



Deer

Integrated Pest Management for Home Gardeners and Landscape Professionals

Deer are one of the California's most visible and widespread wildlife species. Found throughout more than two thirds of California, they have historically been one of the state's most popular game animals.

While some deer populations have declined in recent decades, deer conflicts in residential and agricultural settings remain major problems and have even increased in some localities. Deer can be very destructive to home gardens, ornamental landscape plants, orchards, and vineyards. In some situations, deer may inhibit efforts to restore native vegetation.



Figure 1. Mule deer, *Odocoileus hemionus*.

BIOLOGY AND BEHAVIOR

Mule deer, *Odocoileus hemionus*, (Figure 1) and Columbian black-tailed deer, *O. hemionus columbianus*, (Figure 2) are the two types of deer native to California. The smaller Columbian black-tailed deer is considered a subspecies of mule deer and is generally found along the Pacific Coast from San Luis Obispo County northward into Oregon and gradually more inland into Northern California. Mule deer are found in California from south to north along the eastern side of the San Joaquin Valley northward through the Sierra Nevada Range and its foothills, extending to the Oregon border. Generally, black-tailed deer establish resident populations while mule deer tend to be migratory according to season and food availability.

Deer populations in some areas of California may be declining for various reasons. However, deer numbers at the suburban-wildland interface, and even within

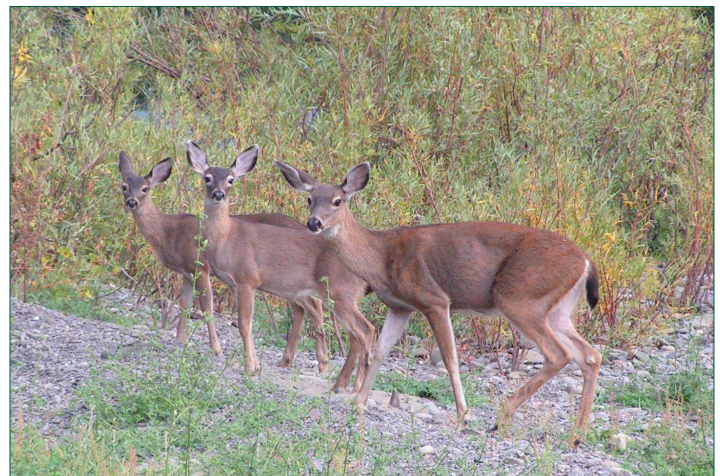


Figure 2. Adult female black-tailed deer and two fawns, *O. hemionus columbianus*.

Author:

Robert M. Timm, ANR Extension Wildlife Specialist, emeritus.

Revised based on a previous version authored by TP Salmon, DA Whisson, and RE Marsh.

some residential environments, have increased in many localities; perhaps a result of increased food availability from irrigated landscape plantings and because of reduced risk of predation.

Deer are browsers, preferring to consume a diet high in semi-woody materials (specifically the terminal and lateral buds of shrubs and trees), but will also eat a variety of vegetation

including grasses and forbs (small broadleaved flowering plants). Deer also consume fruit, nut, and ornamental trees, shrubs, vines, and garden vegetables. In areas of native oak trees, a distinct browse line often can be observed, as deer will consume all green leaves and newer small stems as high as they can reach, usually to a height of about 4 to 5 feet.

DAMAGE

Deer usually feed in the late evening and very early morning, so it is not easy to observe them. However, in suburban areas where deer have become accustomed to people, they may be active throughout the day. When deer browse on leaves and tender stems of shrubs and trees, they leave ragged edges on remaining plant parts (Figure 3).

Highly palatable plants, like roses and apple trees, are often planted around homes for landscaping and gardens, attracting deer and sometimes sustaining severe damage. Deer browsing can stunt the growth of newly planted fruit and nut trees and vines, sometimes delaying their fruit production by several years. Additionally, deer can completely consume or trample leafy vegetables, legumes, ground covers, and flowers.

In mid to late summer, bucks (male deer) will rub their antlers on tree trunks and limbs, fence posts, and other rough surfaces to remove their shedding velvet (the vascular skin that covers antlers while they are growing). While this is not a problem for larger trees, saplings or small limbs can be badly damaged or destroyed. Presence of deer in the garden or orchard can be detected by finding hoof prints or droppings (Figures 4 and 5).



Figure 3. Foliage damaged by a mule deer.

