewer and less vigorous buds.

Mite injury rarely occurs early enough to affect the setting of the current year's crop. New leaves injured early in season will not recover the season, even though mites will decrease naturally by late July or the middle of August. Growers must control mites early in the season to prevent injury.

Factors Affecting Abundance

Initial populations: The number of mites hatching from the overwintering eggs constitutes the initial population. The number of overwintering eggs is influenced by favorable or unfavorable factors of the previous season. Usually, trees that have been severely attacked by mites in midsummer will carry only a few eggs, because the population will have been depleted by predators and lack of food. This will have occurred before the season of heaviest egg deposition. Trees with foliage in good condition in late August and early September will usually carry far greater numbers of overwintering eggs.

When other factors are equal, trees with high numbers of eggs always develop larger and more damaging populations of mites at earlier dates. Data also show that it is more difficult to combat and reduce these high populations. Initial numbers, therefore, must always be considered a factor in seasonal trends.

Weather conditions: These are very important, especially during the early part of the season. Immediately after hatching, the young mites are very susceptible to low temperatures. Many instances have been observed in which threatening numbers of young mites (15 to 25 per leaf) were reduced by low temperatures to a point where they were practically harmless.

Though mites are active at somewhat lower temperatures than many insects, all their life processes are speeded up by temperatures within the general range of 70 to 90 degrees F. Temperatures above this point retard activities. Although temperature is the most important weather factor, wind plays a part in dispersing mite populations, and low humidity will reduce egg hatch. Varying degrees of light seem to influence the movements of mites within a tree.

Natural enemies: Among the predaceous mites, *Amblyseius fallacis,* a phytoseiid, and two stigmaeid mites, *Agistemus fleschneri* and *Zetzellia mali*, are most conspicuous on apples. They are a very definite factor in the control of mites on unsprayed trees, but they are not as effective in sprayed orchards unless growers take care to use broad spectrum pesticides and miticides with low toxicity to these predators. In orchards where mite populations are high, particularly after the season's spray program has ended, phytoseiid mites will be a definite aid in control. Unfortunately, this almost always occurs after severe damage has taken place.

The most efficient predator among the coccinellids is *Stethorus punctum*. This is a very small, robust, black ladybird that is commonly found in connection with heavy mite infestations toward the end of the growing season. Both larvae and adults feed on the eggs and on motile mites making the species doubly efficient. This beetle is found in numbers primarily in orchards south of Michigan because of its intolerance of extreme winter temperatures.

Life History

The European red mite passes the winter in the egg state. Winter eggs may be found on the smaller branches and twigs of the trees. They are much more numerous on the lower sides than above, and they are most often deposited in the forks of two branches and in other roughened places. When the infestation is severe, the bright red eggs may also be found in the calyx ends of apples. At other times, a close examination will show that most of the eggs are transparent and empty because some of the insect enemies of the mites have fed on them.

The eggs start to hatch at the tight cluster stage. Fifty percent will have hatched by pink stage, and all will have hatched by the end of bloom. The first summer eggs are deposited by late petal fall or first cover.

The eggshell splits around its equator for most of its circumference, with a small portion left as a hinge. The larva lifts the upper half, or lid, and crawls out. The lid usually springs back to its original position. All the winter eggs usually hatch within a week or 10 days.

Table 1. European red mite population potential

Generation	Number of Mites		Eggs/Female
	Total	Female	
First	2	1	9
Second	9	6	43
Third	258	172	57
Fourth	9,084	6,536	33
Fifth	215,688	143,124	35
Sixth	5,009,320	3,339,546	7
Seventh	23,376,882		0

Source: New York Experiment Station, Geneva, NY

Table 2. European red mite population on untreated

Generation	Number of Mites	
	Total	Females
First	90,000	60,000
Second	540,000	360,000
Third	15,480,000	3,921,600
Fourth	129,412,800	86,275,200

Source: New York Experiment Station, Geneva, NY

Table 3. European red mite population following 99 percent egg kill

Generation	Number of Mites	
	Total	Females

First	900	600
Second	5,400	3,600
Third	154,800	103,200
Fourth	5,882,400	3,921,600
Fifth	129,412,800	86,275,200

