http://ipm.osu.edu/fruit/index.html

THE OHIO STATE UNIVERSITY Newsletter Extension

Fruit ICM News

Volume 8, No. 15
May 6, 2004

In This Issue:

Calendar

May 10-12: Ohio Wine Competition, Fisher Auditorium, North Exhibit Area and Conference Room, OARDC, Wooster, 2 pm to 6:30 pm. For more information contact Todd Steiner, 330-263-3881.

May 26: Twilight Tree Fruit Field Meeting, Branstool Orchards, Utica, OH. Meet at the farm market on the north side of S.R. 62, 1 ½ miles east of the Utica intersection of S.R. 62 & S.R. 13. Guest speakers will be Dr. Diane Miller and Dr. Mike Ellis.

June 30: Ohio Fruit Growers Society Summer Tour, OARDC Horticulture Unit 2, Wooster, 8 am to 3 pm. Registration fee. The 2004 Ohio Fruit Growers Society (OFGS) Summer Tour is returning to the Ohio Agricultural Research and Development Center (OARDC) Unit 2 Research Farm June 30. The tour will be of interest to Midwest fruit growers who want to inspect current research projects and who enjoy interacting with fellow growers and allied industry exhibitors.

Two orchard tours -- one focusing on horticultural aspects of fruit production and the second on diseases and insects -- will be offered concurrently beginning at 8 a.m. "Both tours will showcase current research projects underway in support of the Ohio fruit industry," said Diane Miller, a researcher with OARDC's Department of Horticulture and Crop Science. "Each tour will run approximately one hour, and registrants are encouraged to attend both of them." Ohio Department of Agriculture Pesticide Applicator Recertification Credit will be available for the disease and insect tour.

The horticulture tour will consist of six informational stops: NC-140 cooperative fruit rootstock evaluations in Ohio by Stephen Myers, chairman of the Department of Horticulture and Crop Science; NE-183 apple variety evaluations in Ohio by Miller; and weed control in young fruit plantings by Doug Doohan, OARDC weed specialist. Also featured in this tour: use of windbreaks for orchard screening and reducing spray drift by Steve Davis, Ohio Department of Natural Resources; grape research at

OARDC by viticulturist Imed Dami; and primocane-fruiting blackberries by Joe Scheerens, OARDC small-fruit specialist.

The disease and insect tour will feature six informational stops, including new developments in fungicides for fruit disease control by OARDC plant pathologist Mike Ellis; organic strawberry production involving composts, pest density, consumer taste panels and economics by Joe Kovach, OARDC integrated pest management specialist; and impact of Asian lady beetle on grape and wine production in Ohio by Roger Williams, OARDC entomologist. Also on this tour: reducing spray drift and improving pest management by Richard C. Derksen, U.S. Department of Agriculture expert based on the Wooster campus; insecticide and pheromone options for managing oriental fruit moth in peaches and codling moth in apples by OARDC entomologist Celeste Welty; and encouraging honey bee populations impacted by diseases, nest site destruction and pesticides by Jim Tew, OARDC beekeeping specialist. Pesticide applicator recertification credit is one hour in commercial category 2B or one hour in private category 3A (vegetables) or 4 (fruit).

The orchard tours will be followed by lunch, which participants can purchase at the site between 11 a.m. and 1 p.m., and the OFGS business meeting, beginning at 1 p.m. under the tent. Other specialists will be available in the tent area to assist you on a one-on-one basis, providing:

A plant pest diagnostic clinic, where you can bring samples and have Nancy Taylor, OSU Extension plant pathologist, diagnose your plant problems.

Fruit on the Web, a demonstration on how to access fruit informational Web sites by Ted Gastier, OSU Extension.

An orchard weather monitoring equipment demonstration by Ron Becker, OSU Extension.

A cider regulation update providing the latest information for the 2004 autumn cider season by Chuck Kirchner, Ohio Department of Agriculture.

The summer tour also will present more than 30 exhibitors who support the fruit industry. Interaction with these exhibitors will allow participants to discuss products and learn about technologies available to grow and market better fruit. Ohio State's Fruit Team members will be available to answer questions and will have a variety of extension publications on fruit-crop production and management available for purchase.

