



Cultivating Cumberland

July - 2017 VOL. 22, ISSUE 7

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Attachments:

Mosquito Facts—29 Things you
Didn't know About Mosquitoes

Cucurbit Downy Mildew Reported in the Region

Wesley Kline, Rutgers University

Downy Mildew was confirmed within 200 miles of East Vineland on cucumbers this week. Depending on wind direction and storms, the disease can be in Southern New Jersey quickly. Growers should scout their field and be protecting crops from now until the end of the growing season, look for leaves specked with light yellow spots. The spots are angular and do not cross leaf veins. They will grow together and turn tan to brown. On the underside of the leaf, look for a fine white to gray fuzzy growth that turns dark gray or purple. The infected leaves die, but remain erect on the plant and leaf margins turn inward. If planting cucumbers, switch to varieties with resistance or tolerance to Downy Mildew. Even with resistant varieties it is important to maintain a good fungicide program. Refer to the Cucurbit Downy Mildew Forecasting website (<http://cdm.ipmpipe.org>) for current status of the disease. There are various strains of the disease which means one year it may attack only cucumbers and other years it could be pumpkins, cantaloupe, and summer or winter squash. No matter which strain, all cucurbits should be protected. Refer to the 2016 Mid-Atlantic Commercial Vegetable Recommendations Guide (pages F55 and 56) and 2017 Critical Update pages for more information.

Poor Pollination in Tomato High Tunnels

There have been reports of misshapen tomato fruit in high tunnels. When the fruit is cut the seed has only developed on one side of the fruit (fig.1). This is a symptom of lack of pollination the result of cold weather or not sufficient bee visits. Anyone who is trying to use honey bees in a high tunnel will be disappointed. Honey bees get disoriented in the tunnels and do a very poor job of pollination. Commercial bumble bees are the best way to pollinate high tunnels. The bee should be placed in the tunnels just before the flowers start to open. This will allow time for them to get acclimated to the tunnel. There are several sources of bees and different quality of hives depending on how long the hive is needed. Explain to the supplier what is being grown and how long the crop will be in the tunnel.



Update on the Food Safety Modernization Act

Wesley Kline, Rutgers University

As the summer progresses think about your food safety plans for 2018. You may think it is too early, but there will be changes starting in 2018 with the implementation of the Food Safety Modernization Act (FSMA). The largest operations (\$500,000 and over) will need to start complying with most parts of the rule. The exception is the water requirement. The Food and Drug Administration is revisiting the water requirement. There will be changes, but until they are released we cannot say exactly what updates there will be. Growers do not need to change how they sample or the number of samples until January, 2020. Do not modify what you are doing continue with the number of samples until we see something in writing about modification. If you are not sampling your water now is a good time to start. For wells, sample once during the season and for surface water three times (at the beginning of irrigation, mid-season and the most important just be harvest). If pumping water from a well into a pond it is all considered surface water.

If a grower is complying with the USDA Harmonized audit there are minor changes in 2017. At the end of this article are the changes listed by USDA. Go to www.unitedfresh.org > [Food Safety](#) for the standards and <https://www.ams.usda.gov/services/auditing/gap-ghp/harmonized> for the checklists that USDA uses during their audits. There will be additional changes in 2018 with USDA trying to make the audit closer to FSMA so expect this winter there will be training on the changes. There have been no changes to the basic GAP/GHP audit in 2017.

Changes to the USDA Produce GAPs Harmonized Audit Checklists (Version 1.1 12/08/2016 Standards)

Updated cover pages and formatting of checklists.

Added question 2.4.3.4 and 2.4.3.5 to USDA Acceptance Criteria

Field Operations New Requirements

2 Field Production- 2.1 Field History and Assessment

2.1.3 Sewage or septic systems are maintained so as not to be a source of contamination.

2 Water Used in Growing Activities-2.4 Water Management Plan

2.4.3.4 If water is treated to meet microbiological criteria, the treatment is approved and effective for its intended use, and is appropriately monitored.

2.4.3.5 If post-harvest handling is used to achieve microbial criteria, Operation has documentation supporting its use.

2.4.3.6 If Operation uses an alternative approach to regulatory microbiological testing, Operation has scientific data or information to support the alternative.