Source: New York Experiment Station, Geneva, NY

Table 4. The influence of temperature on the development of the European red mite*

Avg. Temp. (Degrees F)	Egg Incubation (days)	Hatch to Adult (days)	Total Days
55	19	21	40
60	16	14	30
65	11	10	21
70	8	7	15
75	6	4	10

* The time it takes for a European red mite egg to hatch and the mite to reach adulthood ranges from 40 days at 55F to 7 days at 80F. At 70F, development is twice as rapid as at 60F. At 75F, development is three times as fast as at 60F.

Source: New York Experiment Station, Geneva, NY

Factors Influencing Mite Buildup:

Extremely high biotic potential of all plant-feeding mites. In climates where the European red mite undergoes roughly eight generations a year, it has been estimated that the progeny of a single pair of mites would by the end of the season amount to 227,812,500 individuals. This is a hypothetical figure and never is met in nature.

Abundance of overwintering eggs. The extent of carryover of winter eggs is directly related to the weather of the previous season. Unless the food supply is depleted, the European red mite is incapable of producing winter eggs until mid to late August. If the weather conditions are such that the mites are present in large numbers late in the season, you can be assured that there will be a heavy egg carryover. The opposite is true when the mites are most abundant in July.

Winter eggs survival. Extreme winter temperatures will reduce the populations. In 1957, unusually cold weather during January afforded the opportunity to measure the effect of winter temperatures on egg survival in New York state. Samples of mite eggs were collected from areas where the minimum temperature ranged from -9 degrees to -34 degrees F, and the percent egg hatch was determined in the laboratory. Results showed that the winter eggs were not adjusted to survive the abnormally low temperatures that prevailed in some areas. It would appear that any temperature that falls below -22 degrees F, especially if it is sustained, could destroy an appreciable number of eggs, with mortality

increasing rapidly below this figure.

Weather and spray pressure during the period of egg hatch. The period from prepink through blossoming is perhaps the most critical time in the establishment of the species. Not only are mites more susceptible to acaricidal treatments at this time, but adverse weather will also reduce the population.

Summer weather. The most important factor influencing activity is the weather. The European red mite, like most other mites, does better under hot, dry conditions.

Immature Stages: The small, bright red or orange larvae swarm to the young leaves and begin feeding at once. In some cases, they may travel several inches or even feet before beginning to feed. They crowd down among the unfolding leaves and are not very conspicuous. After a period of feeding during which the larva moves about to some extent, it settles down, usually on the underside of a leaf near a vein or midrib, and remains quiescent (inactive) for a time. The quiescent period lasts about as long as the feeding period. The mite remains perfectly motionless and apparently takes no food. After a time, the skin becomes smooth and glossy and finally turns pearly white, indicating that it has loosened from the new skin underneath. Within a few hours, it splits transversely across the dorsum between the second and third pairs of legs, and the eight-legged protonymph pushes its way out. The molted skins usually remain stuck to the leaf. In severe infestations, these and the eggshells may be numerous enough to give the leaf a silvery appearance.

In the protonymphal stage, the feeding and quiescent periods are repeated, though each is somewhat shorter than the corresponding period in the larval stage. Then the protonymph molts and becomes a deutonymph. The sex of the deutonymph can be determined after it has fed for a time; the females become larger and more round than the male. The duration of this stage is slightly longer than the larval or the protonymphal stage. The males complete each of these stages in a fraction of a day less than the females.

The total for the immature stages averages eight days for males and nine days for females.

Adult emergence and copulation: The male becomes an adult first, and it runs about over the leaves until it finds a quiescent female deutonymph. It then settles down beside the deutonymph to await the emergence of the female. As soon as the nymphal skin of the latter splits across the back, the male begins working at the posterior half of it with his forelegs and mouthparts. The female then backs out of the anterior half of the old skin and copulation takes place immediately, sometimes even before the female has had time to free herself entirely from the nymphal skin. The male crawls under the female from the rear. The female elevates the tip of her abdomen, and the male claps his front legs about her abdomen and his second pair of legs about her hind legs, then curves the end of his abdomen upward and forward until it meets the end of the female's abdomen. The pair remain in this position for 10 or 15 minutes.