Following the tour, attendees are invited for a wagon tour of Secrest Arboretum on the OARDC campus. The arboretum tour will be from 2-3:30 p.m., and wagons will load at the Fisher Auditorium parking lot. Secrest has beautiful collections of crabapples, arborvitae, azaleas and rhododendrons, along with the Garden of Roses of Legend and Romance. To learn more, visit web address www.secrest.osu.edu.

Registration opens at 7 a.m. and the registration fee is $15 individual/$20 family for OFGS members. Individual and family fees increase by $5 for non-OFGS members. The OARDC Unit 2 Research Farm is located on Oil City Road (T-92), southeast of Wooster off U.S. Route 250.

For those interested in arriving the night before, a block of rooms has been set aside at the Best Western Wooster Plaza, 243 East Liberty, Wooster 44691. The OFGS overnight room rate is $59.50 plus 12.75 percent tax, and the reservation deadline for this rate is June 10. The Best Western toll free phone number is 866-264-2057, local phone number is 330-264-7750 and their fax is 330-262-5840.

For more information about the OFGS tour, contact Tom Sachs at 614-246-8292, tsachs@ofbf.org, or Diane Miller at 330-263-3824, miller.87@osu.edu. More OARDC information is at http://www.oardc.ohio-state.edu.

Fire Blight, *Erwinia amylovora*

Source (1998): P.W. Steiner, University of Maryland,
and A. R. Biggs, West Virginia University
http://www.caf.wvu.edu/Kearneysville/disease_month/fireblight.html (Excellent photos are posted at this site).

Introduction: Fire blight is a destructive bacterial disease of apples and pears that kills blossoms, shoots, limbs, and, sometimes, entire trees. The disease is generally common throughout the mid-Atlantic region although outbreaks are typically very erratic, causing severe losses in some orchards in some years and little or no significant damage in others. This erratic occurrence is attributed to differences in the availability of overwintering inoculum, the specific requirements governing infection, variations in specific local weather conditions, and the stage of development of the cultivars available. The destructive potential and sporadic nature of fire blight, along with the fact that epidemics often develop in several different phases, make this disease difficult and costly to control. Of the apple varieties planted in the mid-Atlantic region, those that are most susceptible include 'York', 'Rome', 'Jonathan', 'Jonagold', 'Idared', 'Tydeman's Red', 'Gala', 'Fuji', 'Braeburn', 'Lodi', and 'Liberty'. 'Stayman' and 'Golden Delicious' cultivars are moderately resistant and all strains of 'Delicious' are highly resistant to fire blight, except when tissues are damaged by frost, hail or high winds.

Symptoms: Overwintering cankers harboring the fire blight pathogen are often clearly visible on trunks and large limbs as slightly to deeply depressed areas of discolored bark, which are sometimes cracked about the margins. The largest number of cankers, however, are much smaller and not so easily distinguished. These occur on small limbs where blossom or shoot infections occurred the previous year and often around cuts made to remove blighted limbs. Since many of these cankers are established later in the season, they are not often strongly depressed and seldom show bark cracks at their margins. Also, they are often quite small, extending less than one inch (25 mm), with reddish to purple bark that may be covered with tiny black fungus fruiting bodies (most notably *Botryosphaeria obtusa*, the black rot pathogen of apple).

Blossom blight symptoms most often appear within one to two weeks after bloom and usually involve the entire blossom cluster, which wilts and dies, turning brown on apple and quite black on pear. When weather is favorable for pathogen development, globules of bacterial ooze can be seen on the blossom. The spur bearing the blossom cluster also dies and the infection may spread into and kill portions of the supporting limb. The tips of young infected shoots wilt, forming a very typical "shepherd's crook" symptom. Older shoots that become infected after they develop about 20 leaves may not show this curling symptom at the tip. As the infection spreads down the shoot axis, the leaves first show dark streaks in the midveins, then wilt and turn brown, remaining tightly attached to the shoot throughout the season. As with blossom infections, the pathogen often invades and kills a portion of the limb supporting the infected shoot. The first symptom on water sprouts and shoots that are invaded systemically from nearby active cankers is the development of a yellow to orange discoloration of the shoot tip before wilting occurs. In addition, the petioles and midveins of the basal leaves on such sprouts usually become necrotic before those at the shoot tip.

