ARIZONA COOPERATIVE EXTENSION
THE UNIVERSITY OF ARIZONA • COLLEGE OF AGRICULTURE AND LIFE SCIENCES

Backyards & Beyond

Summer 2008 RURAL LIVING IN ARIZONA Volume 2, Issue 2

Featured Plant

Common Name: Sideoats Grama
Scientific Name: *Bouteloua curtipendula*
(boo-te-LOO-uh kurt-ih-PEN-dyoo-luh)

Kyle Spencer

Del W. Despain, Ph.D., Senior Research Specialist, University of Arizona Cooperative Extension, Mohave County

Sideoats grama, the largest of the grama grasses, is a native, warm-season perennial grass from 1 to 3 feet in height. It is distinguished by oat-like seed spikelets that hang from one side of the seed stalk. Spikelets are orange to dark-red in color when in flower. Leaves are a bluish-green color, sometimes with a purplish cast, and cure to a reddish-brown or straw color. A distinctive characteristic of the leaves are sparse, long, stiff hairs that grow from tiny glands along the edge of the leaf. This grass can produce stout rhizomes, but primarily grows in bunches and reproduces mostly by seed. Growth begins in spring and plants remain green through the summer. Flowering occurs typically from July thru September.

Sideoats grama occurs throughout most of North America and parts of South America. It is typically found on open slopes, woodlands and forest openings up to 7,000 feet in elevation. It is fairly drought-tolerant and prefers rocky, shallow soils within its range. This grass occurs throughout Arizona but is most abundant in the southern half of the state.

Sideoats grama is an excellent forage for all classes of livestock and many other herbivores. It remains moderately palatable with relatively good nutritional value into winter. It is somewhat less palatable than blue grama and is also less tolerant of heavy grazing than blue grama due to its taller growth habit. Sideoats grama is used as an ornamental, especially in xeric landscaping.

Sideoats grama is best established if the seed is planted no more than ½-inch deep. Most guidelines recommend deferring grazing until after the second growing season following establishment. The grass will tolerate and respond well to light to moderate intensity fires.

Notes of Interest: Sideoats grama is the state grass of Texas. It is listed as threatened or endangered in some eastern states. The Lakota call this grass wapaha kamnimnila peji, or "banner waving in the wind grass." Grama is a Spanish term for "coarse grass."

Featured Bird

Common Name: Scott's Oriole
Scientific Name: *Icterus parisorum*

Dan L. Fischer

Dan L. Fischer, Author of *Early Southwest Ornithologists, 1528-1900,* University of Arizona Press

With the coming of spring, several birds return from Mexico that are quite conspicuous because of their striking plumage. Among those are the orioles, so named because of their similarity to a European group named from Modern Latin meaning "golden." Two of the three common orioles that return to Arizona have this rich eye-catching "golden" appearance that brings attention to their plumage, while the third displays an appealing rich lemon yellow.

The brilliant male Scott's Oriole, as shown here in breeding plumage, is strongly marked with a jet black head, throat, neck, back, tail, and most of the wings which also show distinctive white stripes. The remaining plumage is offset from the black by a bright lemon yellow on the breast, lower base of the tail and shoulders. Their sharp, clearly whistled song, often heard well before being observed, is sung throughout the nesting season.

Their summer residence in Arizona occurs from the drier deserts well up into oaks, pinyon pines and juniper woodlands with nesting beginning in mid-April. They feed primarily on insects and nectar and are often associated with several species of yucca. Three or four lovely pale blue eggs blotched, or streaked, with darkish brown are laid generally in a small woven suspended nest of yucca or other plant fibers and lined with soft grasses in dense foliage of a plant or tree. The rather drab-olive to grayish-yellow female bird solely incubates the eggs for about 14 days while the male remains nearby to later aid in feeding the young.

Several young naturalists emerged as a result of the war between Mexico and the United States that occurred from 1846 to1848, followed by the Treaty of Guadalupe Hidalgo, and then the subsequent U.S. – Mexican Boundary Survey. In the concluding phase of the conflict, General in Chief of the Army Winfield Scott entered the field and personally directed the march to Mexico City. Among the officers that served under the general was Lt. Darius Nash Couch (1822-1897), who collected a beautiful oriole near Nuevo León which he believed to be a new species. Having a "high regard" for the general, he named it (*Icterus scottii*) in honor of his commander, who, because of his excessive ceremonial dress had earned him the label of "Fuss and Feathers" by his troops. The scientific name Couch gave proved to be invalid as it had been named seventeen years earlier by the nephew of Napoleon, Charles Bonapart, a serious student of birds visiting America. The common name of the bird, however, still stands. Couch was so taken by the natural history of Mexico that he took a leave of absence from the army to study the region and some of his collections were added to the "Birds of the Boundary." Couch later became a general during the Civil War.

Backyards & Beyond
rural living in Arizona

Summer 2008
Volume 2, Issue 2

Backyards & Beyond is published quarterly by a cooperative team from the University of Arizona Cooperative Extension.

Yearly subscription price $10.00
http://cals.arizona.edu/backyards

Scott Cramer

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Cover Photo credit: Ursula Schuch

ARIZONA COOPERATIVE EXTENSION
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Steven Robertson

Canning in Arizona

Low Acid Food Safety

Part 1

Sharon Hoelscher Day, Extension Agent, Family & Consumer Sciences, University of Arizona Cooperative Extension, Maricopa County

Julie Kendall

What do you do if your garden is overflowing with vegetables?

Home canning can be an option for your bounty. If you have not canned food at home before or it has been a while since you last canned food, you will have some decisions to make before you start. Plan ahead with your garden, what will you do if you get a bumper crop of green beans or tomatoes? Do you have up-to-date canning recipes? Do you have the correct equipment to can the types of food you will have in quantity? If you need a pressure canner, has it been tested recently for accuracy?

The biggest safety concern in home canned foods is the bacterium *Clostridium botulinum* that may cause botulism—a deadly form of food poisoning. These bacteria exist either as spores or as vegetative cells. The spores can survive harmlessly in soil and water for many years. Botulinum spores are on most fresh food surfaces, but because they grow only in the absence of air, they are harmless on fresh foods.

When ideal conditions exist for bacteria growth, the spores produce vegetative cells, which multiply rapidly and may produce a deadly toxin within 3 to 4 days of growth in an environment consisting of:

- Moist, low-acid food (vegetables, meat & some mixtures)
- Temperature between 40° and 120°F
- Less than 2 percent oxygen (like in a sealed canning jar!)

Home canned foods are the most likely candidate for botulism if NOT processed for the correct time or at the correct pressure for low acid foods. Even a taste of food containing botulinum toxin can be fatal. Be sure to use the recommended research-based process times and procedures found in the USDA's *Complete Guide to Home Canning*. Old recipes handed down through the generations have probably not been tested for safe processing times and methods.

