When deer population levels are high or when weather forces deer from their normal feeding patterns damage can occur on tree plantings. Deer will feed on buds, stems, and small branches in the late fall and throughout the winter months as these structures are highly nutritious and visible above the snow. In late summer / early fall bucks will rub their antlers on the stems of seedlings and saplings as a means of removing their velvet and as a way to mark their territory for the upcoming breeding season. This antler rubbing can cause small stems to break and can cause significant damage to the bark of the tree. Several actions can be taken to reduce this damage.

**Exclusion**

Individual trees can be protected using either welded wire mesh cages 5-6 ft tall or rigid plastic tree protectors (Fig. 1). Tree shelters have been around in some form or another since 1979. A British silviculturist developed a tree shelter made of translucent polypropylene plastic supported by a wooden stake. Besides protecting the trees from animal damage, these shelters appear to provide several other benefits. Initially and until the seedlings emerge from the top of the shelter, there is accelerated growth. Trees in shelters also develop straighter and more uniform stems. These shelters also aid in locating seedlings and provide a shield when applying herbicides. Tree shelters are 3 to 5 inches in diameter and are available in lengths of 2, 4, 5, and 6 feet. Costs of these tree shelters are fairly high for forest plantings (as much as $5 for a 5-foot shelter and wooden stake). They can be effective in limiting deer damage, but require **yearly** management and maintenance to minimize other problems such as poor form and mouse damage to trees.

Conifers may be protected by using paper “bud caps”. Moderately durable paper such as typing or computer paper is cut in 4” X 6”, folder around the terminal buds of the tree and stapled to some needles near the top. The caps are applied every October until the terminal buds are above the reach of the deer. Bud caps will not stop damage from occurring lower down on the tree and should not be used to
control deer damage in Christmas tree plantations. By spring, the paper bud caps should have degraded to the point that the terminal bud should be able to grow past the paper cap and cause no damage to the new growth. Individual wire cages are also a good but costly solution to deer damage but again individual tree cages are not advisable in Christmas tree plantations.

**Fences**

Properly constructed and maintained fencing is one of the best methods for preventing deer damage in plantations. However, fencing is expensive, and a cost/benefit analysis prorated over the life span of the fence should be conducted to determine its feasibility. Because of the cost of effective fencing, its use is often limited to small areas of high value plantings.

A conventional wire mesh fence will exclude deer only if it is solidly constructed, at least 8 feet high, and fitted close to the ground. Two 4-foot widths of woven wire attached one on top of the other with standard hog rings on 12-foot tall posts make an effective barrier. For areas with greater deer numbers or where you will be fencing in 10 acres or more, you might add two strands of barbwire spaced 9 inches apart to elevate the top even further.

Properly designed and maintained electric fences can be as effective as conventional woven wire fences. Deer learn to avoid electric fences but will constantly test the fence to see if it is active. Electric fences tend to be less expensive than wire mesh fences, but do require more regular maintenance. Designs vary in their complexity.

A permanent electric fence should be chosen for areas requiring constant protection, while a temporary design could be used for intermittent protection. The New Zealand type energizers which produce high voltage and low impedance are the most effective type. These energizers are usually attached to high tensile strength wire; this type of wire is fairly resistant to breakage by deer and not very prone to short out. These fencers are also available as portable units with self-contained solar chargers and battery options allowing fencing away from hard wired areas.

A three-wire temporary electric fence is recommended where there is low deer pressure on small areas and for use primarily during the summer. The fence is constructed from T posts, insulators, 18 gauge copper covered steel wire or wire infused mesh which is highly visible, fence charger, and one ground rod. It consists of an inner fence which has two runs of electrified wire. The first is placed 16 inches from the ground and the second is placed at ~4 ft. The outer fence has a single strand of electrified fence approximately 30 inches from the ground. It is essential that the deer learn that the fence is electrified and to do
this, place three-inch by four-inch pieces of heavy duty aluminum foil at three to 30 foot intervals on the outer wire or tape. Smear a mixture of equal parts of peanut oil and peanut butter on the adhesive tape (bottom) side of the foil. Bend the foil down to form a tent. Replace the peanut oil/peanut butter mixture once a month. Frequent inspection and maintenance of this fence is required. Minimize maintenance costs by either using herbicides for weed control below the fence or by using the high voltage, low impedance energizers.