Depending on the cultivar and its stage of development at the time infection occurs, a single blossom or shoot infection can result in the death of an entire limb, and where the central leader or trunk of the tree

is invaded, a major portion of the tree can be killed in just one season. In general, infections of any type that occur between petal fall and terminal bud set usually lead to the greatest limb and tree loss. In addition, heavily structured trees tend to suffer less severe limb loss than those trained to weaker systems for high productivity. Where highly susceptible apple rootstocks (M.26, M.9) become infected, much of the scion trunk and major limbs above the graft union very typically remain symptomless, while a distinct dark brown canker develops around the rootstock. As this rootstock canker girdles the tree, the upper portion shows symptoms of general decline (poor foliage color, weak growth) by mid to late season. In some instances, the foliage of trees affected by rootstock blight develop early fall red color in late August to early September, not unlike that often associated with collar rot disease caused by a soilborne fungus. Some trees with rootstock infections may not show decline symptoms until the following spring, at which time cankers can be seen extending upward into the lower trunk.

Disease Cycle: The bacterial pathogen causing fire blight overwinters almost exclusively in cankers on limbs infected the previous season. The largest number of cankers and, hence, those most important in contributing inoculum, occur on limbs smaller than 1.5 inches (38 mm) in diameter, especially around cuts made the previous year to remove blighted limbs. During the early spring, in response to warmer temperatures and rapid bud development, the bacteria at canker margins begin multiplying rapidly and produce a thick yellowish to white ooze that is elaborated onto the bark surface up to several weeks before the bloom period. Many insect species (predominantly flies) are attracted to the ooze, and subsequently disperse the bacteria throughout the orchard. Once the first few open blossoms are colonized by the bacteria, pollinating insects rapidly move the pathogen to other flowers, initiating more blossom blight. These colonized flowers are subject to infection within minutes after any wetting event caused by rain or heavy dew when the average daily temperatures are equal to or greater than 60 F (16 C) while the flower petals are intact (flower receptacles and young fruits are resistant after petal fall). Once blossom infections occur, early symptoms can be expected with the accumulation of at least 103 degree days (DD) greater than 55 F (57 DD greater than 13 C) which, depending upon daily temperatures, may require 5 to 30 calendar days.

With the appearance of blossom blight symptoms, the number and distribution of inoculum sources in the orchard increase greatly. Inoculum from these sources is further spread by wind, rain, and many casual insect visitors to young shoot tips, increasing the likelihood for an outbreak of shoot blight. Recent research conducted in Pennsylvania indicates that aphid feeding does not contribute to shoot blight. More research is needed to determine whether or not leafhoppers play a role in the incidence of shoot blight. Most shoot tip infections occur between the time that the shoots have about nine to ten leaves and terminal bud set, when sources of inoculum and insect vectors are available, and daily temperatures average 60 F (16 C) or more.

In years when blossom infections do not occur, the primary sources of inoculum for the shoot blight phase are the overwintering cankers and, in particular, young water sprouts near these cankers, which become infected as the bacteria move into them systemically from the canker margins. Such systemic shoot infections, called canker blight, are apparently initiated about 200 DD greater than 55 F (111 DD greater than 13 C) after green tip, although visible symptoms may not be apparent until the accumulation of at least 300 DD greater than 55 F (167 DD greater than 13 C) after green tip. In the absence of blossom infections, the development of shoot blight infections is often localized around areas with overwintering cankers.

Although mature shoot and limb tissues are generally resistant to infection by E. amylovora, injuries caused by hail, late frosts of 28 F (-2 C) or lower, and high winds that damage the foliage can create a trauma blight situation in which the normal defense mechanisms in mature tissues are breached and infections occur . Instances of trauma blight are known to occur even on normally resistant cultivars like 'Delicious'.

Rootstock blight, yet another phase of fire blight, has been recognized recently and is associated primarily with the highly susceptible M.26 and M.9 rootstocks. On these trees, just a few blossom or shoot infections on the scion cultivar can supply bacteria that then move systemically into the rootstock where a canker often, but not always, develops and eventually girdles the tree. Trees affected by rootstock blight generally show symptoms of decline and early death by mid to late season, but may not be apparent until the following spring.

Monitoring: Concentrate monitoring in orchard blocks where the disease occurred during the previous season. Observe blighted limbs and shoots for removal during normal pruning operation. There may be a need to remove whole trees on some occasions.