Waste Management NEW SECTION

5.1 Operation has implemented a waste management plan.

Edits

1.4.3 "Subcontractors" replaced with "Contracted personnel"

2.1.2 changed "facilities, facility" to "buildings, building"; removed "designed"

2.2 Worker Health/ Hygiene and Toilet/Handwashing Facilities

2.2.1 Condensed wording, revised requirement: "Operation shall have a policy for toilet, hygiene, and health" **2.2.2** added "be made aware of and"

2.2.4 added "and visitors"

2.3 Agricultural Chemicals/Plant Protection Products

2.3.4 changed "Water (mixed with) used for solutions containing..." to "Water used with..."

2.4 Changed Agricultural Water to Water Used in Growing Activities

2.4.1.3 Changed "Agricultural Water" to "Water"

2.5.3 Changed "domestic" to "domesticated"

3.2 Changed "Water/Ice" to "Water/Ice Used in the Harvesting and Postharvest Operations"

3.4.1 added "visibly contaminated"

5.2 Trash shall not come in contact with produce. (Moved from previous 4.1.3 to new Waste Management section.)

Post-harvest Operations

Updated cover pages and formatting of checklists.

New Requirements**1 General Requirements - 1.5 Worker Education and Training**

1.5.3 Contracted personnel are held to the relevant food safety standards as they would be as employees.

1 General Requirements – 1.12 Containers, Bins and Packaging

1.12.3 Operation has written policy regarding whether product-contact containers are permitted in direct contact with the ground.

1 General Requirements - 1.13 Building, Equipment, Tools

1.13.12 Sewage or septic systems are maintained so as not to be a source of contamination.

1 General Requirements – 1.21 Worker Health/Hygiene and Toilet/Handwashing Facilities

1.21.10 Operation shall have a blood and bodily fluids policy.

1.23 Allergen Control NEW SECTION**Waste Management NEW SECTION**

4.1 Operation has implemented a waste management plan.

Edits (Formatting or wording adjustment to align with regulation)

1.3.2 changed "facility" to "operation"

1.11 added "Post-Harvest"

1.12 Added "Packaging"

1.12.1 Moved from 1.23.2, removed quality from requirement

1.12.2 Was previously 1.12.1 (requirement # change)

1.12.4 Was previously 1.12.3 (requirement # change)

1.12.5 Was previously 1.12.4 (requirement # change)

1.12.6 Was previously 1.12.5 (requirement # change)

1.12.7 Was previously 1.12.6 (requirement # change)

1.13 Building, Equipment, Tools (Changed facility to building)

1.13.1 Building shall be constructed and maintained... (Changed facility to building, removed designed.)

1.13.10 Changed "facility" to "building"

1.17.1 Changed "facility" to "building"

1.21.2 Added "and visitors"

1.21.6 Combined previous requirements 1.21.6 and 1.21.15

1.21.7 Added "shall be made aware of and"

1.21.11 Was previously 1.21.10 (requirement # change)

1.21.12 Was previously 1.21.11 (requirement # change)

1.21.13 Was previously 1.21.12 (requirement # change)

1.21.14 Was previously 1.21.13 (requirement # change)

1.21.15 Was previously 1.21.14 (requirement # change)

1.23.1 If applicable, Operation has a written Allergen Control Program. (Moved into new Allergen Control section.)

1.24.1 Changed "facility" to "Operation"

1.24.2 Changed "facilities" to "areas"

1.25.2 Added "and prevailing regulations"

2.2 Added "or visibly contaminated produce"

2.5 Added "adequately maintained and"

3.1 Temperature Control

Removed "(when refrigerated transport is required for food safety)" from section title and added procedure for each requirement in this section.

4.2 Trash shall not come in contact with produce. (Was previously 3.2.3, moved into new Waste Management section.)

USDA Restricts PACA Violators in Florida, Illinois and New Jersey from Operating in the Produce Industry

The U.S. Department of Agriculture (USDA) has imposed sanctions on three produce businesses for failure to pay reparation awards issued under the Perishable Agricultural Commodities Act (PACA).

The following businesses and individuals are currently restricted from operating in the produce industry:

David & Son Peppers Inc., operating out of Tampa, Fla., for failing to pay a \$3,242 award in favor of a Florida seller. As of the issuance date of the reparation order, Mary Martinez was listed as the officer, director and major stockholder of the business.