You may have heard that it's important to add lemon juice, citric acid or another acid to tomatoes and salsa before canning, but you are not sure why. It's all about pH. It is the measurement of the acidity or alkalinity of the food. Lemon juice is acidic, which means it has a low pH number. Conversely, an item such as soap is very alkaline, or basic, which means it has a high pH number.

The Food and Drug Administration and U.S. Department of Agriculture recommend that naturally acidic foods (like fruit, jams/jellies) and acidified foods (like pickles and salsas) have safe pH levels before canning. **A pH of 4.6 or lower is required for safe canning without the use of pressure canner processing. Low acid foods must be canned at temperatures between 240 ^{o}F and 250 ^{o}F which can only be reached with a pressure canner.** If you do not have a pressure canner, you **cannot** safely can low-acid foods, such as vegetables, meats or mixtures of them. Foods like pickles or salsa must have an acid like vinegar or lemon juice added if they are to reach a pH level of 4.6 or lower to prevent microorganism survival and/or growth.

Read the manufacturer's directions for your pressure canner. Various pressure canners differ in size, pressure control, material, and operating instructions. All canners must be kept in good repair. If yours has a dial pressure gauge, check it at least once a year for accuracy. Some UA Cooperative Extension offices are able to check the accuracy of your gauge, including Apache, Maricopa, Yavapai and Mohave Counties.

Use water bath canners for canning acid foods such as fruits, pickles and tomatoes/salsa with added acid. If you buy a water bath canner, make sure it is deep enough to hold water one inch above quart jars if that's what you plan to use. It should come with a rack to hold jars off the bottom, and a tight-fitting lid. Several manufactures sell replacement parts for canners.

In addition to a pressure canner and/or a boiling water bath canner, you need standard canning jars and *new* two-piece lids. Discard any jars with cracks or chipped rims. The flat lids with the sealing surface can ONLY be used once.

Here are some of the frequently asked questions we get at the University of Arizona Cooperative Extension.

Can I can my own salsa recipe?

Salsas are usually mixtures of acid and low-acid ingredients; they are an example of an acidified food. The specific recipe, and sometimes preparation method, will determine if a salsa can be processed in a boiling water canner or a pressure canner. A process must be scientifically determined for each recipe. The National Center for Food Preservation at the University of Georgia Extension has science-based recipes and information on canning, freezing and preserving many types of foods.

Is it safe to process food in the oven?

No. This can be dangerous because the temperature will vary according to the accuracy of oven regulators and circulation of heat. Dry heat is very slow in penetrating into jars of food. Also, jars explode easily in the oven.

Can food be re-canned if the lid does not seal?

Canned food can safely be re-canned if the unsealed jar is discovered within 24 hours. To re-can, remove the lid and check the jar-sealing surface for tiny nicks. Change the jar; if necessary, add a new treated lid and reprocess using the same processing time.

Visit our website at cals.arizona.edu/maricopa/fcs/foodpres.htm for recipes and information on preserving foods and a link to the National Extension Food Preservation website which includes freezing, canning recipes for vegetables, meats and mixtures foods like salsa and soups. You can also call your local Cooperative Extension office or the UA Cooperative Extension in Maricopa County at 602-470-8086 ext 341 to have questions answered.

Sources:

So Easy to Preserve and *USDA Complete Guide to Home Canning*, National Center for Food Preservation, University of Georgia www.uga.edu/nchfp/

Lisa Benton

The Creosote Bush Smells Like Rain—Where There is None

Steve Woods, Graduate Student; Steve Archer, Ph.D., Professor; and Larry Howery, Ph.D., Range Management Extension Specialist; all with the School of Natural Resources, University of Arizona

Creosote bush (*Larrea tridentata*) is an amazing plant. It can live for thousands of years. As the central stems die or are broken off, new stems sprout around the edge, eventually forming a circle of clones. The leaves contain chemicals making it unpalatable to most animals. Some say 'the creosote bush smells of rain' – or does the rain smell of creosote bush? Perhaps it depends on how long you've been in the desert. Either way, you are unlikely to see a creosote bush experiencing significant browsing by animals. Some insects can tolerate its chemical defenses, but livestock and other mammals find it highly distasteful and shun it. Try rubbing and smelling the leaves and you'll see why.

Creosote bush can grow in the driest hot US deserts, where no other shrubs can survive. It can extract moisture from parched soil through its extensive root system. The leaves can withstand high temperatures and dehydration. It needs plenty of soil air for root growth and is rarely found in areas of poor drainage or moderate rainfall. Temperatures a few degrees below freezing can break the water columns that draw nutrients up from roots to the leaves. This break causes 'cavitation' of the 'xylem vessels' – a damaging event which can kill plants. This helps explain its absence from the cold deserts of Utah and Nevada.

If you drive along I -10 across Arizona and into New Mexico, take a look at the creosote bushes near the road. See how the soil around their stems can be several inches higher than the soil further away. This is 'pedestalling' – the base of the plant has become perched above the rest of the ground. It's a sign of soil erosion, caused by wind or water. Many creosote bush areas have little grass and herb cover, so little protection from erosion exists except close to the creosote bushes, where some dust may be caught. Did the creosote bush reduce the grass cover, or did loss of grass let the creosote bush in? Perhaps both. But the effect remains – significant soil loss.

Remember when you smelled the leaves? Imagine drinking creosote bush tea. Yes, it has been done, as herbal remedies ranging from treating kidney stones to use as an emetic. However, its pharmacology is not well understood and some studies suggest it can cause liver and kidney damage.

So whether you see the creosote bush as just another desert plant or find its aroma intriguing in the rain, we can all respect its tenacity, its ability to thrive where few of its peers can. Many of these bushes may outlive our grandchildren and survive droughts that occur only once in a thousand years.

Susan Pater

Developing a Livestock Vaccination Program

R. Dean Fish, Area Extension Agent, Agriculture and Natural Resources, Cooperative Extension, Southeastern Arizona; S. Peder Cuneo, D.V.M., Extension Veterinarian, Vet Diagnostic Lab; Robert Glock D.V.M., Ph.D., Research Scientist, Vet Diagnostic Lab; and Susan Pater, Extension Agent, 4-H Youth Development, Cochise County Cooperative Extension; all with the University of Arizona.

The livestock industry is extremely important to the economy of Arizona and includes not only commercial producers of meat and milk, but also small producers with a few animals. Producing and delivering wholesome food, and ensuring food safety is the responsibility of every livestock producer, large or small. Most commercial producers follow a quality assurance program implementing a series of good production practices to ensure safe and wholesome food production. Producers with only a few animals need to follow the same standards. Healthy animals usually grow faster and more efficiently. Healthy animals do not require treatment for health problems, this removes the risk of drug residues and removes the cost of treatment. It is cost effective to prevent disease rather than to treat sick livestock.