Where fire blight occurred the previous year in orchards grown on susceptible rootstocks (M.26, M.9), trees showing poor foliage color or dieback should be examined for rootstock cankers and, if found, removed from the orchard immediately and destroyed. A very important aspect of fire blight management involves monitoring the weather for the specific conditions that govern the build-up of inoculum in the orchard, the blossom infection process and the appearance of symptoms. A weather station that records the daily minimum and maximum temperatures and rainfall amounts is needed. When 50 percent of the buds show green tissue, begin keeping a daily record of the cumulative degree days (DD) greater than 55 F (12.7 C). This information can be used to signal when symptoms are likely to appear in the orchard for blossom blight [103 DD greater than 55 F (57 DD greater than 12.7 C) after infection] canker blight [about 300 DD greater than 55 F (167 DD greater than 12.7 C) after green tip, and early shoot blight [about 103 DD greater than 55 F (57 DD greater than 12.7 C) after blossom blight or canker blight symptoms appear].

Continue to monitor and record the daily minimum and maximum temperatures and rainfall amounts, and continue to accumulate degree days (DD) greater than 55 F. At the full pink stage (i.e., first flower open in the orchard), a record should also be kept of the cumulative degree hours (DH) greater than 65 F (18.3 C). Once a total of 200 or more DH greater than 65 F (111 DH greater than 18.3 C) has accumulated after the start of bloom, any wetting event caused by rain or heavy dew that wets the foliage is likely to trigger a blossom infection event if the average daily temperature is 60 F (15.6 C) or more.

This information can be used to schedule streptomycin sprays, which are most effective if applied on the day before or the day of an infection event. Such sprays protect all flowers open at the time of treatment. However, because other flower buds may open after treatment, reassess the need for additional sprays at four-day intervals during bloom. Continue to monitor for strikes and remove all blighted limbs.

Monitor the orchard to locate blighted limbs for removal. For the greatest effect on the current season's damage severity, infected limbs should be removed as soon as early symptoms are detected and before extensive necrosis develops. Where the number and distribution of strikes is too great for removal within a few days, it may be best to leave most strikes and cut out only those that threaten the main stem. On young trees, and those on dwarfing rootstocks, early strikes in the tops of the trees often provide inoculum for later infections of shoots and sprouts on lower limbs near the trunk, which may result in tree loss. Give these early strikes a high priority for removal.

Look for symptoms of early tree decline or early fall color in orchards planted on highly susceptible rootstocks (M.26, M.9) where the disease developed this year. These symptoms may appear either on one side or throughout individual trees. Examine the rootstock area of these trees just below the graft union for evidence of cankering or bacterial ooze. Remove any tree showing these symptoms during this period.

Management: Many practices can help reduce the incidence of fire blight and may help reduce the severity of the disease when it occurs. Not all measures suggested below are necessary or even feasible in every planting, since planting systems play a large role in contributing to the level of risk of disease development. No single control method is adequate and, in regions where it is established, a conscious effort must be made to control the disease each year. Even under the most conscientious efforts, in some years losses from fire blight can be devastating.

Chemical and biological control: A copper spray applied at the 1/4-inch green tip stage may reduce the amount of inoculum on the outer surfaces of infected trees. At bloom, antibiotic sprays are highly effective against the blossom blight phase of the disease. These sprays are critical because effective early season disease control often prevents the disease from becoming established in an orchard. Predictive models, particularly Maryblyt, help to identify potential infection periods and improve the timing of antibiotic treatments, as well as avoid unnecessary treatments. Strains of the pathogen that are resistant to streptomycin are present in some orchards in the eastern U.S., and are widespread in most apple and pear regions of the western U.S. Biological control agents, although not widely used, have provided partial control of blossom infections. More effective biological agents are required if their use is to become widespread.

Removing sources of infection: Dormant pruning to remove overwintering infections helps reduce inoculum for the next season. Make cuts about 4 inches below any signs of dead bark. Remove pruned material from the orchard. Beginning about one week after petal fall, monitor the orchard to locate blighted limbs for removal. For the greatest effect on the current season's damage severity, infected limbs should be removed as soon as early symptoms are detected and before extensive necrosis develops. Where the number and distribution of strikes is too great for removal within a few days, it may be best to leave most strikes and cut out only those that threaten the main stem. On young trees, and those on dwarfing rootstocks, early strikes in the tops of the trees often provide inoculum for later infections of shoots and sprouts on lower limbs near the trunk, which may result in tree loss. Give these early strikes in the tops of trees a high priority for removal. Do not combine the practices of fire blight removal with pruning and training of young, high-density trees.