LEGAL STATUS

California's native deer are game animals, with regulated seasonal hunting that varies among the state's deer management units. Legal sport harvest of deer requires a hunting license as well as purchase of deer tags from the California Department of Fish & Wildlife (CDFW). When verifiable damage is occurring to crops or other resources, the CDFW has authority to issue a depredation permit to allow the lethal removal of deer. Non-lethal methods of preventing or controlling deer damage are usually recommended first, with lethal control via depredation permit considered as a last resort.

MANAGEMENT

Habitat Modification— Creating Deer-Resistant Landscapes

Most traditional gardens and landscapes in California are highly attractive to deer and have little resistance to deer browsing. In many circumstances, gardens attract deer because other natural food sources are out of season or otherwise unavailable.

The plants most resistant to deer browsing are those that contain toxins of some type, such as oleander, which is poisonous to most mammals. Some plants may be toxic or repellent only during certain stages of growth, so they may be considered deer-resistant in some seasons but not others. Many plants that are found on lists of

deer-resistant plants will simply be less palatable or less preferred, but when food is scarce (particularly in drought years), deer are numerous, or both, they will be eaten.

Several published lists of deer-resistant plants are available and can be used as general guides (see References below). Plants avoided by deer in one region of California may be readily consumed in other regions. Realize that not all plants on such lists are going to be deer-resistant in every situation. Talk to neighbors about what has worked for them in the recent past. Deer damage differs according to location, time of year, plant age, weather, and deer numbers, so it may be prudent to employ a trial-and-error approach before investing heavily in new plantings. You might choose a few plants you're considering, but leave them in their pots and place them in the area where you want to plant. Watch them for a few days to see if deer begin feeding on them. Be flexible about your choices.

Exclusion/Fencing

Properly built and maintained fencing is the most effective method for preventing deer damage. Fencing may require high initial financial investment but, considered over time, may prove to be the most cost-effective approach.

The kind of fence you build depends on the cost, terrain, and your needs. Both high-tensile wire and woven mesh, full-height fences are effective (Figure 6). Deer are more likely to crawl under or through a fence than jump over it.



Figure 4. Black-tailed deer hoof print.



Figure 5. Mule deer droppings.

Make sure you secure the fence close to the ground and repair any breaks.

For gardens that approach a quarter acre in size, the best conventional fence material is 4-inch woven wire. A smaller mesh, or fencing with graduated mesh that is smaller toward the bottom, can be substituted if smaller pests such as rabbits and hares also need to be excluded.

Deer normally will not jump a 6-foot fence; but if chased or threatened, they can clear an 8-foot fence on level ground. Because of this ability, a 7- or 8-foot fence is recommended, especially where mule deer are found. On sloping ground, you may need to build fences 10 or 11 feet high to guard against deer jumping down slope. Fence gates should be equal to the height of the fence, and they must be kept closed to prevent deer from entering the fenced area.

A good deer fence is built to work in both directions: if an animal gets in, you will need to have a way to get the deer out without difficulty. A removable section in an uphill corner on sloping ground or a corner farthest from human activity, if on level ground, can be very helpful in allowing deer to be driven out of the fenced area.

An extra strand of wire stretched along the ground of a conventional fence will help prevent deer from crawling under the fence. Stake the wire or mesh firmly to the ground in any depressions between posts, or fill the depressions with materials that will not deteriorate or wash away. If you need to economize, you can stretch two or more strands of 9- or 10-gauge smooth wire spaced 4 to 6 inches apart above a 6-foot mesh fence to make it higher. There is no advantage to using barbed wire for these top strands. In order for the wire to remain tight, the vertical stays on mesh fences should be no more than 6 to 8 feet apart.

A slanted fence can be built with similar materials as conventional fences, but it will not need to be as high. As deer approach the outward-sloping

fence, they come under the overhang, which discourages them from trying to jump over.

High-tensile wire fences are less expensive and can be very effective, although their construction requires special techniques. For more information on various types of fences, see the reference by VerCauteren et al., or contact an agricultural fencing contractor, or visit your local UC Cooperative Extension advisor.

Fencing Riparian Corridors.

Historically, many streamside (riparian) corridors have been damaged and altered by gravel extraction, excessive use by livestock, and other human activities. Restoration of streamside vegetation will stabilize streambanks, reducing erosion and siltation and significantly improving fisheries habitats. Continuing significant impacts of deer browsing in riparian areas is often not fully recognized until exclusion fencing is installed along sections of stream to prevent deer impacts. Often, even without re-planting, vegetative recovery is rapid and visually apparent within a few years. Constructing deer-proof fencing along riparian corridors, or modifying existing livestock fencing to also exclude deer, can be a very cost-effective technique in restoring riparian ecosystems. Once the vegetation is re-established the fence can be used to manage grazing, if that is desired.