The Penn State five-wire fence is recommended for moderate deer pressure on small to moderate acreages. This fence utilizes high voltage, low impedance energizers, high tensile strength smooth steel wire (12 1/2 gauge, 200,000 psi), special in-line tighteners that maintain 250 pounds of tension, and approximately 20 feet of rod or pipe in the soil serving as a ground. The high tensile wire can absorb the impact of deer. The bottom wire must be attached about 10 inches from the ground, and the remaining wires are spaced 12 inches apart. Fences as low as four feet have worked on small plots; fences seven feet high with additional wires have been effective on large acreages. To maintain the strength of the fence, special crimping sleeves are used to splice the wire. The high tension wire requires sturdy corner posts and line posts spaced at 50 to 60 feet or greater intervals. Tube insulators are used to insulate the wire from line posts, and wrap-around insulators are used to fasten wires at the ends and around corner posts. In bushy areas, a six to eight-foot cleared strip should be maintained outside the fence to insure that deer are walking when they approach the fence and to allow an exit around the fence.

A slanted seven wire fence works well for moderate to high deer pressure on moderate to large areas (Fig. 5). This fence may be electrified but also reportedly works satisfactorily without electrification. The wires are spaced at one-foot intervals along a rail slanted at a 45 degree angle to the ground (away from the tree crop) to an outside height of four feet. This fence covers about six feet of horizontal space and presents deer with a formidable barrier as well as a shock upon impact.

A special electric fence design, referred to as "Deer Quik Fence" by the supplier, has recently come on the market. A strip of 5/8-inch wide electrifiable ribbon (usually orange) called "Hot-Tape" is suspended 32 to 36 inches above the ground on fiberglass rod posts (Fig. 6). The tape is electrified with a powerful low impedance energizer. All strain posts (ends, corners, curves) are common steel T-posts to which special insulators are attached. The ribbon's high visibility attracts deer and encourages them to touch it with their noses. A painful and memorable shock is delivered which discourages either leaping over or crawling under the fence. Three factors are considered essential for success: attach no more than two strands of ribbon; use only imported energizers from Europe or New Zealand; and include a special steel cable called "Maxishock" for fences running over 1/8 mile. This fence is available from Premier Fence Systems of Washington, Iowa. Costs indicated are 8 cents per running foot for the fence itself, $200 for the energizer, $32 for the windup reel, and 2 1/2 cents per foot for the Maxishock steel cable.

**Repellents**

Deer repellents are available for use in controlling deer damage. Repellents are: generally best suited for smaller areas; may fail to protect if other foods are scarce; and will dissipated by rain. Follow manufacturer’s label directions to determine application rates and methods. Repellents are classified as area (odor) or contact (taste) agents.

Fermented egg solids are reportedly one of the most effective odor repellents; at least two commercial formulations are registered for use on fruit trees, nursery stock, ornamentals, and conifer seedlings during the dormant season. This type of repellent is typically applied as a liquid and is sprayed onto seedlings via a tank sprayer. Perfumed hotel soaps, mothballs, human hair, creosote, and bone tar meal have also been used. These products are placed in bags or saturated on cloth and suspended from the trees to be protected.

Taste repellents are placed directly on the plants to be protected. They are most effective on dormant trees or shrubs, but must be applied when the temperature is above freezing. Treat to a height of six feet or only the terminal growth on larger trees. Remember, with contact repellents the deer will have to browse the treated plant so some level of damage will occur before the deer learn to avoid the treated plants. Depending on the weather, contact repellents will need to be reapplied every 20-30 days throughout the critical browse window (fall and winter). Newer products now on the market have special adhesives mixed into the spray which allow the spray to remain actively attached to the plant for up to 3 months. It is best to alternate repellent types so that deer do not get used to one product.

**Other Methods or Techniques**

Noise-making devices such as gas exploders, shellcrackers, and firecrackers attached to a slow-burning rope will scare deer away. One propane exploder will generally cover 5 to 10 acres. Noise making devices are effective for about one...
month; moving the device every few days and changing the rate of firing prolongs success. Employ these devices at the first sign of a problem.

Harvesting deer during the legal season is one of the best ways to control their numbers. Encourage hunting in problem areas; solicit the cooperation of your neighbors to allow hunting on adjacent property.

Few cultural practices are effective in preventing deer damage. Some tree species are more highly favored by deer; consider potential for deer damage when selecting species to plant. Establish tree plantations as far away from woody cover as practical. Planting decoy crops or supplemental feeding may also be helpful.

### Iowa’s Deer Depredation Program

Depredation Biologists in Iowa can assist landowners with:

- Providing technical advice on how to exclude or deter the animals causing damage.
- Alternative horticulture or silviculture practices that would minimize the level of damage.
- Working with neighbors to keep wildlife populations at acceptable levels.
- Recommendations to increase hunting pressure and take more antlerless deer within existing seasons.
- Providing extra deer depredation licenses for hunters who hunt your property.
- Providing you (the landowner or tenant) or your designee with permits to shoot deer outside of existing seasons (all deer taken must be recovered and processed for consumption).

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Iowa State University Extension and Outreach programs are available to all without regard to race, color, age, religion, national origin, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. veteran. Inquiries can be directed to the Director of Equal Opportunity and Compliance, 3280 Beardshear Hall, (515) 294-7612.