Insect control: The role of insects in the transmission of fire blight bacteria is under investigation. It is likely that insects that cause wounds (leafhoppers, plant bugs, pear psylla) can create places for bacteria to enter the tree, and some summer infections (shoot blight) are probably facilitated by insects. Where fire blight is a problem, and until more is known about their specific role in the spread of the disease, controlling these insects at levels below their economic injury threshold is advised.

Cultural practices: Use management systems that promote early cessation of tree growth without adversely affecting tree vigor. Excessive vigor is an important component of orchard risk for fire blight. When tree growth continues past mid summer, the likelihood that late season infections will overwinter increases. Orchards should be established on well-drained soils, avoiding low, frost-prone or potentially water-logged areas, and nitrogen fertilizer should be applied based on analyses of foliage N levels.

Resistant cultivars: When establishing new orchards, consider susceptibilities of the scion and rootstock to fire blight. Although none are immune, there is considerable variation among apple cultivars (andpear cultivars) in susceptibility to fire blight. Some cultivar/rootstock combinations are so susceptible to fire blight that investments in these are extremely high risk. In the eastern U.S., Gala on M.26 is a good example. Long range plans for establishing new orchards with fire blight susceptible cultivars should include contingency plans for controlling the disease without streptomycin.

Additional Topics:

Problems in Managing Fire Blight in High Density Orchards on M-9 and M-26 Rootstocks, Paul W. Steiner, Extension Fruit Pathologist, University of Maryland, College Park, MD
http://www.caf.wvu.edu/Kearneysville/articles/SteinerHort1.html

How Good are our Options with Copper, Bio-controls, and Aliette for Fire Blight Control?, Paul W. Steiner, Extension Fruit Pathologist, University of Maryland, College Park, MD
http://www.caf.wvu.edu/Kearneysville/articles/SteinerHort2.html

The Biology and Epidemiology of Fire Blight, Paul W. Steiner, Professor and Extension Fruit Pathologist, University of Maryland, College Park, MD (Jan. 2000)
http://www.caf.wvu.edu/Kearneysville/articles/FB-BIOLOGY00.html

Managing Fire Blight in Apples, Paul W. Steiner, Professor and Extension Fruit Pathologist, University of Maryland, College Park, MD (January 2000) http://www.caf.wvu.edu/Kearneysville/articles/FB-MANAGE00.html

Philosophy for Effective Fire Blight Management, Paul W. Steiner, Professor and Extension Fruit Pathologist, University of Maryland, College Park, MD (Jan. 2000)
http://www.caf.wvu.edu/Kearneysville/articles/PHILOSOPHY2000.html

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: 4/28 to 5/6/04 Late petalfall stage on 5/6/04	
Redbanded leafroller	0 down from 7
Spotted tentiform leafminer	17 down from 22
San Jose scale	0 same as last wk.
Codling moth	0.3 up from 0

Lesser appleworm	3 up from 0
Tufted apple budmoth	0 same as last wk.
Variegated leafroller	0 first report
Obliquebanded leafroller	0 first report

Site: Medina, Wayne, and Holmes Counties
Ron Becker, IPM Program Assistant

Apple: 4/28 to 5/5/04	
Redbandedleafroller	Holmes: 24 down from 67
	Wayne: 17 down from 39
	Medina: 18 up from 16
Spotted tentiform leafminer	Holmes: 300 down from 1800
	Wayne: 215 down from 225
	Medina: 240 up from 137
Oriental fruit moth	Holmes: 0 same as last wk.
	Wayne: 2 same as last wk.
	Medina: 0.5 up from 0
Codling Moth	Holmes: 0 same as last wk.
	Wayne: 0 same as last wk.
	Medina: 0 same as last wk

Apple trees are in full bloom. Frost damage on apples was light. Peaches suffered no frost damage that we could find.

