AN EVALUATION OF MAX-FLEX FAST FENCE™ FOR REDUCING DEER DAMAGE TO CROPS

JOHN T. OWEN, Piedmont Substation, Alabama Agricultural Experiment Station, P.O. Box 368, Camp Hill, AL 36850

JAMES B. ARMSTRONG, H. LEE STRIBLING, M. KEITH CAUSEY, Department of Zoology and Wildlife Science and Alabama Agricultural Experiment Station, 331 Funchess Hall, Auburn University 36849-5414

ABSTRACT: A 2-year study was undertaken to assess the effectiveness of Max-Flex Fast Fence™ electric fencing materials (polytape) for reducing damage to crops. Specifically, our goal was to look at the efficacy of this product for the home gardener. In the first phase of the project, plots of approximately 1/40 acre were established in areas of historically high deer densities. Each plot was planted with soybeans and randomly assigned to 1 of 4 fencing configurations or to the open control group. Within each plot, 6' wide strips were tilled across the length. These tilled areas were checked for the presence of deer tracks. The study design was replicated 3 times to produce 12 treatment plots (3 of each fence configuration) and 3 open controls. Fences were charged via a New Zealand-type high voltage, low-impedance charger. The open controls were fed on heavily by deer and soon were almost void of foliage. Results suggest that under these conditions even a single strand of polytape 2 1/2' high was successful in preventing deer from entering the plots. Phase 2 of the study used a single strand of polytape 2 1/2' feet from the ground to exclude deer from plots ranging in size from 0.025 acres to 1 acre. Each exclosure was planted with soybeans. Three replication areas were selected and plots randomly established within the replicates. The effectiveness of the single strand was much less conclusive than in Phase I, with deer entering all plots at some time during the study. However, there does appear to be a direct relationship between plot size and number of deer tracks observed in the plot. In addition, there were significant differences in fence effectiveness between replicates. We concluded that a single strand of polytape electric fencing, if properly installed, could be a suitable deterrent to deer in a small garden situation.

Proc. East. Wildl. Damage Control Conf. 6:98-101. 1995.

Armstrong (1991) reported that county agents in Alabama averaged 16 complaints per year of white-tailed deer damage (Odocoileus virginianus) to crops and ornamentals. In addition, numerous calls are received by Game and Fish personnel, USDA-APHIS Animal Damage Control, and 2 extension wildlife specialists (pers. commun., 1993). Many commercial fruit and vegetable producers complain of severe damage to crops by deer. Depending on the specific situation, recommendations of repellents, frightening, or exclusion are made.

In most situations, repellents provide temporary relief and must be reapplied periodically (Payne and Palmer 1985, McIvor and Conover 1991). Frightening devices may provide short-term relief but deer soon acclimate, or the devices may not work at all (Roper and Hill 1985). Exclusion via some configuration of woven wire and/or electric wire has proven to provide long-term relief to damage by deer. The use of fencing for excluding big game from agricultural settings has been well documented (Brenneman 1983, McAninch et al. 1983, Smith 1983, Ellingwood et al. 1985, Payne and Palmer 1985, Byrne 1989, McIvor and Conover 1991).

Several configurations of electric fencing have been tested for excluding deer from valuable plants. Use of high-tensile electric wire fencing (Smith 1983, Ellingwood et al. 1985, Byrne 1989) has proven to be popular with commercial producers. However, as noted by McAninch et al. (1983), seasonal and yearly deer densities, size of the area to be protected, and the economic value of that which is to be protected may influence the utility of fencing to control deer damage.

We initiated a 2-year study to assess the effectiveness of Max-Flex Fast Fence™ electric fencing materials (polytape) for reducing damage to crops. Specifically, our goal was to look at the efficacy of this product for the home gardener.

We wish to thank Frank Boyd and Ron Freeman for review of this manuscript and Chad Philipp for preparation of slides for presentation. We express our appreciation to the staff of the Piedmont Substation for their assistance in project construction and data collection. This research was supported in part by the Alabama Agricultural Experiment Station (AAES Journal No. 15-933647).

METHODS

The study had 2 objectives: (1) to determine the effectiveness of different configurations of temporary electric fencing (polytape) for excluding white-tailed deer from agricultural plots; (2) to determine the plot size where a single-strand of polytape ceased to be effective. Both phases were conducted at the Piedmont Substation, Alabama Agricultural Experiment Station, Auburn University.

