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

The Ohio State University Newsletter Extension

Fruit ICM News

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May 2, 2002

In This Issue:

Calendar

May 23: Plasticulture Strawberry Field Night, Southern State Community College, U.S. Rte. 62 North, Hillsboro, Ohio. The agenda is listed later in this newsletter. For more information contact Brad Bergefurd at 740-289-3727 or bergefurd.1@osu.edu.

July 10: Ohio Fruit Growers Society Summer Tour, Hirsch Fruit Farm, Chillicothe, OH. For information about the Ross County/Chillicothe area check out http://www.visithistory.com;. For more info about the summer tour, call Tom Sachs at 614-249-2424.

July 23: Licking County Twilight Fruit School, Branstool Orchards. Contact Howard Siegrist at 740-349-6900 for more information.

Using Fungicides to Control Strawberry Fruit Rots in Ohio

Source: Mike Ellis, OSU/OARDC Plant Pathologist

The most common fruit rots on strawberry in Ohio are: Botrytis fruit rot (gray mold), caused by *Botrytis cinerea*; anthracnose fruit rot, caused by *Colletotrichum acutatum*; and leather rot caused by *Phytophthora cactorum*. Especially in wet growing seasons, successful strawberry production may depend on the simultaneous control of all of these diseases. Generally, all three diseases do not occur simultaneously in the same planting, but this can occur. Botrytis fruit rot or gray mold is the most common disease and generally requires some level of fungicide for control each year. Anthracnose is a problem in years with warm to hot temperatures combined with prolonged rainfall prior to and during harvest. Anthracnose is generally not a problem in most plantings; however, when it does develop, it can be devastating. New fungicide chemistry with good to excellent activity against anthracnose has recently been registered for use on strawberry and should be helpful in providing effective control. Leather rot is a problem in years with excessive rainfall or in fields with poor drainage that have standing water (all of these diseases are a problem in situations such as this). Many growers do a good job of controlling leather rot by planting on sites with good soil drainage and maintaining a layer of straw mulch to prevent contact of berries with soil. In years with excessively wet weather or on sites with problem soil drainage, fungicides may be beneficial for leather rot control.

As previously mentioned, Botrytis or gray mold is the most common disease and is probably the easiest to control with effective fungicide use. Most fruit infections by Botrytis occur only during bloom.

Therefore, most growers that apply fungicide during bloom generally do a good job of controlling Botrytis and do not need to apply fungicides pre-bloom or during harvest. If anthracnose and leather rot **are not a problem**, fungicide sprays during bloom only are generally all that is required. Obviously this is an ideal situation in relation to reducing costs and overall fungicide use.

In plantings and in growing seasons (warm and wet) where anthracnose or leather rot are problems, the need for a more intensive fungicide program is greatly increased. The following information provides guidelines for developing an effective fungicide program for control of the major fruit rots in Ohio.

Prebloom

In most years, there is generally little or no need for fungicides prior to bloom. If weather is exceptionally wet from rain or overhead irrigation from frost protection, some early season fungicide may be required prior to bloom. Applications of Captan or Thiram alone at the highest rate (Captan 50WP, 6 lb/A; Captec 4L, 3 qts/A, Thiram 75WDG, 4.4 lb/A) should be effective in reducing inoculum buildup of all three diseases. A seven day application interval should be sufficient.

During Bloom

This is the critical period for control of Botrytis. In addition, in fields infested with *Colletotrichum* (anthracnose), the fungus may be able to build up inoculum on symptomless (apparently healthy) foliage during warm, wet weather. Increased inoculum could result in increased fruit infections if weather remains favorable for disease development. The main fungicides for control of Botrytis are Topsin-M 70WSB, Elevate 50WG, and Switch 62.5WG. All of these materials have excellent efficacy for control of Botrytis, but only Switch has efficacy against anthracnose. This is an important point to remember if anthracnose is a problem in the planting. I also recommend that all of these materials be tank-mixed with Captan or Thiram during bloom. Captan and Thiram are protectant fungicides that provide some additional control against Botrytis (gray mold), anthracnose fruit rot, and leather rot. In addition, mixing the materials should also aid in reducing the risk of fungicide resistance development.

