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FIELD TRIAL USING FLIGHT CONTROL AS A REPELLENT FOR CANADA GOOSE (*BRANTA CANADENSIS*) CONTROL IN FORT COLLINS, COLORADO

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ABSTRACT: Flight Control, containing anthraquinone, was field tested during 1997 in Colorado as a repellent to keep Canada geese (*Branta canadensis*) off turf. The product was sprayed at a rate of 1.9 kg per ha, using a boom sprayer towed by a golf cart. The reduction in goose numbers on the treatment plot was 95.1% ten days after application. A decline of 64.7% in the number of goose droppings on the area was recorded.

KEY WORDS: anthraquinone, Flight Control, Canada goose, efficacy

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INTRODUCTION

This study was conducted to test the field efficacy of Flight Control, containing anthraquinone, as a repellent for Canada Geese (*Branta canadensis*). The study was conducted in Fort Collins, Colorado at Woodward Governor. The study was conducted from February 20, 1997 to March 21, 1997.

METHODS AND MATERIALS

Study Site

The study was conducted at Woodward Governor, a private corporation located in Fort Collins, Colorado at the intersections of Drake Street and Lemay Avenue. It is a fenced and gated site that is used extensively by Canada geese for feeding, resting, and nesting. The site is well maintained and is comprised of large Kentucky bluegrass (*Poa pratensis*) lawns complemented by several deciduous and coniferous trees and several types of shrubs. Located on the northeast corner of the grounds is a softball field used by employees of Woodward Governor in the spring and summer months. The site is used throughout the year by resident geese and migrating geese. Across Lemay Avenue is a large private pond that adds to the attraction of Woodward Governor as a feeding and resting place for Canada geese by providing additional resting and escape cover.

Goose droppings cover the entire grounds of Woodward Governor including the lawn areas, sidewalks, driveways, and the softball field. Maintenance workers have used scare tactics, including pyrotechnics and harassment, but have had little success at removing the birds or reducing their numbers. Nesting on company grounds has been a main concern for the company due to the increase in aggressiveness and conflicts with geese that are raising young.

Study Plots

In cooperation with the maintenance crew at Woodward Governor, two plots were established on the northern lawn area, adjacent to the softball field. These sites were chosen based on prior observations of geese feeding in the area at the same time every day. Geese were also observed to use the south lawn but, the maintenance crew preferred the north lawn be used. The control plot was established to the east of the softball field

and the treatment plot was placed on the west side of the field. Pretreatment counts of the plots yielded little to no data on goose numbers or droppings, but geese were continually observed using the south lawn area in large numbers. Two new plots were then established on the south lawn on February 28, 1997. Two plots measuring 0.4 ha each were established directly adjacent to one another, resulting in a 0.8 acre study site. The plots were 65 meters on each side and were marked with blue flags around the perimeter. To separate the control plot from the treatment plot yellow flags were used as the dividing line. A transect was laid out across the treatment plot diagonally from the northwest corner to the southeast corner. The transect measured 60 meters long and one meter wide. A transect was also placed in the control plot stretching from the northeast corner to the southwest corner, with the same measurements as the treated plot transect. Transects were marked using lime.

Observations

Observations were made from 0800 to 0821 everyday at five minute intervals. Counts were made on the number of geese present in each plot, and the entire area. Notes were made on the activity of the geese to record feeding, resting, and social activities. Five counts were made every five minutes from a distance of approximately 25 meters to avoid disturbing the geese. Counts were made from a vantage point that ensured geese were counted in the appropriate plot, and binoculars were used to confirm all geese were counted. The droppings count was made after the five goose counts were completed. Transects were walked by one or two technicians and fresh droppings were counted. To ensure consistency, all droppings touching the lime boundaries of the transect were counted to be in the transect. Droppings were removed from the transects to avoid counting them in following days.

Treatment Application

The treated plot was sprayed with the test substance at 0700 hours on March 11, 1997. On the preceding day the sprayer was calibrated, but spraying did not occur because of high wind speed and possibility of drift onto the control plot. An additional spraying was performed on March 12, 1997 because the sponsor wished to

increase the application rate by 50%. For each application, 947 g of test material was mixed with approximately 45 L of water in a 100 L Snyder Sprayer. The application rate for both days was 1,894 g of anthraquinone per hectare.

The sprayer had an attached boom, with a swath width of approximately 6.5 m, at 50 psi. The sprayer was attached to a golf cart and approximately 11 passes were made to cover the entire treatment plot. Observations of geese were conducted in the same manner post-treatment for seven days.

RESULTS AND DISCUSSION

Data were analyzed to compare the effect of test substance on the number of droppings and the number of geese per plot (Tables 1 and 2). Pre-treatment data were collected on the control plot and the treated plot, and compared to post-treatment data. The mean of the highest number of geese observed on each plot was calculated and the percent change was determined (Table 3). This analysis showed a 95.17% reduction in goose activity on the treated plots which indicated a decreased use of the treated plot by geese after treatment with the test substance (Table 3). The number of geese on the control plot was also analyzed for percent change (Table 3). This analysis showed a 312.18% percent change in activity, indicating there was an increased use of the control plot after the test substance was applied (Table 3).

The number of goose droppings was used as a secondary indicator of efficacy. Pre-treatment and post-treatment numbers were tabulated from both the treated and control plots. The treated plot showed a 64.74% efficacy, which denoted a decrease in use of the treated plot (Table 4). The control plot displayed a 52.40% efficacy signifying an increased use of the control plot after the test substance was applied (Table 4).