In the first phase of the project, plots of approximately 45' X 25' (1/40 acre) were established in areas of historically high deer densities. Each plot was planted with soybeans and randomly assigned to 1 of 4 fencing configurations or to the open control group. Fence configurations included a single strand of polytape placed 2 1/2 feet above ground, a New Hampshire 3-wire offset fence using polytape, 2 strands of polytape placed 18" and 36" above ground respectively, and a Penn State 5-wire fence constructed with polytape.

Within each plot, 6' wide strips of ground were tilled across the length. These tilled areas were checked for the presence of deer tracks every Monday, Wednesday, and Friday morning (N=36 observations). The study design was replicated 3 times to produce 12 treatment plots (3 of each fence configuration) and 3 open controls.

Fences were charged via a New Zealand-type low-impedance charger and checked daily to monitor voltage to the fence. Voltage was maintained between 3000 and 5500 volts. One Speedrite HB12 charger was used for each replication site. Each charger was powered by one 12 volt, 675 amp battery and grounded with one 1" X 8' galvanized ground rod. One-half inch round fiberglass posts were used for line posts. Fiberglass T-posts were used for corner posts.

Based on the results of Phase 1, Phase 2 of the study tested the effectiveness of a single-strand polytape fence 2 1/2 feet above ground for excluding deer from plots of various sizes. Three replications of the test were conducted on 3 sites. Each replicate contained randomly ordered plots of 1/40 acre, 1/10 acre, 1/4 acre, 1/2 acre, and 1 acre. These plots were planted with soybeans and maintained as in Phase 1. Data was collected every Monday, Wednesday, and Friday (N=30 observations) during August, September, and October.

Chi-square analysis of data was conducted via SPSS/PC+ 4.0. The percent effectiveness for each plot represents the percentage of observations when no deer tracks were found inside the plots.

RESULTS

Phase 1

Chi-square analysis indicated that all fence configurations differed from the open control (X^2=436.08, p=.000). The open controls were fed on heavily by deer and soon were almost void of foliage. While this level of use was anticipated, the controls did provide a relative measure of deer pressure on each area. However, a single strand of polytape 2 1/2' high was successful in preventing deer from entering the plots. Table 1 provides a summary of the percent effectiveness for each fencing configuration.

Table 1. Effectiveness of polytape fencing configurations for excluding deer.

Configuration	% Effectiveness*
Single strand	100
2-strand	98
New Hampshire 3-wire	99
5-wire	100
Open control	13

* = indicates the % of observations where no deer tracks were observed.

Phase 2

Chi-square analysis indicated a significant difference in the effectiveness of polytape depending on the size of the exclosure (X^2 =110.22,p=.000). Plots of all sizes were invaded by deer. Table 2 provides a summary of the percent effectiveness of a single strand of polytape on various size exclosures.

Further analysis revealed differences in fence effectiveness based on the location of the replication plot. Replications 1 and 2 did not differ significantly for any size exclosure (Table 3).

Table 2. Percent effectiveness of polytape for excluding deer from various size plots.

Plot size in acres	% effectiveness
1/40	76
1/10	63
1/4	48
1/2	28
1	26

Data for replications 1 and 2 were combined and compared to replication 3 for each treatment size and revealed significant differences in fence effectiveness (Table 4).

DISCUSSION

A single strand of polytape was as effective in preventing deer from entering the plots as other more elaborate fence configurations during phase 1. This may be the result of the visual repellency of the small 25' X 45' plot in conjunction with the electric charge of the fence. Deer were seen routinely entering other larger exclosures fenced with the same and with differing configurations and materials in fields adjacent to this test.

Phase 2 was designed to evaluate the effect of the size of the exclosure on efficacy. A single strand of polytape at 2 1/2' above ground was used in all plots.

Table 3. Effectiveness of fencing based on replicate location for replicates 1 and 2.

Plot size	% Effectiveness Rep 1	Rep 2	X^2	prob.
1/40	87	73	1.93	.38
1/10	80	87	1.19	.55
1/4	73	63	2.11	.35
1/2	30	53	5.57	.06
1	43	37	5.43	.07

The effectiveness of the single strand was much less conclusive in phase 2 with deer entering all plots at some time during the study. However, there does appear to be a direct relationship between plot size and number of deer tracks observed in the plot (see Table 2).