Livestock are susceptible to a variety of diseases. One key to keeping livestock healthy is by implementing a proper vaccination program. Having a valid veterinary-client-patient relationship is a key first step to understanding what is involved in developing a vaccination program and in getting guidance if an animal becomes ill. Veterinarians or your local extension office can provide useful advice in dealing with specific production practices.

The purpose of a vaccine is to provide exposure to a non-virulent (non-infective) form of a disease agent BEFORE the animal is exposed to a natural infection. This vaccination causes the animal to develop antibodies and cellular resistance that protect against disease or infection. Please remember that a vaccination is not a simple process that automatically produces immunity. There are many reasons that vaccines can fail as noted below.

You can minimize the chance of vaccine failure by carefully handling and administering the product:

- Keep vaccines refrigerated (not frozen).
- Keep vaccine out of direct sunlight.
- Be sure to use vaccines before expiration date.
- Vaccinate healthy animals, avoid vaccination of stressed livestock.
- **Follow all label directions on proper routes of administration and injection site selection.**
- Follow all label directions on vaccination of pregnant animals, and age of animals at vaccination.
- In addition, it may be necessary to administer booster injections if indicated on the label directions.

Vaccines can fail for a variety of reasons.

- Failure of the animal to respond. A certain percentage of animals will not respond and build an immune response to a vaccination. This is more likely in stressed or debilitated animals.
- Insufficient resistance if the animal is faced with overwhelming exposure.
- For younger animals there are blocking maternal antibodies (from colostrums) present that interfere with the ability of the animal to build immunity. This is the result of vaccinating animals that are too young, FOLLOW ALL LABEL DIRECTIONS.
- There is a lag time of up to three to four weeks before sufficient immunity can develop in a properly vaccinated animal.
- A booster dose is not given to generate an adequate immune response. This is applicable on vaccines with label recommendations that specifically recommend a booster. FOLLOW ALL LABEL DIRECTIONS.
- Improper handling of the vaccine includes exposing to sunlight, improper storage temperature or mixing problems. **Note:** This is the most common cause of vaccine failure.

Immunizing agents are generally grouped together under the term vaccines. The most common vaccines used today are those for the protection of animals against viral diseases. There are also bacterial and toxoid vaccines available. Both types of vaccines are biological agents that stimulate active immunity in the animal. Toxoids are specifically formulated to provide protection against the harmful effects of toxins produced by bacteria. Livestock producers may also have a choice between modified live, killed vaccines and toxoids or chemically altered products. A term that is being used more often is *replicating* for vaccines that are designed to grow and replicate (but not cause disease) in the host animal. Replicating vaccines are also called modified live vaccines. The other term is *non-replicating*, these are the killed vaccines, toxoids and chemically altered vaccines. There are some advantages and disadvantages to using either of these products. Described below are some of the factors that need to be considered in choosing a vaccine product.

Following are recommendations on particular vaccines that should be considered for beef, sheep, meat goats and swine. They are categorized by those vaccinations that are essential for a good herd health program and those that are to be considered optional, but may not be as critical as the recommended ones. Please remember that these are recommendations. Extreme caution must be taken in order to follow the label recommendations properly. There are some vaccines that can cause abortion in pregnant females. There may also be specific animal health issues in your area that need to be addressed. When animals are purchased, be sure to ask what vaccinations have already been administered and when. It is always wise to consult with a veterinarian to ensure that the vaccination program developed is appropriate for the area and species. Your veterinarian may suggest the deletion or addition of certain vaccines to better match the disease risk to your animals.

KILLED VACCINES/TOXOIDS/CHEMICALLY ALTERED (NON-REPLICATING)	
ADVANTAGES	**DISADVANTAGES**
Wide variety of disease protection	More likely to cause allergic reaction
No risk of reverting to “wild strain”	**Boosters usually required**
No risk of spread between animals	Slower onset of immunity
Little risk of abortion	May not stimulate as strong or long lasting immunity
More stable in storage	**Narrower spectrum of protection**
No mixing required	Blocking by maternal antibodies in young animals
Good stimulant for colostrum	Cost often higher than modified live
MODIFIED LIVE (REPLICATING)	
ADVANTAGES	**DISADVANTAGES**
One dose can provide protection	Possible reversion to virulent forms
More rapid protection	Disease problems in immune stressed animals
Wider spectrum of protection	Possible excessive immune response
Less likely to cause allergic reaction	**Risk of abortion/infertility** if directions not followed
Not as susceptible to maternal antibody block	**Proper handling and mixing is very important**
Cost usually less than killed	

BEEF

Vaccines recommended as essential for these common diseases.

1) The vaccines for **clostridial** diseases are available in various combinations from two to eight agents. These diseases are common and usually cause sudden death with little time for treatment. Because treatment success is rare, emphasis is properly placed on preventative measures. Select at least a 4 to 7 way bacterin.

Blackleg	*C. chauvoei*
Malignant edma	*C. septicum*
Black's disease	*C. novyi*
Enterotoxemia	*C. perfringens* Type C & D*; C. sordellii*
Redwater	*C. haemolyticum*
Lockjaw	*C. tetani*

2) **IBR**, Infectious Bovine Rhinotracheitis. Also known as rednose. Causes inflammation of the upper respiratory tract.
3) **PI3**, Parainfluenza Type 3. Upper respiratory infection, suppresses the animal's immune system, allowing other diseases to develop.
4) **BVD**, Bovine Virus Diarrhea. A complicated disease, it can result in a wide variety of disease problems from very mild to very severe
5) **Brucellosis** (heifers only). While this has been mostly eliminated from cattle in the U.S, it is still present in some wildlife. Vaccination MUST be provided by a USDA accredited veterinarian and the heifer must be of a specific age. Vaccination for Brucellosis is highly recommended for cattle that may be involved in interstate movement (such as shows or fairs) or animals that may be marketed interstate.

Vaccines are recommended as optional for the following diseases depending on your situation:

1) **Leptospirosis**. Bacterial infection that typically causes abortion in last half of gestation or still birth.
2) **Pasteurella**. Commonly causes pneumonia.
3) **Hemophilus**. Has the capacity to attack many different organs in the body interrupting blood flow.
4) **BRSV**, Bovine Respiratory Syncytial Virus. A stress-related infection causing respiratory disease and reduces that animal's resistance to other diseases.
5) **Vibriosis**. A bacterial disease transmitted through natural breeding. May result in infertility and abortion.

SHEEP AND GOATS

It is recommended as essential to vaccinate sheep and goats for two main diseases:

1) Tetanus (lockjaw) caused by *Clostridium tetani*.
2) Enterotoxemia (overeating disease) caused by *Clostridium perfringins* types C and D.

SWINE

It is recommended to vaccinate against the following swine diseases.