Goodness Greeness Inc., doing business as Goodness Greeness, operating out of Chicago, Ill., for failing to pay a \$16,179 award in favor of a California seller. As of the issuance date of the reparation order, Howard Berington, Richard T. Scaman and Robert L. Scaman Jr. were listed as the officers, directors and major stockholders of the business. Another principal of the business at the time of the order was Rodney J. Scaman. He has challenged his responsibly connected status.

Gamez Produce LLC, operating out of Hackensack, N.J., for failing to pay a \$97,775 award in favor of a New Jersey seller. As of the issuance date of the reparation order, Faustimo Gamez was listed as a member of the business.

PACA provides an administrative forum to handle disputes involving produce transactions; this may result in a reparation order being issued that requires damages to be paid by those not meeting their contractual obligations in buying and selling fresh and frozen fruits and vegetables. USDA is required to suspend the license or impose sanctions on an unlicensed business that fails to pay PACA reparations awarded against it as well as impose restrictions against those principals determined to be responsibly connected to the business when the order is issued. Those individuals, including sole proprietors, partners, members, managers, officers, directors or major stockholders may not be employed by or affiliated with any PACA licensee without USDA-approval.

The PACA Division, which is part of USDA's Agricultural Marketing Service (AMS), regulates fair trading practices of produce businesses that are operating subject to PACA including buyers, sellers, commission merchants, dealers and brokers within the fruit and vegetable industry. All oversight of actions related to PACA are conducted by AMS, an agency within USDA.

Resources:

http://growingfl.com/news/2017/06/usda-restricts-paca-violators-florida-illinois-and-new-jersey-operating-produce-industry/?utm_source=Growing+Florida&utm_campaign=6f7c15a4b3-growingfl-daily_newsletter&utm_medium=email&utm_term=0_a00cf5c16f-6f7c15a4b3-296638181

NFUF Launching Needs Assessment Survey to Inform Food Safety

The Local Food Safety Collaborative, a collaboration between National Farmers Union Foundation (NFUF) and the U.S. Food and Drug Association (FDA), launched a nationwide food safety survey. The results will help the organization address the needs of small producers and processors with regards to food safety and compliance with applicable Food Safety Modernization Act (FSMA) regulations.

This survey is one component of an assessment that the collaborative is conducting to ensure a comprehensive understanding of the specific needs of small local producers and processors, food hubs, food aggregators or packers, organic farmers, and sustainable producers. FSMA will have broad implications for the farming community, and with the results of this assessment, the collaborative will be positioned to best direct resources to address their concerns.

The survey can be accessed at www.localfoodsafety.org/survey and will be open through the beginning of August. It is available in both English and Spanish. Participation is voluntary and should take no more than 20 minutes. Participants may also elect to be entered in a raffle to win one of twenty \$100 gift cards.

While previous regional assessments have been completed, this is a national survey addressing food safety and FSMA. If you would like to request a paper version of the survey be sent to you, or if you wish to assist with distribution of the survey, please contact FSMA Project Coordinator Chelsea Matzen at 202-554-1600 or cmatzen@nfudc.org

Rutgers New Fact Sheet Available

The following fact sheets are now available through Rutgers University:

FS1274	Build a Better Breakfast Authors: Huber, R. and Hughes, L.
FS1275	Ultra-Niche Crop Series: Mixed Cut Flowers for Small Farms Authors: Carleo, J., Matthews, J. and Melendez, M.
FS1276	New Jersey Hops Productions FAQs Author: Bamka, W.

Visit: <http://njaes.rutges.edu>, go to the bottom of the page, click "publications" link and enter FS number to locate the fact sheets.

Know a Landowner Thinking About Farmland Preservation?

Given the availability of new funding, the State Agriculture Development Committee (SADC) is seeking applications for the Farmland Preservation Program. Farm owners interested in learning about the application, selection and preservation process are encouraged to attend one of the meetings listed below. The SADC particularly is seeking farms that exceed the acreage thresholds listed at below for its State Acquisition Program.

