Using Milorganite® to repel white-tailed deer from ornamental plantings

Odin L. Stephens[1], Michael T. Mengak[1], George Gallagher[2], and Karl V. Miller[1]

[1] Graduate Student, Assistant Professor - Wildlife Specialist, and Professor – Wildlife Management, respectively, D. B. Warnell School of Forest Resources, University of Georgia, Athens, Georgia

[2] Professor – Animal Science, Berry College, Mt. Berry, Georgia

WSFR - Wildlife Management Series No. 3 **March 2005**

Abstract

When deer populations become locally overabundant, deer browsing of ornamental or landscape plants negatively affects plant establishment, survival, and productivity. The ideal repellent would provide plants with protection from over-browsing, be harmless to people and animals, be inexpensive, and be easy to apply to individual or larger plantings. Milorganite® is a slow-release, organic fertilizer produced from human sewage. We tested Milorganite® as a repellent to provide ornamental plants with temporary protection from over-browsing by deer. We measured the amount of protection provided to plants exposed to deer in suburban environments. We planted six beds with several varieties of Chrysanthemums (*Chrysanthemums morifolium)* on a college campus in northern Georgia and monitored them for 35+ days. The distance between each plant varied and all treated plants received a top dressing of 4 ounces (104 g) of Milorganite® (1121 kg/ha or 1000 lbs/ac). The results suggest that Milorganite® can be used to reduce deer damage to the terminal buds of ornamental plants.

Introduction

Many homeowners maintain gardens and landscapes around their homes. With the increase in human population and land development, the need for intensive deer management strategies arises (Butifiloski et al. 1997). Along with aesthetic and economic values, deer can cause a variety of negative economic impacts (Craven and Hygnsorm 1994). Deer can damage personal property, agronomic crops, landscape plantings, food plots, and serve as a host diseases common to livestock and humans (Conover 1997). Unlike other nuisance animals, deer cannot be casually eliminated when human conflicts arise, nor can landowners be expected to carry the entire burden of support for this public resource (Craven and Hygnsorm 1994). Deer damage control can be a difficult social and political problem as well as a biological and logistical one. Scare devices, repellents, and shooting are all considered effective strategies to control deer damage (Butifiloski et al. 1997).

Repellents are used intensively in orchards, gardens, ornamental plants, and agronomic crops. New repellants are continuing to enter the market, but their efficacy varies greatly (Trent et al. 2001). Success is determined on the reduction of damage not total elimination. Repellents generally rely on fear, pain, taste, or conditioned avoidance (Conover 2002). There are three methods to deliver repellents; repellents may be incorporated into the plant (systematic delivery), spread throughout an area (area delivery), or applied to the plant (contact delivery). The efficacy of repellents may vary depending on several factors, including deer density, available resources and seasonal changes in plant palatability (Conover 2002). Milorganite ® has been suggested as an area repellent for use in the spring and summer in Georgia to control deer damage (Kammermeyer et al. 2001).

We tested the efficacy of one area repellent (Milorganite®) on ornamental plants. The specific objective of this study was to determine the effectiveness of Milorganite as a temporary deer repellent when applied to established ornamental plants during the summer.

About Milorganite®

In 1913, the legislature of Wisconsin passed an act to create a sewage commission responsible for cleaning up the waterways. During the same year, a chemist in Birmingham, England, was conducting experiments with the biosludge in sewage. The Milwaukee Sewage Commission adopted this new process for use on December 31, 1919. Jones island, on the shore of Lake Michigan, was chosen to construct the world's first large scale activated sludge treatment plant, the Jones Island wastewater treatment plant.

The main purpose of the Jones Island waste water treatment plant waste produce clean water, but they were faced with a disposal problem of the biosolids left from the activated sludge process. The Milwaukee Metropolitan Sewerage District (MMSD) established a fellowship at the University Of Wisconsin College Of Agriculture to investigate uses of activated sludge as fertilizer with O. J. Noer being the primary investigator. After experimenting with field crops and vegetables, Noer focused on the use of the organic fertilizer on lawns. Based on his research, Noer concluded that the organic, slow release fertilizer can be safely applied to plants without the risk of burning, while providing long-lasting results.

The trade name, Milorganite®, was derived from **MIL**wakee **ORGA**nic **NIT**rog**E**n. This product is often used for soil amendment purposes rather than a fertilizer because of the low Nitrogen-Phosphorus-Potassium (N-P-K) values of 6-2-0. The cost per 40 pound bag usually runs from $7.00 to $10.00. Milorganite is commercially sold by fertilizer dealers throughout the United States.