The European red mite also reproduces parthenogenetically, a process by which females can give birth to living young with out mating.

Summer egg deposition and hatching: In the summer, the oviposition period averages 12 days, during which females lay an average of 19 eggs. The first summer eggs are deposited by late petal fall or first cover. The first generation requires three weeks for development from egg to adult. Summer generations require 10 to 18 days. The average life span of the adult female is 18 days.

Deposition of winter eggs: Though it has been shown that the winter eggs of the European red mite

hatch within a comparatively few days, they are deposited over a rather long period. Deposition of these eggs begins about the middle of August and continues until cold weather kills the mites or causes the leaves to drop. Winter eggs may thus be deposited over a period of months. Deposition of winter eggs is triggered by diminishing food supplies, temperature, and photoperiod. Individual females of the sixth, seventh, and eighth broods may deposit these eggs.

Feeding: The young mites feed mostly on the lower leaf surface. The feeding periods are relatively short, and the mites usually spend the quiescent periods on the lower surface, where there is more protection. Young mites on the upper surface are usually found in the depressions of the veins. Adult mites, however, feed indiscriminately on both surfaces. Observations made on mites feeding on apple foliage in warm, sunny weather showed that about three-fourths of the adults were feeding on the upper leaf surface. In cloudy or rainy weather, most of the adults are found on the lower surface.

Effects of weather: Though the mites are most active during warm weather, they continue to be more active at lower temperatures than many insects. The mites spin very little webbing, but they are able to cling tenaciously to the leaf surfaces and, unlike the common red spider mite, are not easily washed off by rains or heavy sprays. The webbing of the latter species is very easily washed off, along with the mite and their eggs.

Dispersal: The winter eggs are present on the twigs for about six months. Because they are inconspicuous unless present in large numbers, they easily escape detection and are often carried to new localities on nursery stock. The winter eggs deposited about the calyxes of apples are also a possible means of distribution, but the chances of new infestations starting from this source would be extremely small.

During the growing season, the mites are very easily transported from one orchard to another on the clothing of orchard workers and on vehicles and farm machinery. They are also probably blown considerable distances by winds, and they may be transported by irrigation water. When populations are high, European red mites will disperse on silk strands and be carried by wind to other trees. It also is conceivable that they could be carried on birds' feet as the young of the San Jose scale are carried.

Monitoring

Select trees such as Red Delicious or Northern Spy that are susceptible to mites. Using a lens that has a 10x to 14x magnification, examine 10 sample leaves from each of 10 trees. Treat trees if you find an average of six or more mites per leaf and less than one predator mite per leaf.

Control:

Use preblossom applications of superior oil or organic miticides and apply summer applications of miticides as needed. When possible, use miticides that are selective against European red mites. To protect predators, avoid the use of pesticides such as carbamates, pyrethroids, and other classes of compounds that are known to be detrimental to beneficial predators.

Mite damage is a function of time-early populations of mites before bud differentiation takes place can be more damaging than the same number of mites occurring at midseason later. This does not mean that mid- or late season mite populations cannot cause damage. High populations of mites at mid- or late season can result in egg deposition in the calyx ends of fruit. These cannot be removed and can be considered an adulteration. Mite management to keep populations below optimum numbers for reproduction is an important factor in mite control. Preventive measures that maintain low mite

populations and prevent damage are far more effective than eradicative measures that may be ineffective and come too late to prevent damage.

Miticides with different modes of action should be rotated within a season or from season to season to delay the development of resistance. Once resistance to a miticide has developed through selection pressure and the miticide is no longer used, the mite population will regress from homozygous resistance to heterozygous resistance. Therefore, a miticide to which resistance was developed some years ago can often be effective again if employed only once in a season. It generally requires a few generations for the mites to regain resistance when exposed to repeated applications of the miticide. Such miticides could be effectively used in a rotation of miticides with different modes of action.