For successful Botrytis control, it is important to provide fungicide protection throughout bloom. Remember that early blooms (king bloom) may be your largest and best quality fruit, so protection needs to be started early (at least 10% bloom). The number of bloom sprays required depends upon the weather. If it is hot and dry, no fungicides are required. All of the fruit rot diseases discussed here require water on the flowers and fruit in order to infect. If it is very dry and overhead irrigation is used for supplemental water, irrigation can be applied in early morning so that plants dry as fast as possible. Keeping plants dry reduces the need for fungicide application. Fortunately, most years are not this dry and fungicides are generally applied on at least a 7-day schedule through bloom. If it is extremely wet, a shorter interval (4-5 days) may be required in order to protect new flowers as they open. Although Botrytis is the primary pathogen we are trying to control during bloom, the selection of the proper fungicides should also aid in reducing the buildup of anthracnose as well. This is important to remember in plantings where anthracnose is a problem or threat.

Post Bloom Through Harvest

As bloom ends and green fruit are present, the threat from Botrytis infection is generally over. Green fruit are resistant to Botrytis. If you got Botrytis infection in fruit during bloom, it will not show up until harvest as fruit start to mature. At this point, it is too late to control it.

As new fruit form through harvest, the threat of anthracnose fruit infection increases. In many plantings, anthracnose is not present or is not a problem. In these plantings no additional fungicide should be required after bloom through harvest. Unfortunately, you cannot determine if anthracnose is a problem until you see it. Often, this is too late to control it. In plantings with a history of anthracnose fruit rot, or if the disease is identified in the plantings, fungicides with efficacy for anthracnose control may be required from the end of bloom through harvest. Remember, anthracnose is favored by warm to hot wet weather. In addition, anthracnose appears to be a greater problem in plastic culture plantings.

The following are suggestions for developing a fungicide program for simultaneous control of strawberry fruit rots.

Fungicide and (rate/A)	**Comments**
Prebloom Captan 50 WP, 6 lb. or Captec 4L, 3 qt. or Thiram 75WDG (4.4 lb)	Prebloom applications should be required only if excessive water from rain or irrigation is a problem early in the season. Fungicides here could help reduce build-up of Botrytis and Colletotrichum inoculum. In dry or more "normal" seasons, fungicide is probably not required until bloom starts.
During bloom Switch 62.5WG (11-14 oz.) or Elevate 50WG (1-1.5 lb.) or Topsin-M 70WSB (1 lb.) **plus**: Captan 50WP (4-6 lb.) or Captec 4L (2-3 qt.) or Thiram 75WDG (4.4 lb.)	This is the main time to control Botrytis, and if temperatures are high, Colletotrichum could build up in the planting. Switch is excellent for control of Botrytis and is also good to excellent for control of anthracnose. Obviously, this is ideal. The addition of Captan or Thiram provides additional protection against both diseases and may aid in reducing fungicide resistance development. Topsin-M and Elevate are both excellent for control of Botrytis, but have no activity against anthracnose. Where anthracnose is not a threat, these fungicides will provide excellent Botrytis control. When combined with the high rate of Captan or Thiram, the combination should provide some level of anthracnose control. If anthracnose is a concern, Switch would be the fungicide of choice. None of the fungicides (Switch, Elevate or Topsin-M) should be applied more than twice before alternating with a fungicide of different chemistry. This is to aid in reducing fungicide resistance development.
Post bloom Through Harvest Quadris 2.08F (6.2-15.4 fl oz.) or	As green fruit develop, the threat of anthracnose infection increases. Quadris is probably the most effective material for anthracnose

Switch 62.5WG (11-14 oz.) **tank-mixed or alternated with:** Captan 50WP (3-6 lb.) or Captec 4L (1.5-3 qt.)	control. If anthracnose is a problem, the highest label rate should be used. This may be the best time to use Quadris. Switch is also effective for control of anthracnose. If the risk of anthracnose is high or the disease has been observed in the planting, Quadris plus Captan should be applied 7 days after the last bloom spray for Botrytis. If anthracnose remains a threat, sprays should probably be repeated on a 7 day interval through harvest. As harvest approaches, Captan should be removed from the program. Captan applied close to harvest could result in visible residues on fruit and this can be a big problem. Quadris or Switch applied alone should result in minimal visible residues on fruit and can be applied on the day of harvest (0-day PHI). Remember, **these preharvest sprays are required only if anthracnose is a threat or problem.**

The extensive use of Captan in this program could result in problems with visible residues on fruit. This needs to be considered, but under heavy disease pressure for anthracnose a high level of Captan usage may be required. The Captec 4L (flowable) may result in less visible residue than the Captan 50W (wettable powder). Alternating Captan with Quadris or Switch rather than combining Quadris with Captan in every other spray should be helpful in reducing visible residues. The use of Quadris or Switch alone in the last spray or two before harvest should aid greatly in reducing visible residues.