1) **Atrophic rhinitis** is a bacterial disease that causes inflammation of tissue inside the nose. Nasal passages damaged are not effective filtering the air the pig breathes, allowing more bacteria access to the lungs. (For use in young pigs if the disease is known to be present in the herd.)
2) **Erysipelas** is an infectious swine disease that can cause fever, sudden death, diamond shaped skin lesions, stiffness, and abortion. (A good practice in all pigs.)
3) **Mycoplasma pneumonia** is present in virtually all swine herds, and is transmitted from pig to pig. Piglet vaccination is most effective. Pneumonia means inflammation of the lungs. (A good practice in most young pigs.)
4) **Leptospirosis** is a bacterial infection that causes abortions late in gestation, stillbirths and birth of week piglets. (Breeding animals only.)
5) **Parvovirus** is a reproductive disease that may result in embryonic deaths, mummified fetuses and stillborn pigs. (Breeding animals only.)

Often, even more important than the vaccination program for swine is good animal care. It is important to keep pigs either on a frequently cleaned concrete pen or new dirt pens that have not previously had pigs on them. Keeping pigs on the same dirt on a long term basis is not advised for proper care of swine.

Vaccination programs are an important part of successfully raising livestock. There are many different products available for use. Consider all factors in selecting what products to use. Consulting with a veterinarian is a good way to help establish a personalized vaccination program for the species and area.

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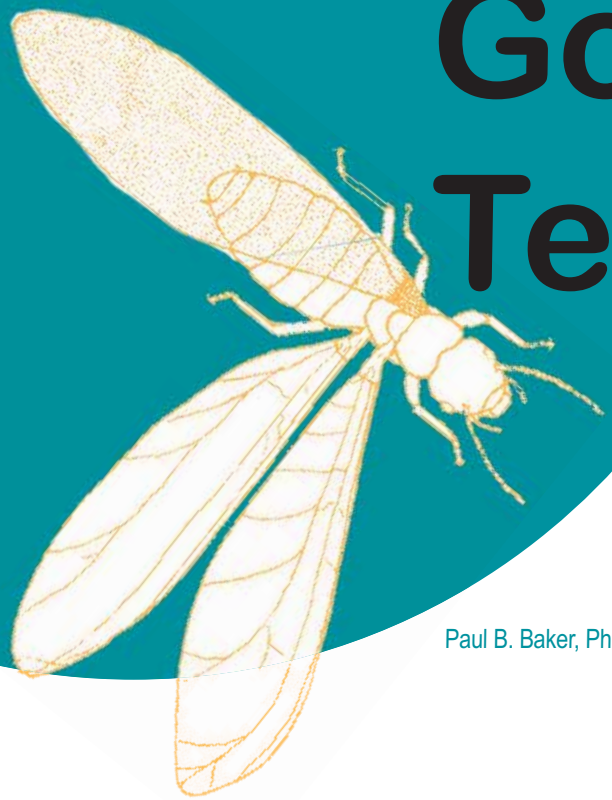
Got Termites!!!



Paul B. Baker, PhD, Urban Entomology Extension Specialist, Department of Entomology, University of Arizona

Summer is here and so are the termites. Termites are well known pests in many parts of the world including Arizona, where they consume cellulose-based materials such as paper and wood. Across the nation, termites are estimated to cause nearly two billion dollars damage annually to structures. Depending on the area of the state you live in, termites are the number one urban pest.

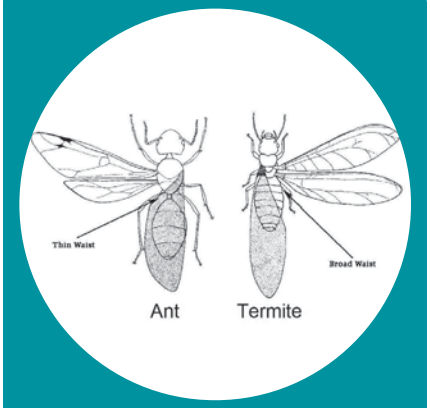
Termites belong to the order Isoptera (iso-ptera = equal-winged), which refers to the adults that have two pairs of equal length wings. There are seventeen species of termites that occur in Arizona, but only seven species are considered to be economically important. Scientists have placed these species into three broad categories based on their habitat: *subterranean, damp-wood*, and *dry-wood*. Subterranean termites derive their name from the fact that they must be in contact with soil as a source of moisture. For these termites to move into a wood source above ground, they construct "mud" tubes made of soil, soft fecal matter and wood chips. Subterranean termites are the most common termite pest in Arizona and their presence is easily observed. Damp-wood termites are found in sound dead wood that is moist. These termites nest in soil and come to wood for food, but are not considered economic pests. Dry-wood termites are capable of infesting dry wood that is not in contact with the ground. Because they do not construct earthen mud tubes, infestations are more difficult to detect. A sign of dry-wood termite infestation is the presence of hard, dry fecal pellets that resemble fine sawdust.

Identification

Winged ants are often mistaken for winged termites, but several characteristics can be seen with the naked eye that will help differentiate the two insects (Figure 1). Ants have two pairs of transparent wings of unequal size, while termites have four equal-sized wings that generally fold over the back. In addition, the region of the body behind the wings is "pinched" in ants but completely straight in termites. Termites are social insects that live in large groups of closely related individuals of many ages. A female reproductive individual, called a queen, lays eggs that hatch into nymphs. Depending on the species and the colony demands, these nymphs develop into wingless adult workers. These are the "white ants" that you might see if a mud tube or a piece of wood is opened. Duties of these worker termites are to care for the eggs and young, feed and clean other termites, forage for food, and construct and repair mud shelter tubes. However, these same nymphs at a certain stage can turn into individuals with large jaws (soldiers) that defend the nest from intruders. The numbers of nymphs increases as the colony matures and each colony has the potential to be made up of thousands of individuals. A mature dry-wood termite colony may have more than 2,500 individuals, while a subterranean termite colony may have over a million.

Detection

As discussed previously, even though termite colonies are made up of numerous individuals, they are quite secretive and spend most of their time inside wood. The homeowner should inspect his/her home twice per year for signs of termite activity. Furthermore, detecting and preventing structural damage differs between dry-wood, damp-wood and subterranean termites. Subterranean termite mud tubes are visible on walls or coming out of the ceiling and are called "drop tubes" (Figures 2 and 3). Other signs of termite



Alex Yelich

Fig 1.

Comparison of termite and ant morphology.

Paul Baker

Fig 2.

Subterranean termite “drop tubes.”

Paul Baker

Fig 3.