MEETINGS:

Cumberland County Meeting
Wednesday, July 12, 7:00 p.m.
CC Administration Building
164 W. Broad Street
Bridgeton, NJ 08302

Hunterdon County Meeting
Wednesday, July 26, 6:00 p.m.
Farmers & Businessman's Picnic
Bob Ribbans Farm
101 Manners Rd., Ringoes, NJ

Monmouth County Meeting
Wednesday, August 9, 7:00 p.m.
Upper Freehold Twp. Municipal Bldg.
314 Rte. 539
Cream Ridge, NJ

Salem County Meeting
Wednesday, August 23, 6:30 p.m.
Salem County Agricultural Complex
51 Cheney Road
Woodstown, NJ

Warren County Meeting
Thursday, July 20, 6:00 p.m.
County Dept. of Land Preservation
500 Mount Pisgah Avenue
Oxford, NJ

State Acquisition Minimum Acreage required:

Atlantic	54 acres
Bergen	18 acres
Burlington	85 acres
Camden	30 acres
Cape May	36 acres
Cumberland	83 acres
Gloucester	55 acres
Hunterdon	49 acres
Mercer	54 acres
Middlesex	65 acres
Monmouth	35 acres
Morris	30 acres
Ocean	33 acres
Passaic	14 acres
Salem	92 acres
Somerset	65 acres
Sussex	51 acres
Warren	69 acres

Interested landowners may also contact the SADC directly at:

sadc@ag.state.nj.us

or

Call: 609-984-2504

Identification and Management of Bacterial Diseases in Peppers

Wesley Kline, Rutgers University

We received a three-year grant to evaluate methods of management for bacterial diseases in peppers. Bacterial Leaf Spot (*Xanthomonas campestris*) is the second most important disease after Phytophthora Blight (*Phytophthora capsici*) in New Jersey. There are at least 10 races of Bacterial Leaf Spot, but not all are present in New Jersey. Through preliminary field screening, races 1-6 and possibly 10 have been identified in parts of the state. There are few resistant varieties that incorporate all 10 races and only a few have been tested in New Jersey. These were developed for the Southern United States and Florida. Many times, varieties developed for the South do not produce well in the North. All released varieties and advanced breeding material need to be evaluated under our conditions.

Combined with the need for new varieties is the problem with wooden stakes used for trellising pepper plants. The stakes can become contaminated with bacterial diseases. If untreated, the stakes can spread bacteria into a new field the following year. Grower's options are to treat the stakes or purchase new stakes each year. Purchasing stakes is not a viable option due to the expense. Growers have had varying results when treating stakes. This is partially due to method and possible chemicals used to treat the stakes. Unless new varieties and methods to sanitize stakes are developed, peppers in New Jersey will increasingly be difficult to grow profitably.

Growers can help us with the project by contacting us if bacterial leaf spot is found in a field. We want to sample the plants to determine which races are present and collect some stakes at the end of the season to see if the bacteria carries over on the stakes. Contact Wes Kline at 856-451-2800 ext 1, Andy Weynandt at 856-455-3100 ext. 4144 or Kris Holmstrom at 848-932-9802.

Municipal Leaf Use Survey

Meredith Melendez, Rutgers University

Rutgers Cooperative Extension of Mercer County is conducting an online survey to identify current and potential uses of municipal leaves by farms. This informational gathering is a result of a County Department of Health inspection of a farm utilizing leaves and their expectations based on the way the current regulatory code is written.

Grower response to this survey will provide information to the DEP/SADC/Rutgers about municipal leaf holding on farms. The hope is that we can update the regulatory code to better reflect farm use of the leaves. We would appreciate anyone using or thinking about using municipal leaves to fill out the survey. Go to: <https://www.surveymonkey.com/r/municipalleaves>

A CONVERSATION ABOUT THE NEW JERSEY 2017 WATER SUPPLY PLAN

THURSDAY, JULY 6
7 – 8 PM

HOSTED BY THE COHANSEY AREA WATERSHED ASSOCIATION
31 WEST COMMERCE ST
BRIDGETON NJ 08302

The New Jersey Water Supply Plan is a critical planning document for economic development, urban and suburban planning, sustaining agriculture, and preserving the ecological integrity of streams and other waterbodies.

In May of 2017, New Jersey released a draft water supply plan for the first time since 1996. The State is currently seeking public input on this draft plan through public meetings and written comments.

Join Sal Mangiafico of Rutgers Cooperative Extension for a discussion of what is in this plan and what it means for our community. Free of charge.

FOR MORE INFORMATION CONTACT:
SAL MANGIAFICO OR PAM BURTON
856-451-2800 EXT. 4
mangiafico@njaes.rutgers.edu

RUTGERS

New Jersey Agricultural
Experiment Station



COHANSEY AREA
— WATERSHED ASSOCIATION INC. —



Calendar of Important Events

↻ Indicates the newly added event since last calendar

July 2017

↻ July 25

Gold and Fine Turf Day, Hort Farm 2, 102 Ryders Lane, North Brunswick, NJ. Optional CORE training available; \$75 fee with exam at 3 p.m. For more information call 973-812-6467.