Data were analyzed for trends in the number of goose droppings and the number of geese per plot for pre- and post-applications. The number of droppings on the control plot showed a positive trend from pre- and post-treatments, indicating an increased use of the control plot after the test substance was applied (Fig 1). The treated plot showed a negative trend in droppings after application of the test substance. Trends in goose counts showed a positive increase on the control plots and a negative trend on the treated plot (Fig. 2).

Preliminary indications of this study support the efficacy of anthraquinone as a field repellent for Canada geese. Data analysis indicates that anthraquinone is an effective repellent even under varied weather conditions, including snow accumulation. The test substance appeared to repel the geese even after the accumulation of six inches of snow that lingered for three days (Table 1). Observations of geese during the field trial demonstrated their avoidance of the treated plot for several days. Geese were observed to feed freely throughout the Woodward Governor compound and would even feed within 5 to 10 feet of the treated plot, but would not cross onto the plot. This may indicate a learned response and avoidance to the repellent after the initial application.

Observations of geese during the post treatment period did not indicate any adverse effects to individuals or flocks. There was no indication of an affect on social behavior or individual health of the birds. This study provides support that Flight Control is a safe and effective field repellent.

Figure 1. Pre- and post-treatment Canada goose dropping counts on plots during a study using Flight Control conducted in Fort Collins, Colorado.

Figure 2. Pre- and post-treatment Canada goose numbers on test plots during a field test with Flight Control.

Table 1. Number of droppings found on transects at Woodward Governor during the pre-treatment and post-treatment periods of the repellency test.

Date	Number of Droppings Pre-treatment		Comments
	Treated Plot	Control Plot	
2/21/97	0	0	
2/22/97	7	0	
2/23/97	0	0	5" of snow
2/25/97	44	14	
2/27/97	39	14	
2/28/97	13	1	
3/2/97	---	---	gate locked
3/3/97	0	1	
3/6/97	---	---	1" of snow
3/7/97	15	13	
3/8/97	10	8	
3/9/97	9	4	
3/10/97	8	13	
3/11/97	14	6	
	Number of Droppings Post-treatment		
	Treated Plot	Control Plot	
3/12/97	1	18	
3/13/97	11	16	
3/14/97	---	---	6" of snow
3/15/97	---	---	snow remained
3/16/97	---	---	snow remained
3/17/97	5	12	
3/18/97	1	10	
3/19/97	2	17	
3/20/97	3	3	
3/21/97	0	4	

¹On the afternoon of February 28, 1997, plots were mapped and moved to another area on the property.

Table 2. Highest number of geese seen on plots at Woodward Governor during the pre-treatment and post-treatment periods of the repellency test.

Date	Treated Plot	Control Plot	Entire Area	Behavior
Pre-treatment				
2/20/97	0	0	30	Feeding and drinking
2/21/97	0	0	5	Feeding
2/22/97	0	0	16	At 1440 approximately 50 geese were observed in the area
2/23/97	0	0	0	Light snow was falling and approximately 5 to 6" covered the plot
2/24/97	---	---	---	3 to 5" of snow
2/25/97	0	0	54	Feeding and territorial fights occurring
2/26/97	---	---	---	3 to 5" of snow
2/27/97	21	0	40	Feeding and resting, occasional territorial fights
2/28/97	0	0	56	Feeding
3/1/97	---	---	---	6" of snow
3/2/97	0	0	55	Feeding
3/3/97	22	0	62	Feeding
3/4/97	---	---	---	2.4" of snow
3/5/97	---	---	---	2" of snow
3/6/97	30	0	74	Feeding and resting, courting behavior is increasing
3/7/97	38	8	72	Feeding
3/8/97	33	5	63	Feeding
3/9/97	15	11	11	Feeding
3/10/97	7	3	71	---
Post-treatment				
3/11/97	0	0	3	Feeding, plot sprayed
3/12/97	0	28	0	Feeding, plot sprayed again
3/13/97	0	0	28	Feeding
3/14/97	0	6	9	Feeding and resting
3/15/97	0	0	50	Feeding and resting
3/16/97	0	0	16	Feeding and resting, snow covering the plots
3/17/97	0	30	10	Feeding
3/18/97	5	5	39	5 geese crossed treatment plot, 2 of 5 grazed lightly with no apparent effect
3/19/97	7	0	0	Feeding, grass mowed yesterday
3/20/97	0	3	12	Feeding
3/21/97	0	0	8	---

¹On the afternoon of February 28, 1997, the plots were mapped and moved to another area on the property.

Table 3. Means of highest number of geese seen on plots at Woodward Governor; March 2, 1997 to March 21, 1997.

Plot	Mean	Standard Deviation	¹ Percent Efficacy
Pre-treatment treated	20.71	13.02	95.17%
Post-treatment treated	1.00	2.27	
Pre-treatment control	3.86	4.05	-312.18%
Post-treatment control	15.91	15.59	

Table 4. Means of the number of droppings found on the transects at Woodward Governor; March 2, 1997 to March 21, 1997.

Plot	Mean	Standard Deviation	¹ Percent Efficacy
Pre-treatment treated	9.33	4.89	64.74%
Post-treatment treated	3.29	3.49	
Pre-treatment control	7.50	4.43	-52.40%
Post-treatment Control	11.43	5.65	

¹To calculate percent efficacy, the following formula was used:

% Efficacy = $\frac{\text{Pre-Treatment Activity} - \text{Post-Treatment Activity}}{\text{Pre-Treatment Activity}} \times 100$
A negative number denoted an increase in activity.