Miticides for Apple

Source: 2004 Commercial Tree Fruit Spray Guide

The following miticides are registered for use on apples. Refer to product label for registered uses, amount of use, harvest restrictions, and remarks for use on other crops.

Brand Name	Rate per 100 Gal.	Rate per Acre	Days to Harvest
Superior oil	2 gal	- - - - -	before pink
Acramite 50 WS		0.75-1 lb	7
Agrimek 0.15 EC[a]	2.5 fl oz	10 fl oz	28
Apollo SC	1-2 fl oz	4-8 fl oz	45
Carzol 92 SP	4-5 oz	1-1.25 lb	by petal fall
Dicofol 1.6 EC	1.5 qt	4-10 qt	14
Kelthane 50 W*	0.75-1.5 lb	3-6 lb	7
M-Pede[bc]	1-2%	½ gal	101
Pyramite 60 W[d]	2.2-3.3 oz	4.4-13.2 oz	25
Saf-T-Side[b]	1-2%	- - - - -	25
Savey 50 WP		3 oz	28
SunSpray[b]	1-2%	1-2 gal	28
Vendex 50 W	4-8 oz	1.3 lb	14
Vydate L[e]	1-2 pt	2-4 pt	14
Zeal 72WDG		2-3 oz	28

++ Apply before waxy bloom forms on fruit.

[a] Apply within 2 weeks after petal fall.

[b] Do not use with Captan, Sevin, or other sulfur containing products. Do not apply when temperatures exceed 90F.

[c] Not very effective alone. Enhances efficacy of other miticides.

[d] Allow at least 30 days between sequential applications.

[e] Vydate may cause fruit thinning if used within 30 days of bloom.

* Not permitted for use in Wisconsin.

Water-Sensitive Paper as a Spray Evaluation Tool

Source: Helmut Spieser, Engineer, Pesticide Application & Grain Storage/OMAF (Ontario Ministry of Agriculture & Food)
http://www.gov.on.ca/OMAFRA/english/crops/hort/news/hortmatt/2004/15hrt04a6.htm

Seeing the results of your spray efforts can take hours, days, or even weeks. It would be nice to be able to evaluate your spray job at the time of spraying, and a number of techniques have been used by researchers to do just that. Colored dyes, ultraviolet dyes, and water-sensitive papers have and still are being used. All have their advantages and limitations. Water-sensitive paper offers a grower the ability to quickly and clearly see where the spray droplets went and possibly did not go.

What is water-sensitive paper? Water-sensitive paper is a rigid paper with a specially coated yellow surface that is stained dark blue by aqueous (water) droplets impinging on it. It was developed for field use for quick evaluation of LV sprays. One limitation of water-sensitive paper is that these flat paper strips do not emulate the textural characteristics of leaf surfaces.

Method of use

Place water-sensitive papers where you plan to evaluate your spray job. This may be stapled to a short stake, pinned by a marker flag, or fastened to a plant leaf. You should consider placing some of these papers in locations that are hard to reach with spray. Papers installed upside down will show under leaf surface coverage, useful for insecticide and fungicide application. This method of spray evaluation can only be used when the crop is dry of surface moisture, there is no rain, and the relative humidity is less than 80%. Care should be taken in the handling of these papers, as sweaty hands will also change the paper from yellow to blue.

If you are using papers in a number of locations in the crop canopy, mark the back of the papers with a pencil as to the location name for future reference. Retrieve the papers as soon as they are dry and keep them in a moisture proof container until you can evaluate them.