As mentioned previously, leather rot should be controlled by good soil drainage (no standing water) and a good layer of straw mulch to prevent berries from soil contact. If leather rot is a threat or a problem, fungicides may be required. Quadris has excellent activity against Phytophthora diseases on other crops. Although not on the label and I have seen no data to support this idea, Quadris may have some activity for control of leather rot in addition to anthracnose and Botrytis gray mold. If applied at the time suggested here (green fruit through harvest) for anthracnose, Quadris may be beneficial for control of leather rot as well. We are currently conducting research to determine the efficacy of Quadris for leather rot control.

Fungicides for Leather Rot Control

As previously mentioned, emphasis for leather rot control should be placed on the use of cultural practices, such as planting on well drained sites or improving water drainage in the planting and a good layer of straw mulch to prevent berry contact with the soil. When needed, the following fungicides are labeled specifically for control of leather rot.

Ridomil Gold is labeled for control of Red Stele (caused by *Phytophthora fragarieae*) and Leather Rot (caused by *Phytophthora cactorum*). The label for perennial strawberries reads as follows: "Established Plantings: Apply Ridomil Gold EC at 1 pt. per treated acre in sufficient water to move the fungicide into the root zone of the plants. Make one application in the spring after the ground thaws and before first bloom. A second application may be applied after harvest in the fall. **Note:** Although not labeled for leather rot control, the early spring application for red stele control should provide some control of leather rot. **For supplemental control of leather rot**, an application may be made during the growing season at fruit set. This application at fruit set (as green fruit are present) has been very effective for leather rot control.

Aliette 80WDG is labeled for control of Red Stele and Leather Rot. For Leather Rot, apply 2.5 to 5 lb/A. Apply as a foliar spray between 10% bloom and early fruit set, and continue on a 7-14 day interval as long as conditions are favorable for disease development. Applications can be made the same day as harvest (PHI=0 days). Do no exceed 30 lb product per acre per season.

Remember these are only suggested guidelines for a fruit rot control program. It is always the grower's responsibility to read and understand the label. For the most current pesticide recommendations in Ohio, growers are referred to Bulletin 506-B, *Ohio Commercial Small Fruit and Grape Spray Guide*.

If growers have questions regarding the information covered here, they should contact: Mike Ellis at 330-263-3849 or e-mail ellis.7@osu.edu.

Anatomy of a Freeze Event

Source: Jeff Andresen, Agricultural Meteorology Geography, Michigan State Fruit Crop Advisory Team Alert, Vol. 17, No. 4, April 30, 2002

Abnormally cold temperatures on April 21-23 caused major damage to a variety of crops in Michigan. The cold temperatures were associated with a large Arctic-origin air mass moving across eastern North America. Conditions on April 21 and 22 were best characterized as a "black frost," where the sub-freezing temperatures were accompanied by cloudy skies, light to moderate winds, and no visible frost formation on soil or vegetative surfaces. Minimum temperatures in the 28-32° F range were common across northern Michigan the evening of April 21 through the morning of April 22.

The second event was a more typical, radiation-type of frost. Clear and relatively calmer conditions on the evening of April 22 allowed temperatures to fall to sub-freezing levels over all but southeastern sections of the state (where clouds persisted for much of the night). Air temperatures and wind speed from the Michigan Automated Weather Network station at Fremont, MI are representative of this radiation-type freeze event across western Lower Michigan. The air temperature fell off quickly during the evening hours of April 22, and quickly approached the dew point temperatures, which were in the mid-20's by early morning on April 23.

Remember that under relatively clear, calm conditions during the overnight hours, air temperatures typically fall to the dew point temperature. As the air reaches this level, condensation or deposition of frost on the surface releases latent heat and slows the rate of cooling. In the figure, the relationship between temperature and wind is evident, with relatively warmer temperatures associated with the presence of wind and associated atmospheric mixing that it produces. The duration of sub-freezing temperatures varied by location, but was typically six to ten hours. While freezing temperatures in late April are normal at almost all locations in Michigan (the mean last freezing temperatures of the season typically occur at the end of April or in early May), the impacts of this freeze event were made worse due to the unusually warm temperatures and rapid early crop development that occurred just the week before.