↻ July 26

Lawn, Landscape and Sports Field Day Trade Show, Adelpia Farm 594 Halls Mills Road, Freehold, NJ. Optional CORE training available. For more information call 973-812-6467.

August 2017

August 21-25

Introduction to Food Science, NJ Institute for Food, Nutrition and Health, Room 101, 61 Dudley Road, New Brunswick, Full registration by 8/7 \$1,495; lesser days available. For more information call 848-932-9271 or visit: www.cpe.rutgers.edu/food

September 2017

September 20

Basic Pesticide Training Course, NJDEP Public Hearing Room, 1st Floor, 401 E. State St., Trenton, NJ; 9am-1pm. The Course is Free and pesticide recertification credits are available. For more information call Stephen Bross 609-984-6953

October 2017

October 3-5

HACCP Plan Development, Rutgers Continuing Ed, University Inn & Conference Center, 178 Ryders Lane, New Brunswick, \$945 by 9/19. For information call 848-932-9271 x2 or visit: www.cpe.rutgers.edu/food

October 18-19

Sensory Evaluation, Rutgers Continuing Ed, University Inn & Conference Center, 178 Ryders Lane, New Brunswick, \$845 by 10/4. For more information call 848-932-9271 x2 or visit: www.cpe.rutgers.edu/food

October 20

Statistics for Food Scientists, Rutgers Continuing Ed, University Inn & Conference Center, 178 Ryders Lane, New Brunswick; \$395 by 10/6. 8:0am—4:30 pm. For more information call 848-932-7316 or visit: www.cpe.rutgers.edu/food

November 2017

Better Process Control School, Rutgers Continuing Ed, University Inn & Conference Center, 178 Ryders Lane, New Brunswick, NJ; 8:30am—4:30pm. Check in time 8am. Registration \$995 by 12/23; \$1,095.00 after. For more information call 848-932-7315 or visit: www.cpe.rutgers.edu/food

December 2017

December 4-5

Practical Food Microbiology, Rutgers Continuing Ed, University Inn & Conference Center, 178 Ryders Lane, New Brunswick, NJ; 9am-:30pm, Check in 8:30 a.m. Registration \$795 by 11/20; \$825 after. For more information call 848-932-7315 or visit: www.cpe.rutgers.edu/food

REGULARLY SCHEDULED MEETINGS

✓ Indicates meeting will be held at RCE of Cumberland County

<p>✓</p> <p>Pesticide Certification Exam Schedule—Cumberland County 291 Morton Avenue Millville, NJ 08332 (Between Rosenhayn & Carmel)</p> <p><u>2017</u></p> <p>Oct 19</p> <p>To Register call 609-984-6614 For directions call 856-451-2800 *****</p>	<p>✓</p> <p>Cumberland County Agriculture Development Board County Administration Bldg. Freeholder Room 164 W. Broad Street Bridgeton, NJ 08332</p> <p><u>2017</u></p> <p>Jun 13 Jul 11 Aug 8 Sept 12 Oct 10 Nov 14 Dec 12</p> <p>Reg. Meetings start at 7 p.m. Information call 856-453-2211 *****</p>	<p>✓</p> <p>Cumberland County Board Of Agriculture 291 Morton Avenue Millville, NJ 08332 (Between Rosenhayn & Carmel) 7 pm meetings</p> <p><u>2017</u></p> <p>Sept 21 Oct 19 Nov 16 Dec 21</p> <p>For info call Hillary Barile, President 856-453-1192 *****</p>
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**Cumberland County Improvement Authority (CCIA)
Pesticide Container Recycling**
9:00 a.m. to 12 Noon
Cumberland County Solid Waste Complex
169 Jesse's Bridge Rd. (located off Route 55 Exit 29)
Deerfield Township, New Jersey

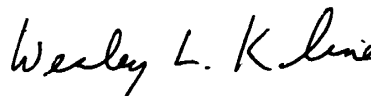
Questions? Call Division of Ag & Natural Resources, NJ Dept. of Ag 609-292-2242

Jun 16 July 21
Aug 18 Sept 15 Oct 20 Nov 17

Sincerely,



Salvatore S. Mangiafico, Ph.D.
County Agent II/Associate Professor
Environmental & Resource Management
Internet: Mangiafico@njaes.rutgers.edu



Wesley L. Kline, Ph.D.
County Agent II/Associate Professor
Vegetable & Herb Production
Internet: wkline@njaes.rutgers.edu

Pesticide User Responsibility: Use pesticides safely and follow instructions on labels. The user is responsible for the proper use of pesticides, residues on crops, storage and disposal, as well as damages caused by drift.