Visual assessment

Once you have the dry water-sensitive papers, you can observe the pattern of spray droplets. You can get a sense of the number of droplets, the droplet distribution, as well as the relative size of the droplets on the papers. You can see how much material got to the various monitoring locations. To determine if enough spray material got to your target to do the job, you need to count droplets. A hand lens may aid in seeing all the droplets. The water-sensitive papers come with a counting guide. This counting guide has a cutout window that is 1 cm2. The droplet density in this cm2 window should not be less than outlined below for the various types of product sprayed:

Number of droplets/cm2	Type of spray
20-30	Insecticides
20-30	Herbicides pre-emergence
30-40	Contact herbicides post-emergence
50-70	Fungicides

Sources of water-sensitive papers

Water-sensitive papers are available from a number of sources that include dealers that sell TeeJet and HARDI components. These papers are available in different sizes. The small strips 26mm X 76mm (1" X 3") work well. For more information call toll free: 1-877-424-1300.

Strawberry Renovation

Source: Sonia Schloemann and A. Richard Bonanno, UMass Extension, Massachusetts Berry Notes, July 6, 2004

Matted row strawberry plantings benefit from a process called 'renovation' after harvest to stimulate new growth to support next year's crop and to interrupt the build-up of certain pests and diseases mid-way through the growing season. For best results, renovation should be started immediately after the harvest is completed to knock down two-spotted mites, sap beetles, and/or root weevils and to promote early runner formation. Early runner-set translates to higher yield potential the following year. Build-up of leaf spots and other foliar pathogens can be cleaned up with this process, too. Renovation should be completed by late July in normal years.

The following steps describe renovation of commercial strawberry fields. Specific rates and timing of applications can be found in the *New England Small Fruit Pest Management Guide*, http://www.umass.edu/plsoils/soiltest/Tissue%20Analysis.PDF.

- **Subsoil**: Where tractor and picker traffic has been heavy on wet soils, compaction may be severe. Subsoiling between rows will help break up compacted layers and provide better infiltration of water. Subsoiling may be done later in the sequence if necessary.
- **Narrow rows and cultivate between rows:** Reduce the width of rows to 12-18 inches at the base. More berries are produced along row edges than in row middles. Wider rows lead to lower fruit production (yield and quality) and increased disease pressure. Narrow rows also give better sunlight penetration, air circulation, spray coverage, and over-all fruit quality. Use a roto-tiller, multivator, or cultivator to achieve the row-narrowing. Work in the straw between the rows at this time, too. If possible, try to throw 1-inch of soil on top of the rows at this time to stimulate new root formation on established crowns and new runners.
- **Weed control**: Preemergence weed control should begin immediately after the plants are mowed and the soil is tilled to narrow the crop row. The most common practice at this time is to apply half the annual rate of terbacil (Sinbar at 4 oz/acre). It is essential that the strawberry plants are mowed, even if 2,4-D was not applied, to avoid injury from Sinbar. If regrowth of the strawberry plants has started, significant damage may result. Some varieties are more sensitive to Sinbar than others. If unsure, make a test application to a small area before treating the entire planting. Sinbar should not be used on soils with less than 0.5% organic matter or on reportedly sensitive varieties such as Guardian, Darrow, Tribute, Tristar and possibly Honeoye. Injury is usually the result of

too high a rate or overlapping of the spray pattern. If Sinbar is not used, napropamide (Devrinol at 4 lb/acre) or DCPA (Dacthal at 8 to 12 lb/acre) should be applied at this time. Dacthal is preferred over Devrinol if the planting is weak. If Sinbar is used, napropamide (Devrinol at 4 lb/acre) should be applied 4 to 6 weeks later. This later application of Devrinol will control most winter annual weeds that begin to germinate in late August or early September. Devrinol should be applied prior to rainfall or it must be irrigated into the soil. During the summer, Poast can be used to control emerged grasses.

Cultivation is also common during the summer months. Cultivation should be shallow and timely (weeds should be small) to avoid root damage to the strawberry planting. The growth of strawberry daughter plants will also limit the amount of cultivation possible, especially near the crop row.