Subterranean termite “mud tube” on the foundation of a house.

activity include: holes in wood that have appeared since a last inspection; pellets or sawdust that keeps coming back; piles of wings near light sources; and swarming termites. Dry-wood termites are detected by visual and non-visual methods. These include inspection of wooden structures and furniture for fecal pellets, and damage. Wood, which has a dull or hollow sound when tapped, should be examined closely. Careful probing of wood with a sharp instrument may also disclose drywood termite galleries. Visual notice of infestation also may be provided by evidence of dispersal flights by winged adults. Non-visual means of detection include acoustic emissions, sound amplifiers, metabolic gas detection, and canine olfaction (specially trained sniffing dogs). Although these methods are effective in detecting an infestation, they do little to delimit the extent or size of the infestation.

Control

Lack of knowledge as to the size of a dry-wood termite infestation directly impacts the control options that can be implemented. Thus, in most parts of the country including Arizona, control of dry-wood termites is primarily by whole-structure treatment by fumigation. This method is generally 100% successful in elimination of the current dry-wood termite infestation. If an infestation is small and can be isolated, removal of the infested wood is another alternative. Local and “spot treatments” for dry-wood termites can also be accomplished by various chemical and non-chemical methods. Wood injections with various chemicals have at various times also been utilized for control. Non-chemical local control is possible by wood surface electrocution, and microwave radiation. Remember, many of these control products are only available to the pest management professional.

Control of subterranean termites can be achieved by either liquid barrier treatments, local or “spot” control, or population control by baiting systems. The application of liquid termiticides to the soil to form a chemical barrier between the wooden structure and termite colonies existing beneath soil has been the primary method of control of subterranean termites. Soil insecticide barriers involve trenching around the perimeter of a home, and drilling concrete slabs for injection of various chemical insecticides.

Population control of termite colonies has been achieved to varying degrees with commercially available baits containing insecticides. The bait contains an insect growth regulator in edible bait that subterranean termites pass along to nest mates by grooming and food transfer. These baits have had varying success in reducing foraging activities of populations of target termite colonies, but not necessarily eliminating colonies. Baiting methodology has been used since the 1990s and has seen rapid expansion in the last ten to fifteen years.

Prevention

Termite colonization and subsequent damage can often be prevented through proper building and landscape design. There are many things to consider, but the following are some good general guidelines to prevent termite damage to structures:

- Inspect your home twice per year looking for signs of termite damage or activity.
- Keep all substructural wood at least 12 inches above the soil beneath the building.
- Maintain structures to prevent moisture inside walls and within the structure.
- Keep attic and foundation areas well ventilated and dry.
- Use screening over attic vents and seal other openings, such as knotholes and cracks, to discourage the entry of winged drywood termites.
- Reduce chances of infestation by removing or protecting any wood in contact with the soil on or near the structure.
- Prevent landscape plants and water from irrigation systems from coming into contact with the structure.

In summary, prevention is the most important step in termite management. If you have a termite infestation, do not panic. For most homeowners, a reputable pest management professional should be your first option. They have the expertise, the equipment and materials to do the job. Once you’ve hired a professional, make sure that you get everything in writing and remember service after the sale is also important.

Cynthia Warzecha

Responsible Recreation: Balancing Human Activity and Nature

Cynthia Warzecha, Area Assistant Agent, Agriculture & Natural Resources, University of Arizona Cooperative Extension, Coconino and Yavapai Counties

It is an all too common scenario. You spend days or weeks preparing an outdoor adventure that includes a visit to your "secret spot." Upon arrival, you are greeted by an area devoid of vegetation or strewn with unsightly trash—major disappointment!

Increasingly, we share our favorite recreational areas with others who also seek to enjoy Arizona's majestic mountains, scenic vistas, and diverse recreational opportunities. Although spending time outdoors is good for the body and soul, it is not always good for nature! Recreationists often inadvertently harm sensitive resources and, given Arizona's arid climate, these damaged landscapes may take decades to recover. By following a few simple guidelines, you can help maintain a balance between recreational activity and a healthy environment.

Whether traveling by off-road vehicle, mountain bike, horseback, or even on foot, be sure to stay on designated roads and trails. Travel in the middle of the trail to avoid widening it and respect all trail and road closures. Venturing off designated routes can damage vegetation and compact the soil. The weight of tires, hooves, or even foot traffic, compresses soil particles by squeezing out the tiny air spaces between the particles. When soil becomes compacted, water cannot infiltrate and plant root growth is inhibited. Moist soils are especially susceptible to compaction. Whenever possible, avoid traveling in wet conditions or near streams and other water bodies. In addition to compaction, off-trail travel near or through these sensitive areas can cause sediment (soil) to enter the water, harming fish and other aquatic species.

Veering off established roads and trails can also destroy sensitive species and contribute to the spread of invasive weeds. Weed seeds easily become lodged in tire treads and the soles of hiking boots and are transported to areas where the weeds had not previously existed. Off trail travel also disturbs the soil, creating bare ground where new weed populations can become established. Weeds have many characteristics that allow them to compete with native species for nutrients, water, and light. Over time, they can displace native plants causing the extinction of rare species or eliminate sources of food and cover for wildlife.

In western states, ranchers graze livestock on public lands and use fencing to manage the placement of livestock. If you encounter gates while traversing the landscape, be sure to leave them as posted. If gates are not posted, leave them as you find them—closed if closed and open if open. Also, respect range structures such as stock tanks, fences, and gates. If you encounter livestock or wildlife, enjoy their presence while keeping your distance. Chasing or harassing domestic or wild animals can cause stress or injury.

Finally, leave recreational areas and trails in better condition than you found them. Litter is unsightly and often attracts even *more* litter, which can persist in the environment for a very long time. Aluminum cans take 500 years to decompose and even a banana peel could be around for several years! Be a good steward of the land—pack out your trash and pick up a few extra pieces that others have left behind.

By following these simple guidelines, you can do much to protect Arizona's outstanding recreational resources so that future generations may also explore and enjoy their natural beauty.

PROPERLY PLANTING A TREE
THE EASY WAY!

Robert E. Call, Extension Agent, Horticulture, University of Arizona Cooperative Extension, Cochise County

Fall is a great time to plant trees and shrubs. Roots will become established for superior spring growth. Follow the instructions below for best success.

1 Loosen soil 3 to 5 times the width of the tree root ball.

2 Dig a hole only as wide and deep as the root ball.

3 Remove the tree from the pot.

4 Cut or score roots ½ to 1 inch with a knife to stimulate root growth and mitigate any potential circling roots.

5 Place the tree in the hole on solid ground, slightly above ground level.

6 Fill the hole with the same soil that was removed. No amendments, root stimulator, or fertilizers! When the hole is half filled with soil, water to remove air pockets.

7 Finish filling the hole leaving a slightly depressed basin above the root ball.

8 Water to settle all the soil around the root ball.

9 If drip irrigation is used place tubing around the root ball.

10 Always water out to the tree drip-edge (tips of the branches). Gradually reduce watering over several weeks.

11 Spread mulch around the entire loosened soil area to conserve moisture, reduce weeds and cool the soil. Pull mulch away from the trunk.