Another Organic Experience

Source: Dave Combs, Harvey Reissig and Art Agnello, Entomology, Geneva,; Scaffolds Volume 11, No. 7, April 29, 2002

The past few years have brought about ground-shaking changes in pesticide uses and legislation. In an effort to roll with these changes, research has been conducted both here at the Geneva Station and in private orchards to test the efficacy of not only the new generation of currently available conventional insecticides, but some of the organic options as well. In the 2000 growing season, handgun applications of several materials were made in orchards at Geneva on a season-long basis. The results of this project were discussed last spring in *Scaffolds*, and (in case you can't find your back issues) are currently available online at http://www.nysaes.cornell.edu/ent/scaffolds/2001/4.2_insects.html.

The 2001 growing season saw another project with organic materials with a slightly different twist. With the cooperation of a western NY grower who agreed to apply the materials, a field project was conducted using an airblast sprayer in an already certified organic orchard. The block of approximately 10 acres of 'Delicious' and 'Cortland' trees was evenly split into two treatments. Surround, the particle film formulation of kaolin, was applied from petal fall on a weekly schedule until the final cover spray in mid-August in half of the block, while the other half received Surround at petal fall, and then again weekly for the following four weeks. Then, the treatment was switched to the neem-derived product, Aza-Direct, for the remainder of the cover sprays until mid-August. The Surround-only program received 13 applications over the course of the season, while the combination program received 5 applications of Surround and 8 applications of Aza-direct.

The reasoning behind the treatments was that kaolin would deter plum curculio oviposition, so it was used in both treatments until the degree day model predicted egg-laying was finished. The Aza-Direct was then applied to control the rest of the pest complex, while providing a comparison to the full-season program of Surround. Also in this orchard, two rows of 'Cortland' apples were excluded from these treatments and used for another trial on the efficacy of handgun applications of Surround and Aza-Direct against apple maggot and the later season generations of the complex of internal Lepidoptera (oriental fruit moth, codling moth, and lesser appleworm). These applications were made with a high-pressure (450 psi) handgun sprayer.

The Surround-only program was significantly more effective in controlling internal Lepidoptera and resulted in a higher percentage of clean fruit than the combination program of Surround and Aza-Direct (Table 1). Damage from other pests was not significantly different between the two treatments. The higher percentage of clean fruit in the Surround-only treatment was due to improved control of internal leps and plum curculio, as damage from other pests in the two treatments was similar.

Table 1. Fruit Damage

Damage Category	Mean % Fruit Damage	
	Surround	Surround / Aza-Direct
Internal Leps	20.4 a	34.0 b
Spring OBLR	0.2 a	0.4 a
Summer OBLR	5.0 a	8.0 a
Apple maggot	9.0 a	3.6 a
Plum curculio	25.4 a	32.8 a
Tarn. plant bug	0.4 a	0.8 a
Clean	44.6 b	29.2 a

Means within a row followed by the same letter are not significantly different (Fisher's Protected lsd test, $P < 0.05$). Data transformed (arcsine-square root) prior to analysis.

The late-season handgun sprays of both Surround and Aza-Direct were significantly more effective in controlling internal Lepidoptera than the airblast treatments (Table 2). The handgun sprays of Surround were also significantly more effective against apple maggot than the airblast sprays. The Aza-Direct handgun sprays were not effective in controlling apple maggot in the sprayed 'Cortland' trees, but maggot damage in the 'Delicious' apples treated with airblast sprays was significantly lower than that in the handgun plots. It is unlikely that the lower damage level in the

Aza-Direct airblast treatments was due to the effectiveness of the sprayer, as most studies conducted in the past have shown that handgun sprayers provide more complete coverage than airblast sprayers. Therefore, these differences between apple maggot damage levels in the different application methods of Aza-Direct were probably due largely to differences in infestation levels in the two cultivars. 'Cortland' apples, which had the highest infestation levels in the handgun sprays (42%), are generally considered to be more susceptible to apple maggot than 'Delicious'.

Table 2. Handgun vs. Airblast Treatments

Treatment/Application Method	% Internal Lepidopt.	% Apple Maggot
Surround/Handgun*	3.5 a	0.0 a
Aza-Direct/Handgun*	6.9 a	42.0 c
Surround/Airblast**	20.4 b	9.0 b
Aza-Direct/Airblast**	34.0 c	3.6 ab

* Data taken from 'Cortland' trees
** Data taken from 'Delicious' trees
Means within a column followed by the same letter are not significantly different (Fisher's Protected lsd test, $P < 0.05$). Data transformed (arcsine-square root) prior to analysis.