Methods

Research was conducted on the Berry College campus located in North Georgia. Deer density in the area was estimated by Georgia DNR to be 35-50 deer per square mile. The campus contained two research sites: Campus site and Oak Hill Garden site. At the

Campus site, test plants were small and we counted the number of terminal buds prior to planting. Then, at approximately 7-day intervals we again counted the number of buds to determine the extent of deer damage. At the second site, Oak Hill Garden, the chrysanthemums were larger with abundant buds so we instead counted the number of bud bites at approximately 7-day intervals. A bud bite was recorded if the flower bud was removed from the stalk. All bites were assumed to be due to deer. We also measured the mean plant height for each plant at each site.

Campus Site

Chrysanthemums (*C. morifolium* var. sunny Linda) were planted in three plots at the Campus site. The distance between plots ranged from 435 – 650 yards (400 to 600 m). Each plot contained a row of 10 control and 10 treatment plants planted 1-foot apart. Respective rows of the control and treatment plants were separated by 3.5 yards. Prior to planting, all terminal buds were counted and plants were assigned to respective locations based on the number of terminal buds. Thus, the total initial numbers of available terminal buds were similar for each plot. The treatment plants received an application of Milorganite® equal to 1000 lbs/ac (453.6 kg/0.4 ha) or 4 ounces (0.104 kg per plot) the same day of plant installation to minimize any pre-test damage done by deer. After planting, the number of existing terminal buds/blooms and plant height to the highest terminal bud data (cm) was recorded for 35 days. Milorganite® was weighed and spread by hand around each plant.

Oak Hill Garden Site

The Oak Hill Garden site was planted with approximately 1000 chrysanthemums among three plots within established formal garden areas. Each plot contained 20 control and 20 treatment plants. Spacing between mums was similar to the Campus site. However, because of the orientation of the formal gardens, distance between respective control and treatment plants was 11 yards (10 m) at two of the plots and 22 yards (20 m) at the third site. The treatment plants received application rate of 1000 lbs/ac (453.6 kg/ha) of Milorganite®. Because of these plants level of maturity data were collected on the number of terminal bites recorded and plant height to the tallest terminal bud (cm) for each plant during a 28-day period.

Results

Campus Site

The average number of terminal buds for each plant across the three plots prior to planting was 72.10 (treatment) and 72.23 (control). The mean plant height for all plants, was also similar (Treatment = 19.97 cm; Control = 19.82 cm). Throughout the 35-day trial the number of terminal buds on the Milorganite treated plants exceeded the controls (Figure 1). The presence of a greater number of terminal buds at days 21 and 28, compared to the numbers recorded immediately prior to planting, is an additional indication of the mums having the opportunity to grow due to limited browsing damage. Average plant height was consistently higher for the Milorganite treated mums as compared to respective controls following the initial planting (Figure 2).

Oak Hill Garden Site

The average number of terminal bites recorded for Milorganite treated and control plants across the three plots is presented in Figure 2. While damage recorded as the removal of terminal buds (terminal bud bites) occurred for both treatment and controls, plants treated with Milorganite had fewer average number of terminal bud bites. Because of the maturity of the Chrysanthemums utilized at these sites, changes in height would be expected to be more of a function of degree of deer damage as compared to plant growth. While number of terminal bud bites was lower for the treated mums throughout the 28-day trial, average plant height decreased on days 7 and 14 before returning to similar heights as the controls (Figure 4).

Conclusions

From these results, we concluded that Milorganite® has potential as a deer repellent for ornamental plants. Though the repellent did not eliminate deer damage, it reduced the overall impact. The effectiveness of a repellent is highly dependent on climatic conditions, deer density, and resource availability. High deer densities and low resource availability may reduce the efficacy of Milorganite® as a repellent. Reduction of plant damage may further be improved if Milorganite® is reapplied when deer damage is initially observed. Further research involving different application rates and different plant varieties will prove useful in determining the deer's tolerance level to Milorganite®.

References

Butifiloski, J. W, D. I. Hall, D. M. Hoffman and D. L. Forster. 1997. White-tailed deer management in a coastal Georgia residential community. Wildlife Society Bulletin 25: 1-5.

Conover, M. R. 2002. Resolving human-wildlife conflicts: the science of wildlife damage management. CRC press. Boca Raton, Florida. pp. 253-257.

Conover, M. R. 1997. Monetary and intangible valuation of deer in the United States. Wildlife Society Bulletin 25:298-305.

Craven S. R. and S. E. Hygnsorm. 1994. Deer. Pages D-28 – D-35 *in* S. E. Hygnstorm, R. M. Timm and G. E. Larson, editors. Prevention and control of wildlife damage. Cooperative Extension Division, Institute of Agriculture and Natural Resources, Univ. of Nebraska – Lincoln.