12 Mulch should be 3 to 4 inches deep. Use a soda, fruit or vegetable can to determine the proper depth.

13 Prune off any broken, damaged or dead branches. Leave lower branches on the trunk ("trashy trunk"). Remove 1/3 of trunk branches each year after 3 years, to encourage trunk and root growth. Only use tree stakes if needed.

14 Sit down, relax and enjoy your new properly planted tree!

Further information is available from the Arizona Cooperative Extension publication, "Planting Guidelines: Container Trees & Shrubs" AZ1022. http://ag.arizona.edu/pubs/garden/az1022.pdf.

Photos by Lori Kovash

Linda Houtkooper Ph.D., R.D., Professor and Associate Director, Programs, Arizona Cooperative Extension and Melanie Hingle Ph.D., MPH, R.D., Senior Research Specialist, Department of Nutritional Sciences, University of Arizona

Marilyn Nieves

Healthy Hydration for Outdoor Activity

Water is the most abundant nutrient in our bodies and vital to health. Dehydration occurs when body water levels are below normal. Even a low level of dehydration can sap your energy, and more severe dehydration can be dangerous because it can cause heat illness. Preventing dehydration when working or doing recreational activities outdoors is extremely important, particularly during the hot summer months. Children and people older than 65 years of age are more susceptible to becoming dehydrated. Drinking fluids throughout the day is the best way to prevent dehydration.

What Fluids Are Best to Drink to Stay Hydrated?

Almost any fluid will help keep your body hydrated. However, some fluids are better than others for keeping you hydrated and healthy. Choose water, diluted fruit juices (fruit juice mixed with sparkling or plain water), unsweetened teas and diet sodas more often, and full strength juices, regular sodas, and energy drinks less often. Sports drinks are appropriate if you are doing high intensity physical activity for more than 1 hour. These drinks are specially formulated to help replace fluid and electrolytes lost through sweat. Alcohol is a diuretic and therefore beverages that contain alcohol are not appropriate for healthy fluid replacement.

How Much Fluid Should I Drink and How Often Should I Drink Fluids?

Allow thirst to be your guide. Feeling thirsty is a sign of dehydration. However, people can drink enough fluid to satisfy their thirst and still be dehydrated. These are two guidelines for drinking enough fluid to prevent dehydration.

- Start your activity hydrated and keep replacing fluids throughout the time you are outdoors and during your physical activity.
- Take drinks of cool fluids (5-10 oz) every 15 to 20 minutes when doing physical activity or during prolonged times of being outdoors.

How Can I Tell If I Am Drinking Enough?

Fluid needs are based on body weight and physical activity levels. Quick weight loss is due to body water loss. A pound of lost body water weight is equal to about two cups of lost fluid. A good indicator of body hydration is your urine color. An odorless, pale yellow urine color (like the light pale yellow color of lemonade) indicates that you are well hydrated. A darker yellow-orange color* (like the color of apple juice) with an odor indicates you need to drink more fluids.

*Note: If you are taking a multivitamin supplement, it is important to be aware that some vitamins in the supplement change the color of your urine for a few hours, making it bright yellow or discolored. By the end of the day (if you take a supplement in the morning), your urine should be back to a normal color.

Signs of dehydration – dry lips and tongue, dizziness, light-headed, infrequent urination, bright or dark-colored urine, small amount of highly concentrated urine, low energy levels.

Signs of heat illness – chills, clammy skin, muscle pains or spasms, and nausea. If you have these signs, move to a cool place, remove excess clothing, and consume cool fluids. If symptoms don't improve, seek medical attention.

Tips to Prevent Dehydration

1. Carry a water bottle and drink from it throughout the day.
2. Start physical activity well hydrated, replace lost fluids during and after the activity.
3. Use a sports drink if you do high intensity physical activity for more than 1 hour or replace lost electrolytes with salty food or snacks and drink plenty of water.
4. Watch for signs of dehydration or heat illness and take necessary steps to prevent worsening of these signs.

Ribbons of Green:
Riparian Areas of Arizona

George Zaimes, Ph.D., Riparian and Watershed Extension Specialist, School of Natural Resources, University of Arizona and Douglas Green, Ph.D., Associate Department Chair, Department of Applied Biological Sciences, Arizona State University Polytechnic

When looking at the Arizona landscape you can see ribbons of green, up in the high mountain region of the ponderosa pines to the southern desert shrublands. These ribbons, the riparian areas, are distinctive, unique and have always been attractive to humans and wildlife, although these areas make up a relatively small portion of the landscape. It is estimated that in the Western United States only 2% of the land area is riparian. Their relatively small area and many human and wildlife uses often lead to competition for this resource among various stakeholders.

But what makes these areas distinctive and unique compared to the surrounding landscape? There are three main factors: i) water, ii) soils, and iii) vegetation (Figure 1). These three factors are interconnected and interrelated to each other. So let's look at each of these factors in more detail.

Water is the most important factor, the driving force of the riparian areas. Riparian areas are located along surface water bodies such as streams, rivers, lakes or ponds. In semiarid and arid regions, water is the most limiting factor to the survival of human, wildlife, and plant populations. As water is limiting in these regions, so are riparian areas and this is not a coincidence. Although greater water availability than that in the adjacent uplands is necessary to support the riparian area, definitions differ on how long surface water needs to be present before an area is considered riparian. Some argue that to be defined as "riparian," the area must be adjacent to perennial (having water year around) or intermittent (having water most of the year) water bodies. Others extend the definition to include ephemeral water bodies that flow only in response to precipitation events or snowmelt. This is a debate that is very important for semiarid and arid regions like Arizona, where more than 90% of streams are ephemeral, a percentage much higher than in most other states. But to really understand the influence of water we need to discuss the other two factors.

Riparian **Soils**, have greater water availability (higher moisture) compared to the surrounding landscape because they are so close to a surface water body. Processes such as erosion and deposition frequently disturb these soils because they are adjacent to a surface water body. As a result, riparian soils are poorly developed compared to the surrounding upland soils and considered young. These processes of erosion and deposition are driven by flood events. Floods erode sediments from stream banks and floodplains, but also rejuvenate floodplains by the deposition of sediment and nutrients. If you look at an exposed stream bank, you can see different layers of soil material and rocks that were deposited by past floods (Figure 1). The variation in the size of sediments generally corresponds to different local flood magnitudes.

Riparian **Vegetation** is a very distinctive feature in comparison with the surrounding landscape. In general, riparian vegetation is denser, taller and in many cases has very different plant species composition. This is the result of greater water availability (higher soil moisture) and the unique riparian soils. With greater water availability these areas can support more plants that grow faster and to a larger size. The wetter soil conditions, young soils and frequent disturbances (e.g. flooding) also lead to different plant species occupying these areas. Many of these species are pioneer species that occupy areas first after a disturbance event. Common

woody species include cottonwoods, willows and alders and the invasive non-native salt cedar.