Converting an Existing Fence. To convert an existing fence, attach up-rights vertically or at an angle sloping away from the area you want to protect. Fasten mesh wire or smooth wires above the fence with no more than 4 to 6 inches between them. Most fences can be made deer-proof with an up-right extension of 3 or 4 feet, provided the lower portion is well constructed and fitted tightly to the ground.

Electric Fences. Standard electric fences used for livestock have not proven very effective for deer control in California. However, the New Zealand-type high voltage electric fence, built specifically for deer with its



Figure 6. Wire mesh fencing can be used to protect newly planted trees from deer damage.

high-tensile-strength wire and more intense charge, may be effective. Electric fences are significantly less costly to construct than conventional woven wire fences, but they require more routine monitoring and maintenance to make sure they are functioning; they can short out when contacted by vegetation, when a wire slips off an insulator, or when a tree branch falls and causes two wires to come into contact with each other.

Poly-tape and poly-twine fences are temporary, portable electric fences used for confining livestock in small plots. These may be effective at excluding deer from seasonal gardens or from newly-planted landscaping, especially when installed before deer develop a habit of feeding in a particular location.

Temporary Fences. Polypropylene fencing can also be effective for limited-term deer exclusion. Such fencing can be useful in situations where newly-planted trees or shrubs need to become established and will grow in a few years to a size that is more resistant to or out-of-reach of deer browsing (usually 5 to 7 feet above the ground).

Individual Plant Protectors. In many places, protecting individual plants may be more practical and economical than fencing an entire area. For example, young fruit or nut trees in a home orchard can be individually fenced until primary branches grow above the deer's reach.

Poultry wire, heavier woven wire, or strong plastic netting can be attached to two stakes to form a circle around the tree (Figure 7). If you are also seeking to prevent rabbit or rodent damage to the new tree or vine, use a smaller mesh size as appropriate. Plastic trunk protectors are especially useful. Inspect individual protectors regularly because they can restrict plant growth. In addition, care must be taken to ensure the protector itself does not damage the vine or tree by causing an accumulation of excess heat or moisture.

Frightening and Behavioral Change

Use of noise, visual objects, or other frightening devices to keep deer away from desirable food items are usually effective for only a few days, if at all. In

urban and suburban residential areas, deer come into contact with a variety of changing auditory and visual stimuli daily and often quickly habituate to things that cause them no harm. Even in rural areas, electronic or mechanical noisemakers that periodically discharge sound (for example, propane cannons and electronic alarms) typically work only for short periods of time.

Some home gardeners have had better success with motion-activated devices that emit stimuli when deer come into range of their motion detector. Motion-activated sprinklers may be effective in some situations for a given period of time.

Some landowners with small orchards, vineyards, and gardens have reported solving deer damage by using dogs trained to stay within an invisible fence system installed around the periphery of the plantings. As with repellents (below), it is difficult to predict accurately where and for how long frightening strategies may work.

Repellents

Various chemical repellents are sold for reducing or preventing deer damage to plants, although their effectiveness in most situations is not very good or long lasting. Deer repellents are designed to impart objectionable odors or tastes.

Studies suggest that repellents containing fermented egg compounds are more effective than other repellents. Most repellents are not allowed on edible food crops, but can sometimes be used during the dormant season or when fruit is not present; check the product label to determine its approved uses.

Some repellents can be injurious to certain trees or shrubs, especially to the new growth. If in doubt, test the repellent on a single plant to make sure it is not harmful to the plant. When choosing a deer repellent, read the label carefully to find out if its use is permissible for your situation. Be sure the repellent is registered for your intended plant

and season. Always follow product label directions.

Repellents should be applied before damage occurs and must be reapplied frequently, especially after a rain, heavy dew, or sprinkler irrigation. To be effective, repellents must usually be applied to new foliage as it develops.

When repellents succeed in protecting plants, it is usually because they have significantly reduced the plant's palatability to deer, thus causing deer to choose alternative foods.

Repellents are unlikely to be effective when food sources are scarce or when deer numbers are high in relation to available food. Such situations can often occur in drought years, or when deer browse becomes scarce and grasses or other alternative forage is not present during California's Mediterranean climate in late summer and autumn.

