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Agricultural Extension Service
The University of Tennessee
SP 598

Wildlife

Using Single-Strand Fencing to Manage Deer Damage

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White-tailed deer are the number one source of crop depredation in Tennessee. Once in peril of extermination, the white-tailed deer population in Tennessee now approaches one million. The number one field crop for depredation is soybeans; however, other crops, gardens, tree plantings and ornamentals shrubs and flowers are damaged also.

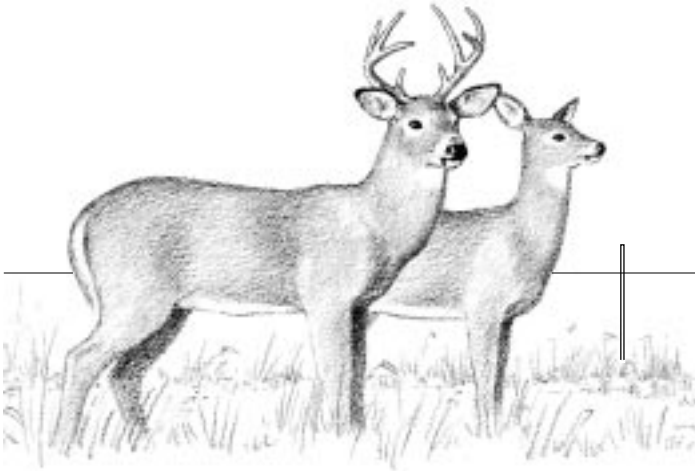
Deer damage soybeans by browsing, trampling and bedding, and indirectly by increasing weed competition. Deer feed on soybeans from the seedling stage through harvest. Browsing of seedlings is most destructive, as one bite can kill a plant if the cotyledons (the first pair of leaves on a soybean seedling) are eaten. Browsing on older plants also can cause yield reductions. Trampling and bedding associated with browsing can have a major affect on yield. As deer travel and bed throughout fields, plants are broken and mashed to the ground, making them unavailable to the combine. Weeds become a problem as an indirect result of browsing. Soybeans typically form a canopy following final herbicide application; however, browsed soybeans may leave gaps in the canopy. These gaps allow weeds to establish, which compete with the soybeans, reduce combine efficiency and increase weed seed in the seed bank. Similar damage may occur in other crops, while damage to ornamentals is usually limited to browsing.

Deer damage is not spread evenly across Tennessee, or across any given portion of the state. Even in areas where deer numbers are high, soybeans at some locations receive little damage, while those at other locations are destroyed. Fields most likely to suffer severe damage are small ($\leq$10 acres), partially or totally surrounded by woods and located away from roads and other human activity. Gardens and ornamentals in isolated areas are most likely to be damaged; however, damage also occurs in many suburban and urban areas.

General Considerations

The three primary techniques used in reducing deer damage are shooting (population reduction), fencing and repellents. Effectiveness of these techniques varies, as there are several types of fences, repellents and many different situations that influence the success of population reduction efforts. Usually, a combination of these techniques can provide adequate control of the problem. Described on the next page are two types of fences, electric and repellent, and their usefulness in managing deer damage to soybeans. The fences described will not eliminate all deer damage, but are tools that have demonstrated effectiveness at reducing deer damage to acceptable levels where deer depredation has been severe.

Several factors can influence the effectiveness of fences at deterring deer damage. First is deer density. The number of deer and availability of alternative foods in the area will influence fence effectiveness. The desire for palatable, nutritious food can overpower the fear of fences. Single-strand fences do not represent a physical barrier to deer, but rely on the animal's fear of electrical shock or odor to reduce deer access to the fenced area.



Timing of fence construction is also important. In areas with a history of deer damage, fences should be erected prior to seedling emergence and at the first sign of damage in other areas. Soybean plants are easily killed as seedlings. When soybeans are grazed below the cotyledons, the young plant dies. Larger plants can withstand some browsing without severely reducing production. Erecting fences early also helps keep deer from establishing a pattern of feeding in the area. Deer, like people, are creatures of habit; thus, it is more difficult to deter deer damage after it has begun than before it starts.