Understanding the factors that make these areas unique, and even more importantly knowledge of the processes that drive riparian areas, are essential to manage and conserve them. Properly managing these areas is critical in semiarid and arid Arizona, where the acreage of riparian areas remains the same in the face of a rapidly growing human population and the subsequent increased demand for this resource.

Want to learn more about riparian areas?

1. The educational web-module "Arizona's Riparian Areas" available at http://cals.arizona.edu/extension/riparian/ and
2. The University of Arizona Cooperative Extension publication "Understanding Arizona's Riparian areas" available at: http://cals.arizona.edu/pubs/natresources/az1432.pdf.

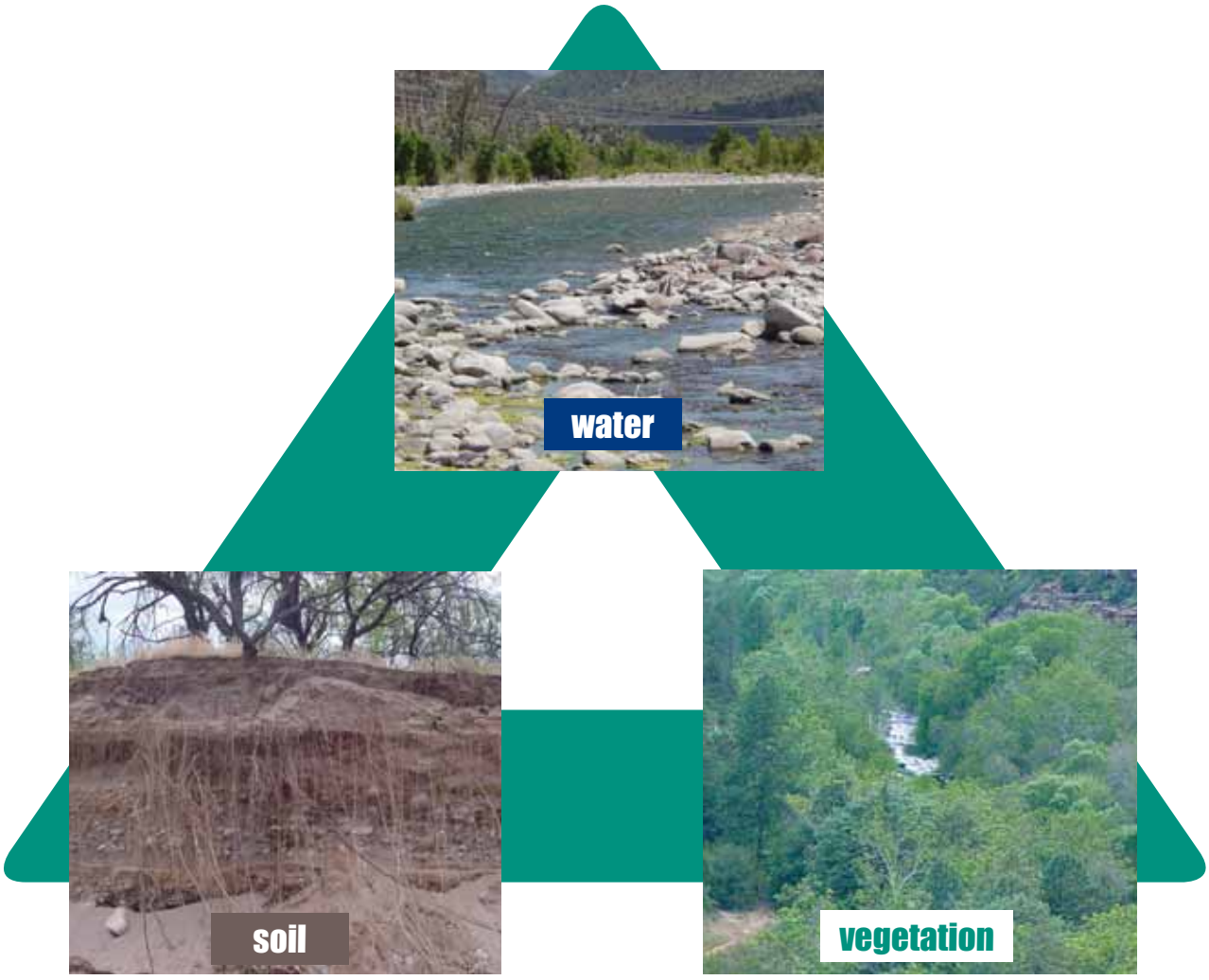


Figure 1. Water, soil and vegetation characterize the riparian areas compared to their surrounding landscape (photos courtesy of George Zaimes and Doug Green).

Chiggers in Arizona?

Illustrated by Joel Floyd in Venomous Animals of Arizona, Arizona Cooperative Extension

Figure 1. Larval harvest mite or chigger.

University of Nebraska, Department of Entomology

Figure 2. Adult harvest mite.

Kim McReynolds, Area Extension Agent, Natural Resources, University of Arizona Cooperative Extension, Cochise, Graham and Greenlee Counties

Many people will tell you that chiggers do not occur in Arizona. I have first hand experience as the recipient of numerous itching welts that they were responsible for producing right here in Arizona. One book that I read states that chiggers seem to occur only in the southern part of the state. While I have encountered them in several mountain ranges of southeastern Arizona, I have also had chigger bites in Pinetop and along the Verde Rim.

Chiggers are the larval stage of the harvest mite in the *Trombicula* family (Fig. 1). Closely related to ticks and spiders, adult harvest mites have eight legs (Fig. 2). They are usually red in color and can be easily seen walking across the soil surface. Adult harvest mites lay eggs in the soil during the spring, from which the larval stage (chiggers) hatch later in the year. My Arizona encounters with chiggers have typically been during late summer or early fall when vegetation growth is hitting its peak production for the year. At this stage of development, the chiggers have only six legs and are about 1/50th of an inch in size. Hungry for their first meal, chiggers climb to the top of grass or other higher points and wait for animals to pass by and jump onto them. Humans are not primary hosts for chiggers. They prefer rodents, birds and other vertebrate animals.

Once on a human, chiggers tend to migrate to areas where clothes are confined. Bites tend to be found around the ankles, behind the knees, around the waistband, and with less frequency, the armpits. The chiggers clasp onto the skin with specialized mouth parts, injecting saliva filled with enzymes that break down skin tissue. The skin cell contents are what the chiggers feed on, not blood as some people think. Another myth that I remember from childhood is that chiggers burrow under your skin. They actually attach themselves near a skin pore or hair follicle. When the chigger injects the enzyme, our bodies react by hardening the cells around the saliva-injected cell. This makes a tube that the chigger uses to drink the cell contents. This tube is called a stylostome, which is actually the thing that becomes irritated and red and produces an intense itch.