Use of Trade Names: Trade names are used in this publication with the understanding that no discrimination is intended and no endorsement is implied. In some instances the compound may be sold un-

Have you visited the Cumberland County website for the Present and/or past issues of "Cultivating Cumberland"? It's a great resource for information and dates.....

<http://Cumberland.njaes.rutgers.edu/>

Public Notification and Non-discrimination Statement

Rutgers Cooperative Extension is an equal opportunity program provider and employer. Contact your local Extension Office for information regarding special needs or accommodations. Contact the State Extension Director's Office if you have concerns related to discrimination, 848-932-3584.

Cooperative Extension of Cumberland County



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Extension Education Center
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Millville, NJ 08332-9791

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Mosquito Facts - 29 Things You Didn't Know About Mosquitoes

1. **Only female mosquitoes bite.** Both male and female feed mainly on fruit and plant nectar, but the female also needs the protein in blood to help her eggs develop. Once she's had her fill of blood, she'll rest for a couple of days before laying her eggs.
2. **There are more than 3,500 species of mosquitoes.** About 175 of them are found in the United States, with the *Anopheles quadrimaculatus*, *Culex pipiens*, *Aedes aegypti* and *Aedes albopictus* (Asian tiger mosquito) among the most common. The *Anopheles* is a malaria carrier, and the other three are known to spread various forms of encephalitis.
3. **West Virginia has the fewest species of mosquitoes.** There are 26 in the mountainous state, while Texas has the most with 85. Florida is a close second with 80 identified species.
4. **Mosquito is Spanish for "little fly."** The word reportedly originated in the early 16th century. In Africa, New Zealand and Australia, mosquitoes are often called "Mozzies"
5. **Mosquitoes don't have teeth.** The females "bite" with a long, pointed mouthpart called a proboscis. They use the serrated proboscis to pierce the skin and locate a capillary, then draw blood through one of two tubes.
6. **A mosquito can drink up to three times its weight in blood.** Don't worry, though. It would take about 1.2 million bites to drain all the blood from your body.
7. **Female mosquitoes can lay up to 300 eggs at a time.** Usually, the eggs are deposited in clusters – called rafts – on the surface of stagnant water, or they are laid in areas that flood regularly. Eggs can hatch in as little as an inch of standing water. Females will lay eggs up to three times before they die.
8. **Mosquitoes spend their first 4-10 days in water depending on weather conditions.** Water is necessary for the eggs to hatch into larvae, called wigglers. Wigglers feed on organic matter in stagnant water and breathe oxygen from the surface. They develop into pupae, which do not feed and are partially encased in cocoons. Over several days, the pupae change into adult mosquitoes.
9. **Mosquitoes hibernate.** They are cold-blooded and prefer temperatures over 80 degrees. At temperatures less than 50 degrees, they shut down for the winter. The adult females of some species find holes where they wait for warmer weather, while others lay their eggs in freezing water and die. The eggs keep until the temperatures rise, and they can hatch.
10. **The average mosquito lifespan is less than two months.** Males have the shortest lives, usually 10 days or less, and females can live about six to eight weeks, under ideal conditions. The females lay eggs about every three days during that time. Females of species that hibernate may live up to six months.



The Bloodsucker Behavior & Anatomy

11. **Mosquitoes have six legs.** They also have a head, thorax and abdomen. On the head are two large compound eyes, two ocelli (simple eyes), two antennae and a proboscis. Two large, scaled wings sprout from the thorax.
12. **Midges and crane flies are often mistaken for mosquitoes.** Biting midges are smaller, have shorter wings and tend to feed in swarms. Mosquito traps often attract and kill biting midges. Meanwhile, crane flies are much larger than mosquitoes – up to 1 ½ inches long in some cases – and do not bite.
13. **Male mosquitoes locate females by the sound of their wings.** Females can beat their wings up to 500 times per second, and the males pick out the higher frequency of those beats when seeking a mate.
14. **Mosquitoes can't fly very far or very fast.** Most mosquitoes can fly no more than about one to three miles, and often stay within several hundred feet of where they were hatched. However, a few salt marsh species can travel up to 40 miles. The top speed for a mosquito is about 1.5 miles per hour.
15. **Mosquitoes generally fly below 25 feet.** However, some species have also been found at extraordinary heights, including 8,000 feet up in the Himalayas.