Kammermeyer, K., D. Gregory, and E. J. Williams. 2001. Controlling deer damage in Georgia. Georgia Department of Natural Resources, Wildlife Resources Division, Social Circle, Ga.

Trent, A., D. Nolte and K. Wagner. 2001. Comparison of commercial deer repellents. Tech Tips. 0124-2331-MTDC.

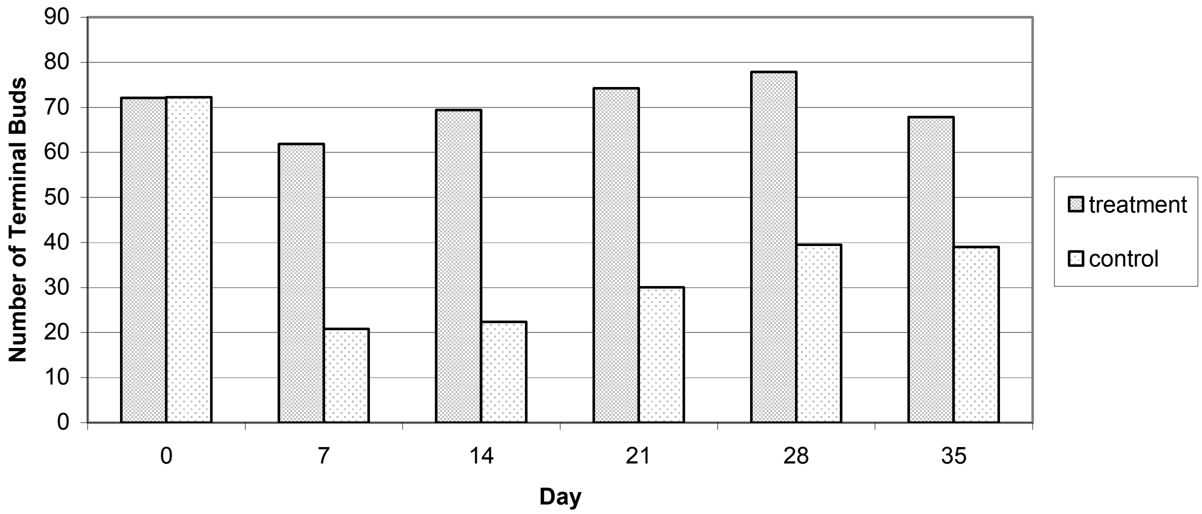

Figure 1. Average number of *Chrysanthemum* terminal buds present on the plants at seven day intervals at one site on the Berry College campus (Campus site) during summer, 2004.

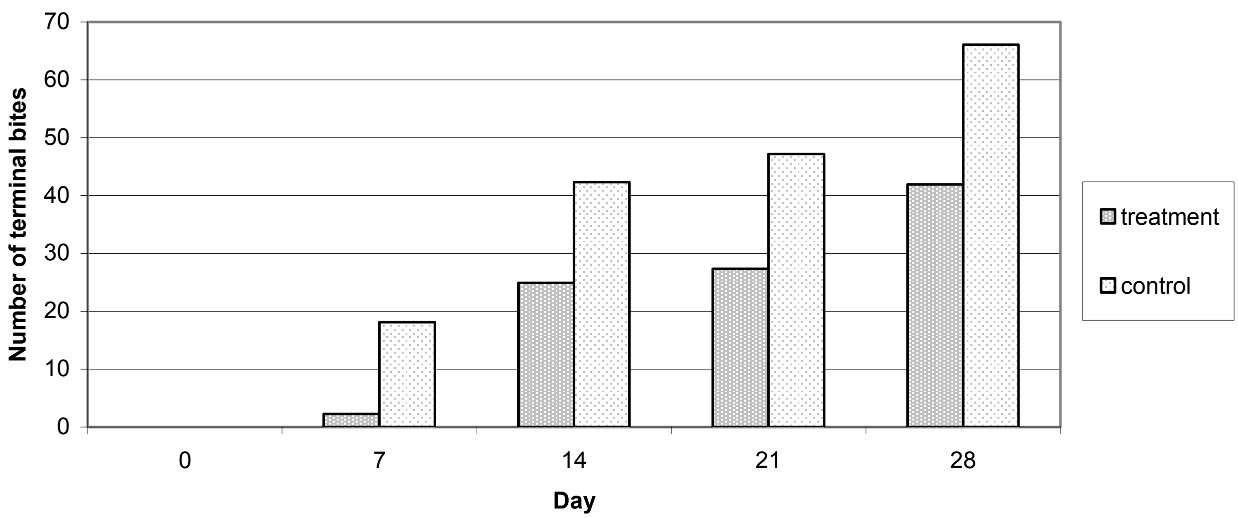

Figure 2. Average number of terminal bites on *Chrysanthemum* plants observed at seven day intervals on Berry College campus (Oak Hill Garden site) during summer, 2004.