In this study, less than half of the harvested fruit was free from insect damage in trees treated with a conventional airblast sprayer. Although there were no unsprayed check trees left in the orchard to estimate insect pest population levels, observed damage levels and evaluations of harvested fruit taken from the orchard in previous years indicate that indigenous pest pressure within this orchard is very high. Obviously, it is very difficult to protect fruit in heavily infested orchards with available materials certified for use in organic programs. The two materials evaluated in this study are probably some of the best insecticides currently available to growers opting to appeal to an organic market. Application technology for these particular products has not yet been perfected, but this study has shown that handgun spraying results in substantially better control of two key direct pests of apples, apple maggot and plum curculio, particularly in the case of Surround. Although handgun applications were not evaluated in this study against the plum curculio, previous studies conducted in a heavily infested research orchard at the Geneva Station have shown that handgun sprays of Surround were very effective against all direct fruit-feeding insects, including the plum curculio. Therefore, applying sprays of Surround with a handgun may be an option for growers seeking to increase the amount of insect-free fruit in their organic orchards.

Identification of adequate markets for fresh organic apples in the Northeast is another challenge for organic producers. Most organic fruit in this region is sold for processing, and there are small niche markets that offer limited amounts of fresh fruit. However, organic apples are usually sold at prices 2-3 times higher than conventionally grown apples. By increasing the percentage of clean fruit, the grower also increases his profit margin, but this may still not be enough to make this system economically feasible.

These organically approved insecticides are about five to six times more expensive than conventional products (Table 3). Also, more frequent, sometimes weekly applications are required, and labor costs for these treatments are naturally more expensive, especially if handguns are used. These high labor costs for organic production apply not only to pesticide applications, but also to hand-thinning, hand-weeding, and harvesting. Other inputs such as increased fuel, water, and equipment wear should also be considered.

Table 3. Pesticide Cost Analysis

Material	Rate/A	Cost*	Cost/A/application	Cost/Acre/season
Guthion 50WP	1.5 lb	$8.13/lb	$12.20	$85.40 (7 appl's)
Surround 95WP	50.0 lb	$0.65/lb	$32.50	$422.50 (13 appl's)
Aza-Direct 1.2L	32.0 oz	$1.48/oz	$47.36	$615.68 (13 appl's)

* Prices quoted from UAP Northeast 10/19/01

Organic production does have positive aspects as well. If the quality of fruit is high enough, the price it fetches may cover the input costs and still make a profit for the grower. Competition for the organic market is small, and consumers concerned about the pesticides used in conventionaly grown crops are probably willing to pay more for certified organic products. This increased interest by both the grower and consumer then prompts not only the apple industry but also researchers to develop better materials and techniques. Also, most of the organically certified materials tend to be "softer" and offer more of an opportunity for biological control, further reducing the amount of pesticides needed.

Because of the complexities associated with organic production systems, a grower must be prepared to make a substantial investment to enter into this market. The increasing interest of organic consumers has had an effect on the number of farmers attempting to grow organic produce. With the development of more efficient materials and techniques, producing a high quality certified organic product might be possible. However, consumers willing to pay premium prices for this type of produce will be the driving factor behind future organic markets.

Correction to Blueberry Fertilization

The article in the e-mail version of last week's Ohio Fruit ICM News contained an error when a hyphen was dropped. The rate of N per acre should read 60 to 70 pounds.

Pest Phenology

Coming Events	Degree Day Accum. Base 50F
	65 - 221

Redbanded leafroller 1st flight peak	
Spotted tentiform leafminer 1st flight peak	65 - 275
Apple grain aphid present	67 - 251
San Jose scale 1st catch	69 - 385
European red mite egg hatch	74 - 208
Oriental fruit moth 1st flight peak	96 -298
Lesser peachtree borer 1st catch	110 - 553
White apple leafhopper present	123 - 404
Spotted tentiform leafminer sapfeeders present	130 -325
1st codling moth catch	141 -491

Thanks to *Scaffolds Fruit Journal* (Art Agnello)

SkyBit® Apple Scab Prediction for North-Central Ohio

Observed:
April 8, 9, 12-15, 20, 22, 23, 27, 28
Possible infection & damage

April 10, 11, 16-19, 21, 24-26, 29, 30, May 1
Active, but no infection

Predictions based on weather forecasts:
May 2, 6, 7, 9-11 - possible infection & damage

May 3-5, 8 - active but no infection

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: 4/24 to 5/1
Petal fall stage on May 1, 2002
- RBLR: 0 (down from 7)
- STLM: 2 (down from 12)
- CM (mean of 3 traps): 0.3 (up from 0)
- TABM: 0 (same as last week)
- SJS: 0 (same as last week)

Peach: 4/24 to 5/1/02
- OFM: 1 (same as last week)
- LPTB: 0 (first report)

Site: Wayne County, Ohio:
Source: Ron Becker, Program Assistant, IPM, Agriculture & Extension

Apple: 4/24 to 5/01/02
- STLM: 35 (1st report)
- CM: traps set
- RBLR: 0 (1st report)
- OFM: 0 (1st report)
- LPTB: 0 (1st report)

The only insects found have been light infestations of tarnished plant bugs. Rust is easily seen in bramble plantings.