16. **Mosquitoes can smell human breath.** They have receptors on their antennae that detect the carbon dioxide released when we exhale. Those plumes of CO₂ rise into the air, acting as trails that the mosquitoes follow to find the source.
17. **Sweat helps mosquitoes choose their victims.** Our skin produces more than 340 chemical odors, and some of them smell like dinner to mosquitoes. They are fond of octenol, a chemical released in sweat, as well as cholesterol, folic acid, certain bacteria, skin lotions, and perfume.
18. **Body heat marks the target.** Mosquitoes use heat sensors around their mouthparts to detect the warmth of your body – actually, the blood inside it – then land on you and locate the best capillaries for tapping.
19. **Mosquitoes feed day and night.** Some species, like the *Aedes* are daytime biters, while others, like *Culex*, start biting at dusk and continue a few hours into dark.

The Trouble with Mosquitoes

20. **Mosquitoes have been around since the Jurassic period (Remember the Movie).** That makes them about 210 million years old. They've been mentioned throughout history, including in the works of Aristotle around 300 B.C. and in writings by Sidonius Apollinaris in 467 B.C.
21. **The bumps from mosquito bites are caused by saliva.** While one tube in the proboscis draws blood, a second pumps in saliva containing a mild painkiller and an anti-coagulant. Most people have minor allergic reactions to the saliva, causing the area around the bite to swell and itch.
22. **Malaria is caused by a parasite that lives in mosquitoes.** The parasite gets into mosquito saliva and is passed on when the insect bites someone. West Nile and other viruses are passed the same way. Mosquitoes can also carry and pass on canine heartworm.
23. **West Nile virus came to the U.S. in 1999.** Scientists first identified it in a feverish woman in Uganda – the West Nile district – in 1937. There were large outbreaks of the virus reported in Israel, South Africa, and Romania up through the late '90s. The virus first appeared in the United States in 1999 with an epidemic in New York.
24. **Mosquitoes do not transmit HIV.** The virus that causes AIDS does not replicate in mosquitoes and is actually digested in their stomachs, so it's broken down without being passed on.
25. **Mosquitoes are considered the deadliest “animal” in the world.** The *Anopheles* mosquito, in particular, is dangerous because it transmits malaria, which kills more than one million people every year, primarily in Africa. Alexander the Great is believed to have died of malaria in 323 B.C.

Keeping THEM Away From You

26. **DEET is considered the 'gold standard' of mosquito repellents.** Endorsed by the Centers for Disease Control (CDC), DEET doesn't mask the smell of the host or jam the insect's senses - mosquitoes simply don't like it because it smells bad to them. A product containing 10 percent DEET can protect you for up to 90 minutes. Two other repellents, picaridin and lemon-eucalyptus oil, have also proven effective and are now recommended by the CDC.
27. **Bacteria can be used to kill mosquito larvae.** *Bacillus thuringiensis israelensis* (Bti) is a commercially-produced bacterium, sold in pellet and powder form, that can be laced into water where larvae live. It produces proteins that turn into toxins after the larvae eat it.
28. **Insecticides work, but only in the short term.** Permethrin, one of the most common chemicals used by local mosquito control programs, kills mosquitoes on contact by disrupting their central nervous systems. However, eggs and larvae often are not affected. Once the insecticide dissipates, mosquitoes can return.
29. **The two main mosquito predators are fish and dragonflies.** *Gambusia*, or mosquitofish, feed on mosquito larvae and are used all over the world to help control mosquito populations. Dragonfly larvae, called nymphs, eat mosquito larvae, and adult dragonflies prey on adult mosquitoes. Some towns in Maine release dragonflies every summer as a natural form of mosquito control.

Sources: *The American Mosquito Control Association; the U.S. Centers for Disease Control; the U.S. Department of Agriculture; and, entomology and agriculture departments at the University of California – Davis, Colorado State University, Rutgers University, University of Nebraska, and the University of Florida.*