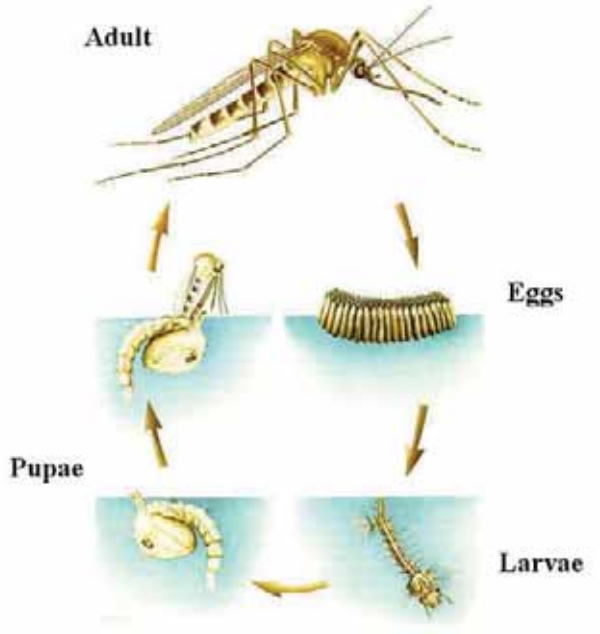
Chiggers that attach themselves to humans probably never finish their meal. They will most likely be brushed, scratched, or showered off within a couple of hours. On other host animals, once the chigger has had its fill (3-4 days), it will drop from the host. It will then proceed to the nymph stage (where it develops eight legs), and later become an adult. At these two later stages, the mites are harmless to humans.

It is nearly impossible in Arizona to recognize and avoid chigger infested areas. If you are going to be spending some time in areas of heavy vegetation (including open grasslands) some precautions can be taken. Wearing long pants, long sleeve shirts and high top boots or shoes will help. Make sure that they fit snuggly, but not tight as this may become a possible feeding site. Tucking pants into boots can also be helpful. Applying insect repellent on your skin and to your clothing around your ankles, wrists, neckline and waist will increase your chance of avoiding bites. Be sure to reapply repellents as often as necessary since the effects of many will only last for a couple of hours.

If you happen to come home with chigger bites, expect the itching to last for a week to ten days. There are a few things you can do for some relief. Take a hot, soapy shower or bath as soon as you return home. This will remove any chiggers that may still be hanging on. Applying over-the-counter anti-itch lotions and creams will give some temporary relief. Another popular myth associated with chigger bites is that applying nail polish to the bite will suffocate borrowing chiggers. Since chiggers don't borrow into the skin, there is no value in this particular treatment. It is important to realize that the source of the itching is the stylostome, and until your body completely breaks that down and absorbs it, it will continue to itch. While scratching seems to give some short-term relief, it only further irritates the stylostome and can lead to secondary infections.

Dawn Gouge, Ph.D., Associate Extension Specialist, Department of Entomology, Maricopa Agricultural Center, University of Arizona

West Nile Virus



Mosquito Life Cycle

So far this year, Arizona and Mississippi have reported their first West Nile human cases to the Center for Disease Control. California has reported WNV-infected birds, and Alabama has reported a WNV infected horse. Detailed statistics for the entire US can be found at: http://www.cdc.gov/ncidod/dvbid/westnile/index.htm.

Signs and Symptoms

Most of the time, infection with West Nile virus makes people mildly ill. A person may experience flu-like symptoms such as fever, headache, body aches, and sometimes skin rash and swollen glands. Many of us have already been exposed and carry antibodies to the virus, without even knowing. More severe infection can result in encephalitis, which includes symptoms of severe headache, high fever, neck stiffness, disorientation, and sometimes convulsions. Although very rare, severe West Nile infection in healthy, younger people can be fatal, but the medically compromised and the elderly are at greatest risk for severe complications.

The incubation period for West Nile virus is usually 5 to 15 days. In the United States, infections occur most frequently in the summer and early fall. In Arizona our mosquito and virus surveillance program begins April 1st, and continues for as long as the weather remains warm (sometimes into October). In the most severe cases, West Nile virus causes meningitis and/or encephalitis, which may be fatal or may cause long-term neurologic damage. However, about 80 percent of all West Nile virus infections are asymptomatic, and about 20 percent result in only a mild flu-like illness. Less than 1 percent of all West Nile infections result in neurologic disease.

Prevention

The best way to avoid contracting West Nile virus, and other mosquito-borne illnesses is to avoid exposure to mosquitoes and eliminate mosquito-breeding sites:

- Eliminate standing water in your yard. Mosquitoes breed in pools of standing water. Only 4 days is required in summer to generate more blood feeding adults.
- Unclog roof gutters.
- Empty unused swimming pools, ponds, water features.
- Change water in birdbaths at least every four days.
- Remove old tires or any unused containers that might hold water and serve as a breeding place for mosquitoes.
- Watch for sick or dying birds and report them to your local health department.

To reduce your own exposure to mosquitoes:

- Avoid unnecessary outdoor activity when mosquitoes are most prevalent, such as at dawn, dusk and early evening. People who work outside should ensure they protect themselves sufficiently.
- Wear long-sleeved shirts and long pants when you go into mosquito-infested areas.
- Apply mosquito repellent; the Center for Disease Control (CDC) recommends that adults apply a 10 percent to 30 percent concentration of DEET (chemical name, N,N-diethyl-meta-toluamide) to skin and clothing. Choose the concentration based on the hours of protection you need — a 10 percent concentration is effective for about two hours, while higher concentrations last longer. Keep in mind that chemical repellants can be toxic, and use only the amount needed for the time you'll be outdoors. Don't use DEET on the hands of young children or on infants under 2 months of age. Instead, cover your infant's stroller or playpen with mosquito netting when outside. According to the CDC, oil of lemon eucalyptus, a more natural product, offers the same protection as DEET when used in similar concentrations. Other alternatives to DEET have been verified as effective and include products with picaridin as the active ingredient.

A vaccine is available to protect horses from West Nile virus. The vaccine is extremely effective, but booster inoculations are important. No vaccine is yet available for humans, but work to develop a human vaccine is under way.

The Department of Health Services has a 24-hour West Nile Virus hotline: 800-314-9243 and 602-364-4500 Phoenix Metro.

To see West Nile Virus incidence in the state of Arizona go to: http://www.azdhs.gov/phs/oids/westnile/histdata.htm

Additional prevention information can be found at: http://www.azdhs.gov/phs/oids/westnile/

Why is avian flu (also called bird flu) more of a concern than WNV?

The reason why avian influenza is more worrisome than West Nile is that the fatality rate is far higher (greater than 50 percent so far), and the infection is transmitted from person to person, not by mosquitoes. So there is a potential for a worldwide epidemic. More information can be found on: http://www.cdc.gov/flu/avian/

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