Some home remedy repellents are used because in theory they produce odors thought to frighten or repel deer from an area. Examples are human hair, bars of soap with an intense fragrance, and predator feces or urine. These substances may repel deer for a day or a few days, perhaps more because of their novelty value rather than any inherent repellency. Most such odorous materials, as well as many commercially sold deer repellents, have not proven to be satisfactory in protecting gardens from deer damage in California.



Figure 7. Protect young trees with a wire fence.

REFERENCES

Editors of Sunset Magazine. 2007. *Sunset Western Garden Book, 8th Edition*. Oxmoor House, Menlo Park, CA.

Opperman JJ, Merenlender AM. 2000. Deer Herbivory as an Ecological Constraint to Restoration of Degraded Riparian Corridors. *Restoration Ecology* 8(1):41-47.

Singer C. 2006, 2008. *Deer in My Garden*. (Vol. 1: Perennials and Subshrubs; Vol. 2: Groundcovers and Edgers). Garden Wisdom Press. Grass Valley, CA.

VerCauteren KC, Lavelle MJ, Hygnstrom S. 2006. Fences and Deer-Damage Management: A Review of Designs and Efficacy. *Wildlife Society Bulletin* 34(1):191-200.

WARNING ON THE USE OF PESTICIDES

Pesticides are poisonous. Some pesticides are more toxic than others and present higher risks to people, nontarget organisms, and the environment. A pesticide is any material (natural, organic, or synthetic) used to control, prevent, kill, suppress, or repel pests. "Pesticide" is a broad term that includes insecticides, herbicides (weed or plant killers), fungicides, rodenticides, miticides (mite control), molluscicides (for snails and slugs), and other materials like growth regulators or antimicrobial products such as bleach and sanitary wipes that kill bacteria.

Always read and carefully follow all precautions and directions provided on the container label. The label is the law and failure to follow label instructions is an illegal use of the pesticide. Store all chemicals in the original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, and animals. Never place pesticides in food or drink containers. Consult the pesticide label to determine active ingredients, correct locations for use, signal words, and personal protective equipment you should wear to protect yourself from exposure when applying the material.

Pesticides applied in your garden and landscape can move through water or with soil away from where they were applied, resulting in contamination of creeks, lakes, rivers, and the ocean. Confine pesticides to the property being treated and never allow them to get into drains or creeks. Avoid getting pesticide onto neighboring properties (called drift), especially onto gardens containing fruits or vegetables ready to be picked.

Do not place containers with pesticide in the trash or pour pesticides down the sink, toilet, or outside drains. Either use all the pesticide according to the label until the container is empty or take unwanted pesticides to your local Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Hazardous Waste Collection site nearest you. Follow label directions for disposal of empty containers. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

Produced by the **Statewide Integrated Pest Management Program**, University of California, 2801 Second Street, Davis, CA 95618-7774.

Technical Editor: K Windbiel-Rojas

ANR Associate Editor: AM Sutherland

Editor and Designer: B Messenger-Sikes

ILLUSTRATIONS: Figures 1 and 5: WP Gorenzel; Figures 2 and 4: K Cabrera; Figures 3, 6, and 7: Jack Kelly Clark.

This and other Pest Notes are available at ipm.ucanr.edu.

For more information, contact the University of California Cooperative Extension office in your county. See your telephone directory for addresses and phone numbers, or visit: ucanr.edu/County_Offices.

University of California scientists and other qualified professionals have anonymously peer reviewed this publication for technical accuracy. The ANR Associate Editor for Urban Pest Management managed this process.

To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products that are not mentioned.

This material is partially based upon work supported by the Extension Service, U.S. Department of Agriculture, under special project Section 3(d), Integrated Pest Management.

Suggested citation: Timm RM. 2019. *UC IPM Pest Notes: Deer*. UC ANR Publication 74117. Oakland, CA.

ANR NONDISCRIMINATION AND AFFIRMATIVE ACTION POLICY STATEMENT

It is the policy of the University of California (UC) and the UC Division of Agriculture & Natural Resources not to engage in discrimination against or harassment of any person in any of its programs or activities (Complete nondiscrimination policy statement can be found at ucanr.edu/sites/anrstaff/files/215244.pdf).

Inquiries regarding ANR's nondiscrimination policies may be directed to John Fox, Affirmative Action Contact, University of California, Agriculture and Natural Resources, 2801 Second Street, Davis, CA 95618, (530) 750-1397.



UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources

Integrated Pest Management Program