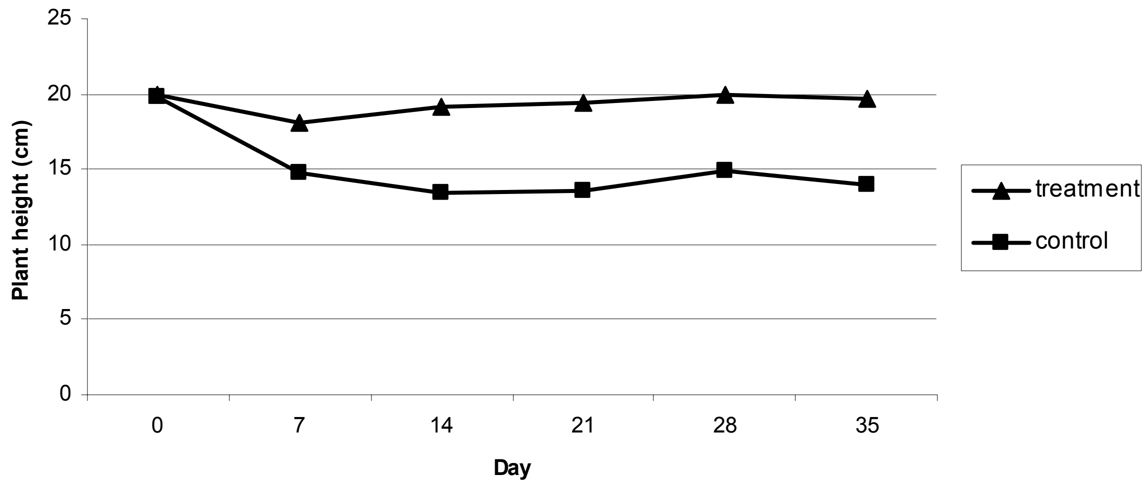

Figure 3. Average plant height (cm) of *Chrysanthemum* recorded at seven day intervals at on site (Campus site) on the Berry College campus, Mt. Berry, Georgia, summer 2004.

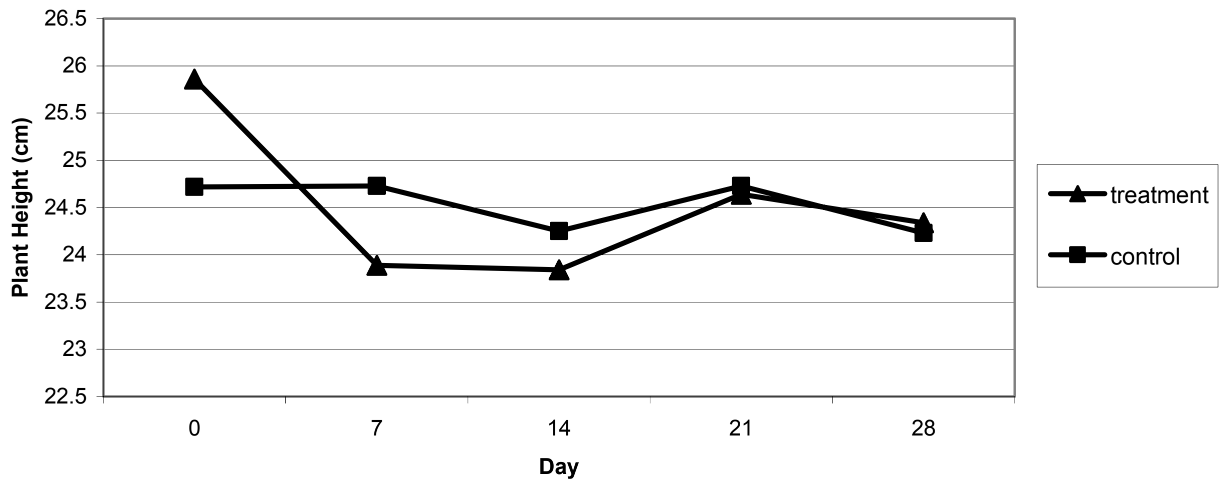

Figure 4. Average plant height (cm) of *Chrysanthemum* recorded at seven day intervals (Oak Hill Garden site on the Berry College campus, Mt. Berry, Georgia, summer 2004.