Another consideration is the type of crop to be protected. Single-strand fences are the least expensive type of fencing used to reduce deer depredation; however, some damage usually will continue and may increase over time as the animal(s) becomes accustomed to the fence. This may be more than what can be tolerated for some crops. High-value crops should be protected by a fence that provides a physical barrier, such as permanent high-tensile electric or 8-foot woven wire. Conduct a cost-benefit analysis to match the cost and life of the fence to the crop being protected.

Electric Fencing

Electric fences used to reduce deer depredation are similar to temporary fences some farmers use to control livestock distribution. Low-impedance fence chargers minimize fire danger while delivering a charge most effective at turning animals without harming them. Where a power source is accessible, AC-powered chargers are generally best. These chargers require the least maintenance and provide more charger for the money.
A 12-volt-powered charger or solar-powered charger with an enclosed battery can provide an electric charge where electricity is not available. The solar-powered chargers require less maintenance than 12-volt chargers, but are more expensive. All chargers should be grounded properly.

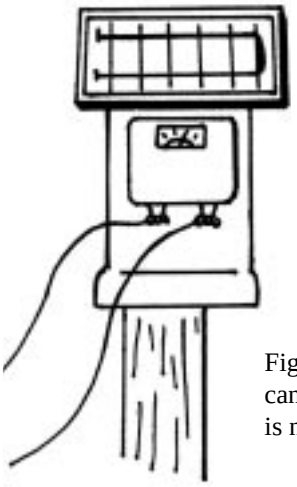


Figure 1. Solar-powered chargers can be used in areas where electricity is not available.

Sturdy, metal T-posts, wooden posts or self-insulating posts (e.g., fiberglass) can be used for corners and 4-foot rebar or self-insulating post as line posts when constructing electric fences. Line posts spaced at intervals of approximately 30 feet provide adequate support for electric fences. The optimum fence height is 24 to 30 inches. Fencing materials can be attached directly to self-insulating posts, but insulators are required for metal posts. Several types of fencing materials are effective. Polytape 1/2 -inch wide is more visible and easier to work with than wire, but is more expensive. In addition, peanut butter can be applied directly to the tape as an attractant, insuring nose-to-fence contact, eliminating the need for aluminum foil tabs, which are used with wire. Additional strands of fencing can be strung at other levels if other animals such rabbits or raccoons become problems (see ***Managing Nuisance Animals and Associated Damage Around the Home***, PB 1624, available at your county Extension office, for further details).

Electric fences require persistent maintenance. Immediately following construction, they should be tested daily until deer in the area have become aware of the fence. Fences should be monitored weekly thereafter. Following harvest, fences should be dismantled and stored to reduce weathering of material and deer familiarity with the fence.

Repellent Fencing

Repellent fences are constructed similar to single-strand electric fences. Sturdy T-posts or wooden posts can be used for corners and rebar used for line posts. Self-insulating posts or insulators on steel posts are not needed. Line posts should be spaced approximately 30 feet apart and the fencing material attached at a height of 24 to 30 inches above the ground. The material can be attached to the post with lengths of baling wire or other suitable material. Several materials have proven effective with these fences. One-quarter-inch nylon rope is effective, easy to work with and inexpensive. Polytape electric fencing and 1/2 -inch cotton rope have been effective also.

Repellent fences should be sprayed with repellent, using a common garden sprayer at construction and monthly thereafter. A hook formed from a steel rod and attached to the spray nozzle will aid in directing the spray onto the rope. Misting the material on the fence is adequate; soaking is not necessary.

Figure 2. A hook attached to the sprayer nozzle aids in directing the repellent onto the fence.

Fencing Cost

Repellent and single-strand electric fences are relatively inexpensive (Appendix A). The primary cost associated with repellent fences is the fencing material. The charger is the main cost associated with an electric fence. An electric fence, based on fencing a 10-acre field with polytape and using a solar-powered charger with a battery backup, will cost approximately $170 per 1000 feet. Expense for materials to construct the repellent fence, including repellent cost for one growing season and $^{3}/_{8}$ -inch cotton rope, will cost about $200 per 1000 feet.