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

Apple: 4/28 to 5/04/04	
Lesser appleworm	3.0 first report
Oriental fruit moth	1.6 down from 11.5
Redbanded leafroller	40.8 first report
Peach: 4/28 to 5/04/04	
Oriental fruit moth	0.8 up from 0.0
Redbanded leafroller	30.8 first report

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

Apple: 4/28 to 5/04/04	
Oriental fruit moth	12.7 first report
Redbanded leafroller	23.8 first report
Peach 4/28 to 5/04/04	
Oriental fruit moth	1.5 up from 0.0
Redbanded leafroller	11.0 up from 0.0

Pest Phenology

Coming Events	**Degree Day Accum. Base 50F**
Lesser appleworm 1st flight	49 - 377
Spotted tentiform leafminer sap-feeders present	130 - 325
1st codling moth catch	141 - 491
European red mite egg hatch complete	183 - 298
Plum curculio oviposition scars present	232 - 348

Thanks to *Scaffolds Fruit Journal* (Art Agnello)

Degree Day Accumulations for Ohio Sites May 6, 2004

Ohio Location	**Degree Day Accumulations Base 50**	
	Actual	**Normal***
Akron-Canton	174	179
Cincinnati	298	320
Cleveland	165	170
Columbus	259	244
Dayton	251	283
Kingsville	152	126
Mansfield	167	177
Norwalk	181	151
Piketon	304	269
Toledo	169	155
Wooster	196	163
Youngstown	170	163

WeatherTracker® Apple Scab Report

Thanks to funding from the Ohio Fruit Growers Society and other friends of apple producers, Dave O'Brien, Production Specialist with UAP Great Lakes, and Ted Gastier have established an apple disease network in Ohio. This funding along with individual purchases by apple producers has placed 15 Spectrum Technology's WeatherTrackers® in orchards for the purpose of monitoring apple scab infection periods. Growers in 8 counties are willingly sharing e-mail reports twice weekly about possible scab infection events as indicated by their monitoring instruments.

The WeatherTracker® instrument constantly monitors air temperature and leaf wetness. Combined with internal software based on the Modified Mills Apple Scab Table, the WeatherTracker® provides direct readings of possible scab infections as well as a 30 day archive.

The following table is a summary of scab reports from cooperating apple growers. The degree of possible infection is indicated by light, medium, and heavy as used in the Modified Mills Table.

County	Columbiana	East Erie	West Erie	Geauga	Holmes	Licking	Lucas	Sandusky	Wayne
4/13-14	Light					Light			
4/18	Light	Light							
4/21-22			Light	Light					
4/23	Light				Medium	Medium			
4/25				Light		Light			
4/26	Light			Light		Light			
4/30		Medium	Medium	Light	Light	Light	Light		Light
5/1		Medium	Medium	Light	Medium	Light	Heavy		
5/2	Medium	Light	Heavy	Light	Medium	Light	Heavy		Medium
5/3	Heavy	Light	Heavy	Light					Medium

Preliminary Monthly Climatological Data for Selected Ohio Locations, April, 2004

Weather Station Location	Monthly Precip	Normal Monthly Precip	Year-to-Date Precip	Normal Year-to-Date Precip	Avg High	Normal High	Avg Low	Normal Low	Mean Temp.	Normal Mean
Akron-Canton	3.39	3.39	11.36	11.31	58.0	59.0	39.6	37.1	48.8	48.1
Cincinnati	4.50	3.96	13.27	13.53	63.1	64.7	43.8	42.7	53.5	53.7
Cleveland	3.74	3.37	12.01	11.08	57.3	57.3	40.7	37.9	49.0	47.6
Columbus	3.96	3.25	14.33	10.87	61.6	62.9	43.5	41.2	52.6	52.0
Dayton	3.39	4.03	11.80	12.21	62.1	60.7	43.0	40.4	52.5	50.6

Fremont	1.42	3.03	6.38	9.17	61.1	58.9	36.3	37.8	48.7	48.4
Kingsville	4.89	3.20	12.07	9.40	56.8	55.2	38.1	36.8	47.5	46.0
Mansfield	3.13	4.17	12.00	12.33	58.0	58.4	39.4	36.1	48.7	47.3
Norwalk	2.88	3.13	10.12	9.53	60.0	57.7	39.4	36.9	49.7	47.3
Piketon	2.97	3.80	11.34	14.40	64.9	63.4	42.8	41.4	53.8	52.4
Toledo	0.97	3.24	5.06	9.67	62.0	58.9	40.1	37.7	51.1	48.3
Wooster	4.00	3.06	12.97	9.90	59.8	59.6	39.9	36.7	49.8	48.1
Youngstown	3.29	3.33	11.65	10.75	57.9	58.2	39.4	36.5	48.7	47.3

Temperatures in degrees F, Precipitation in inches

Record low temperature set on April 28 in Mansfield at 25 degrees F

Table Created by Ted W. Gastier, OSU Extension, from National Weather Service, OARDC & Local Data

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