Site: East District: Erie & Lorain Counties
Source: Jim Mutchler, IPM Scout

Apple: 4/23 to 4/30/02
- STLM: 513 (up from 405)
- OFM: 0.7 (down from 2)
- RBLR: 7.9 (up from 6)

Peach: 4/23 to 4/30
OFM: 2 (down from 3)
RBLR: 10.7 (up from 4)

Site: West District:Huron, Ottawa, & Sandusky Co.
Source: Gene Horner, IPM Scout

Apple: 4/23 to 4/30
OFM: 0 (down from 02.8)
RBLR: 10.7 (down from 22.5)
Peach: first report
OFM: 0.5 (down from 3.4)
RBLR: 2.5 (down from 20.8)

Degree Day Accumulations for Ohio Sites, May 1, 2002

Location	Degree Day Accumulations Base 50F	
	Actual	Normal
Akron-Canton	178	153
Cincinnati	297	286
Cleveland	171	144
Columbus	277	202
Dayton	241	208
Fremont	155	130
Kingsville Grape Branch	152	104
Mansfield	168	150
Norwalk	156	133
Piketon	307	307
Toledo	191	126
Wooster	201	133
Youngstown	186	133

Preliminary Monthly Climatological Data for Selected Ohio Locations, April, 2002

Weather	Monthly	Normal	Year-to-	Normal	Avg	Normal	Avg	Normal	Mean	Normal

Station Location	Precip	Monthly Precip	Date Precip	Year-to-Date Precip	High	High	Low	Low	Temp.	Mean
Akron-Canton	5.92	3.39	13.90	11.31	60.1	59.0	40.7	37.2	50.4	48.1
Cincinnati	5.97	3.96	14.71	13.53	66.0	64.7	45.3	42.7	55.7	53.7
Cleveland	3.67	3.37	12.44	11.08	59.2	57.3	41.8	37.9	50.5	47.6
Columbus	4.02	3.25	11.06	10.87	64.6	62.0	44.6	40.0	54.6	51.0
Dayton	5.72	4.03	12.44	12.21	63.3	60.7	43.7	40.4	53.5	50.6
Fremont	3.47	3.03	9.80	9.17	60.5	58.9	39.0	37.8	49.7	48.4
Kingsville	5.31	3.15	13.55	9.40	58.4	55.2	38.9	36.8	48.7	46.0
Mansfield	4.83	4.17	12.50	12.33	59.6	58.4	40.6	36.1	50.1	47.3
Norwalk	4.29	3.13	13.61	9.53	57.9	57.7	42.6	36.6	50.2	47.2
Piketon	4.78	3.80	13.63	14.40	68.5	64.1	42.8	40.7	55.7	52.4
Toledo	4.14	3.24	11.55	9.67	61.9	58.9	42.9	37.7	52.4	48.3
Wooster	4.11	3.06	13.60	9.90	62.6	59.6	40.8	36.7	51.7	48.1
Youngstown	3.86	3.33	11.67	10.75	60.6	58.2	39.6	36.5	50.1	47.3

Temperatures in degrees F, Precipitation in inches

Record highs set: April 15: Dayton 82, Fremont 82, Piketon 84, Toledo 85, Wooster 80, Youngstown 85
April 16: Akron 84, Cleveland 85, Fremont 86, Kingsville 85, Mansfield 84, Piketon 87, Toledo 88, Wooster 85
April 17: Kingsville 85, Piketon 86
April 18: Kingsville 85, Piketon 87
April 19: Mansfield 83, Piketon 88, Youngstown 84

Record highs tied: April 15: Akron 79, Cleveland 81, Columbus 82, Mansfield 79
April 16: Youngstown 84
April 17: Toledo 86
April 18: Mansfield 82, Toledo 88
April 19: Fremont 85, Toledo 85, Wooster 84

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

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