Demonstration and Treatments

Single-strand repellent and electric fences were erected in May and June 1998 around soybean fields to evaluate their effectiveness at reducing deer damage. One field was used for demonstration in Henry County, two fields in Carroll County and three fields on the Milan Experiment Station. At each of these sites, fields were divided, with three sections receiving treatments and one or more sections left unfenced as a control (except at the Henry County site, where no control area was left).

At the Henry County site, soybeans were replanted after being destroyed by deer in a six-acre field bordered by woods on three sides. Upon replanting, treatment fences were put in place. The three treatments were single-strand electric fence, repellent fence using Deer Away® (containing egg solids) and a repellent fence using Deer Stopper® (containing all-natural materials).

Each treatment used heavy-duty T-posts for corner posts and electric fence posts as line posts. All fences were erected approximately 24 inches above the ground. A solar-powered charger with an enclosed battery was used to charge the electric fence. Electric fence tape $^{1}/_{2}$ -inch wide was used to carry the charge. The tape was attached to the post with plastic insulators. Aluminum foil tabs coated with peanut butter were hung between each line post to aid in “getting the deer’s attention!” The repellent fences were comprised of $^{1}/_{2}$ -inch cotton rope upon which repellents were applied with a common garden sprayer. Attached to the spray nozzle was a hook, formed from a $^{3}/_{16}$-inch steel rod, to keep the nozzle close to the rope while spraying.

Site	**Average Yield (bushels per acre)**	
	Fenced Plots	**Control Plots**
Henry County	42	N/A
Carroll County	37	0
Milan Exp. Station–Field 1	41	16
Milan Exp. Station–Field 2	40	36
Milan Exp. Station–Field 3	26	17

Results

Deer browse treated (both electric and repellent single-strand fencing) soybean plots considerably less than untreated (control) areas. In fact, soybean plants in some of the control areas were all but eliminated. There was no difference between treatments (electric or repellent fencing) in repelling deer; however, minimal browsing did occur within fenced areas. Two months after planting, soybeans within the treated areas averaged 36 inches tall, while those within the control areas averaged only 12-18 inches tall.

Weed pressure was more severe in control areas. Although herbicide applications were identical in all treatments within each field, weeds were more abundant and taller where deer browsing occurred. Browsing reduced the leaf canopy in control areas, thus allowing weeds to establish and flourish following final herbicide treatment.

Conclusion

Repellent and single-strand electric fences can be used to reduce deer damage to crops, including soybeans. Fences in this demonstration did not eliminate deer depredation, but did allow farmers to grow soybeans in areas where deer damage had been severe historically. Some browsing will persist even after the fences are erected, which may not be acceptable for some crops. Size of field, location, deer density and quality of surrounding habitat (including available forage) will influence deer use. Application of single-strand fences, however, is not limited to protecting crops. These fences can be used effectively in controlling damage to vegetable gardens, flower beds and other ornamental plantings.

Single-strand fences require persistent maintenance, especially repellent fences. Population control should be included as means of controlling depredation. Overabundant deer populations should be reduced during the regulated hunting season and through depredation permits where necessary. For further information on dealing with deer depredation, pick up a copy of ***Managing Deer Damage in Tennessee***, PB1509, available at your county Extension office.

Appendix A

Budget for fencing 10-acre field (1000' x 450')

Cotton rope with repellent:

3/8-inch cotton rope 15 cents/ft. (~2900 ft.)	$ 435
small post (space at ~25 ft.)	85
T-post (4)	10
miscellaneous (wire, sprayers)	25
estimated repellent cost*	75
Total	$ 630

Electric fence with peanut butter tabs:

fence charger with solar panel & battery	$ 150
electric tape 5 cents/ft. (~2900 ft.)	145
small post (space at ~25 ft.)	85
T-post (4)	10
miscellaneous (ground rods, insulators, aluminum foil, peanut butter)	100
Total	$ 490

* 1 quart of Deer Stopper® concentrate costs $37.50 (as of March 2002), and will make 2 gallons of ready-to-use product.

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