- **Irrigate**: Water is needed for both activation of herbicides and for plant growth. Don't let the plants go into stress. The planting should receive 1 to 1-1/2 inches of water per week from either rain or irrigation.
- **Cultivate to sweep runners into the row** until plant stand is sufficient. Thereafter, or in any case after September, any runner plant not yet rooted is not likely to produce fruit next year and is essentially a weed and should be removed. Coulter wheels and/or cultivators will help remove these excess plants in the aisles.
- **Adequate moisture and fertility** during August and September will increase fruit bud formation and improve fruit yield for the coming year. Continue irrigation through this time period and fertilize if necessary. An additional 20 to 30 pounds of N per acre is suggested, depending on the vigor.

Degree Day Accumulations for Ohio Sites July 7, 2004

Location	Degree Day Accumulations Base 50F	
	Normal	Actual
Akron-Canton	1185	1128
Cincinnati	1627	1559
Cleveland	1219	1090
Columbus	1560	1304
Dayton	1486	1352
Kingsville	1098	983
Mansfield	1204	1110
Norwalk	1281	1095
Piketon	1614	1526
Toledo	1247	1090
Wooster	1291	1041
Youngstown	1121	1009

Pest Phenology

Coming Events	Degree Day

	Accum. Base 50F
Lesser appleworm 2nd flight begins	866 -1298
Spotted tentiform leafminer 2nd generation tissue feederd present	913 - 1182
Redbanded leafroller 2nd flight peak	972 - 1368
San Jose scale 2nd flight begins	1000 - 1294

Thanks to Art Agnello, Cornell Entomologist

Fruit Observations & Trap Reports

Insect Key
AM: apple maggot
CM: codling moth
ESBM: eye-spotted budmoth
LAW: lesser apple worm
LPTB: lesser peachtree borer
OBLR: obliquebanded leafroller
OFM: oriental fruit moth
PTB: peachtree borer
RBLR: redbanded leafroller
SJS: San Jose scale
STLM: spotted tentiform leafminer
TABM: tufted apple budmoth
VLR: variegated leafroller

Site: Waterman Lab, Columbus
Dr. Celeste Welty, OSU Extension Entomologist

Apple 6/30 to 7/7/04	
Redbanded leafroller	3 up from 2
Spotted tentiform leafminer	3453 up from 814
San Jose scale	792 up from 27
Codling moth	6.3 up from 2.3
Lesser appleworm	5 up from 2
Tufted apple budmoth	1 up from 0

Variegated leafroller	0 same as last wk
Obliquebanded leafroller	1 up from 0
Apple maggot (3 trap sum)	4 down from 5

Site: West District; Huron, Ottawa, Richland, and Sandusky Counties
Lowell Kreager, IPM Scout/Technician

Apple 6/30 to 7/06/04	
Apple maggot (3 trap sum)	0.0 same as last week
Codling moth	0.6 up from 0.5
Lesser appleworm	2.3 up from 1.7
Oriental fruit moth	1.3 down from 0.5
Redbanded leafroller	15.6 down from 37.2
San Jose scale	0.0 same as last wk
Spotted tentiform leafminer	879 up from 791
Peach 6/30 to 7/06/04	
Lesser peachtree borer	3.3 up from 1.3
Oriental fruit moth	1.7 up from 0.2
Peachtree borer	0.3 down from 0.7
Redbanded leafroller	22.6 down from 40.4

Other observations include lilac borers.

Site: East District; Erie and Lorain Counties
Jim Mutchler, IPM Scout/Technician

Apple 6/30 to 7/06/04	
Apple maggot (3 trap sum)	0.0 same as last week
Codling moth	1.5 same as last week
Lesser appleworm	7.1 up from 3.1
Oriental fruit moth	0.8 down from 1.5
Redbanded leafroller	10.0 down from 12.9
San Jose scale	0.0 same as last week
Spotted tentiform leafminer	783 down from 906
Peach 6/30 to 7/06/04	
Lesser peachtree borer	5.8 up from 3.8

Oriental fruit moth	1.3 up from 0.3
Peachtree borer	2.2 same as last week
Redbanded leafroller	7.3 up from 7.0

Beneficials include native lady beetles, Multi-colored Asian lady beetles, and lacewings.

Other observations include apple scab, fire blight, plum curculio strikes, and codling moth strikes.

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