The control of deer (no tracks in plots) was highest in the smallest plot (1/40th acre, 75.6% control) and decreased as plot size increased (1 acre, 26.7% control). This does indicate that smaller polytape exclosures may effectively prevent deer from entering. As size of polytape exclosure increased, control of deer was reduced to the point that the fenced area received heavy deer damage.

Table 4. Effectiveness of fencing based on a comparison of replicate 3 to replicate 1 & 2.

Plot size	% Effectiveness 1&2	3	X^2	prob.
1/40	80	67	2.54	.28
1/10	83	23	50.21	.00
1/4	68	7	52.21	.00
1/2	41	0	39.36	.00
1	40	0	23.64	.00

It is interesting to note the differences in efficacy of polytape with location. Polytape exclosures 1/40 acre or larger were significantly more effective for reps 1 and 2 than rep 3 (see Table 4). Reps 1 and 2 of phase 2 were located approximately 1 mile from rep 3. Deer populations are similar at all 3 locations. However, Rep 3 was located in an area with a history of an evolving complexity of electric fence structures for 2 years prior to the start of this test. These deer have been exposed to a succession of fences from the single strand of polytape to structures with 8 high-tensile wires surrounding highly desirable food materials (apple, plum, and blueberry orchards, clover, wheat, oats, peas). The deer in the rep 1 and 2 locations were first exposed to electric fencing with the initiation of this study.

Observations on the Piedmont Substation suggest that, when starting with minimal electric fence structures, succeeding years in the same location often require more complex electric fence structures to prevent deer entry.

The deer in the area of Rep 3 demonstrated their ability to successfully negotiate the polytape and enter the exclosure. However, even with these more experienced deer, the smaller polytape exclosure was more effective in controlling deer.

MANAGEMENT IMPLICATIONS

We concluded that a single strand of polytape electric fencing, if properly installed and maintained, can be a suitable deterrent to deer in a small garden or ornamental planting. The quick, easy, and relatively inexpensive installation of polytape electric fences will enhance their desirability with the homeowner and gardener. A fence made of a single polytape strand can be blended into many home and garden locations and offers some degree of deer control with minimal aesthetic interference to the landscape setting. Our experience with varied fence materials in constructing one and two wire electric fences shows the polytape to be more effective than single strand wires. With continuing exposure of deer in a location to such electric fences, more complex structures may be required for a desired level of control. Deer population, distance from cover, attractiveness of plant material enclosed, alternate food materials and cover available, and other repelling/attracting factors are additional considerations that will influence level of deer control.

LITERATURE CITED

Armstrong, J.B.. 1991. Extension wildlife damage management in Alabama. Proc. 5th Eastern Animal Damage Control Meeting,Ithaca, NY. 5:148-150.

Brenneman, R. 1983. Use of electric fencing to prevent deer browsing in Allegheny hardwood forests. Proc. East. Wildl. Dam. Control Conf. 1:97-98.

Byrne, A. E. 1989. Experimental applications of high-tensile wire and other fencing to control big game damage in Northwest Colorado. Proc. Grt. Plains Wildl. Dam. Conf. 9:109-115.

Ellingwood, M. R., J. B. McAninch, and M. J. Fargione 1985. Current status of deer fencing in the Northeast. Proc. East. Wildl. Dam. Control Conf. 2:180-185.

McAninch, J. B., R. Winchcombe, and M. Ellingwood 1983. Fence designs for deer control: a review and the results of recent research in southeastern New York. Proc. East. Wildl. Dam. Control Conf. 1:101.

McIvor, D. E. and M. R. Conover 1991. Uninvited Guests. American Nurseryman 6:46-54.

Payne, J. M. and W. L. Palmer 1985. Deer damage prevention efforts in Pennsylvania. Proc. Grt. Plains Wildl. Dam. Conf. 7:119-130.

Roper, R. B. and E. P. Hill 1985. An evaluation of visual and auditory electronic devices to repel deer. Proc. East. Wildl. Dam. Control Conf. 2:186-191.

Smith, D. 1983. Deer control using 5 strand vertical fence. Proc. East. Wildl. Dam. Control Conf. 1:99.