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PRACTICAL APPLICATION TECHNIQUES FOR FLIGHT CONTROL®, A NEW BIRD REPELLENT FOR THE AVIATION INDUSTRY.

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Abstract

Flight Control® is a product that has shown promise as a non-toxic, chemical bird repellent. Work conducted to date continues to confirm the effectiveness of Flight Control® to function as an effective bird repellent for turf and structural applications. This paper describes the product, how it works, application techniques and results of recent turf and structural field trials at three airports in the United States.

Key Words: Anthraquinone, Flight Control®, Bird repellent, Bird strike, Non-toxic, Non-lethal, Chemical bird repellent, Turf application, Structural application, Canada Geese, European Starlings, Nuisance birds, Dual mechanism, Visual cues, Post-ingestional response.

Introduction:

At the BSC Canada Meeting in Quebec City, Quebec, Canada in October 1998, a report was cited that between 1991 and 1997, the Federal Aviation Administration (FAA) recorded a total of 16,949 wildlife strikes in the United States (1). Of this total, approximately 97 percent involved birds.

During this same seven year period, the FAA reported a 53 percent increase in the number of annual strikes. The FAA also reported that a strike analysis at three major airports showed a reporting rate of less than twenty percent.

At the same BSC Canada Meeting, Bruce MacKinnon, Wildlife Control Specialist for Transport Canada, reported a total of 36 bird strikes at various aerodromes in Canada during a ten month period, January To October, 1998 (2). In addition, Captain Sara Karcha, reported that the Canadian Air Force experienced approximately 600 bird strikes between 1993 and 1997 (3).

Universally, aircraft bird strikes are recognized as a serious problem and a variety of techniques, some more effective than others, have been developed to reduce this risk. Techniques currently employed to reduce this risk, fall into two categories – lethal and non-lethal -- and all are considered part of an integrated approach to wildlife management.

In the early nineties, **ebi**, a technology company based in Wilmington, DE, developed Flight Control®, a non-lethal, bird repellent, based on the chemical anthraquinone. In December, 1997, Flight Control® was registered with the EPA (Reg. No. 69969-1). Since registration, a great deal of effort has been directed toward the introduction of the product into the aviation market.

Field testing of Flight Control® demonstrated its ability to act as a goose repellent. (4, 5, 6, 7, 8, 9, 10) Additional testing has shown the product to have a similar effect on other bird species (11 – 17, 20 – 25, 28). Actual field application experiences within the United States have confirmed the effectiveness of Flight Control® as a bird repellent. Not only can the product be used as bird repellent on turf; it can also be used as a bird repellent on structures.

This paper provides a brief review of Flight Control®, how it is used and application experiences at three airports in the United States.

Discussion:

What is Flight Control®?

Flight Control® is an aqueous dispersion of the chemical anthraquinone, a member of the poly-cyclic quinone family. The chemical formula for anthraquinone is $C_{14}H_8O_2$ and the chemical structure is shown in Figure1.

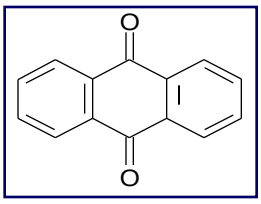

Figure 1. The Chemical Structure of Anthraquinone, $C_{14}H_8O_2$.

Anthraquinone (AQ) is light tan in color, is naturally occurring and has solubility in water of approximately 80 PPB. The half-life of anthraquinone has been measured to be 28 days in soil. The persistence of the product is only interrupted by the eventual biodegradation of the product or its removal via some physical force. Flight Control® is very stable and has no appreciable volatility so there is very little loss due to evaporation. The product has no odor.

How Does Flight Control® Work?

Dr. Melvin Kreithen, University of Pittsburg, and Dr. Richard Dolbeer, USDA, at Sandusky, OH have studied the product and offered explanations regarding the repellency mechanism. Kreithen concluded that birds see in two ranges; one being the visual range and the second being the UV range. Since Flight Control® absorbs in the UV range, Kreithen further concluded that birds see the compound in the UV range. See Figure No 2.

Studies have shown that Flight Control® is not a trigeminal irritant but rather a post-ingestional irritant. The compound is non-toxic to birds. Behavior studies have shown Canada Geese, following a sampling of turf treated with the compound, shaking their heads and heading for water to drink and wash off the compound. Similar actions have been observed in gulls and pigeons following contact with Flight Control®.

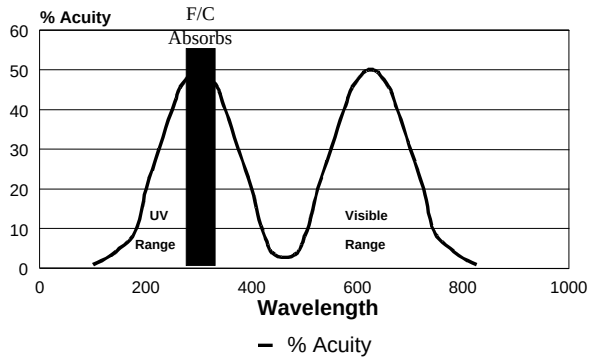

Figure 2. Visual Acuity of Birds as Suggested by Dr. Melvin Kreithen

We believe the combination of a visual signal and a post ingestional irritant results in birds rapidly learning that turf treated with Flight Control® is not good. Kreithen observed this rapid-learned response in a few birds seems to be communicated to other birds in the flock causing them to avoid the Flight Control® treated materials (26, 27, and 28). The exact mechanism of the information transfer is unknown at this time.

Based on our current understanding, a food source, such as grass, treated with Flight Control® provides an unexpected visual experience to the birds thus causing them to be somewhat suspect of the food source. See Figure3.

Figure3 graphically depicts how birds might see grass before and after treatment with Flight Control®.

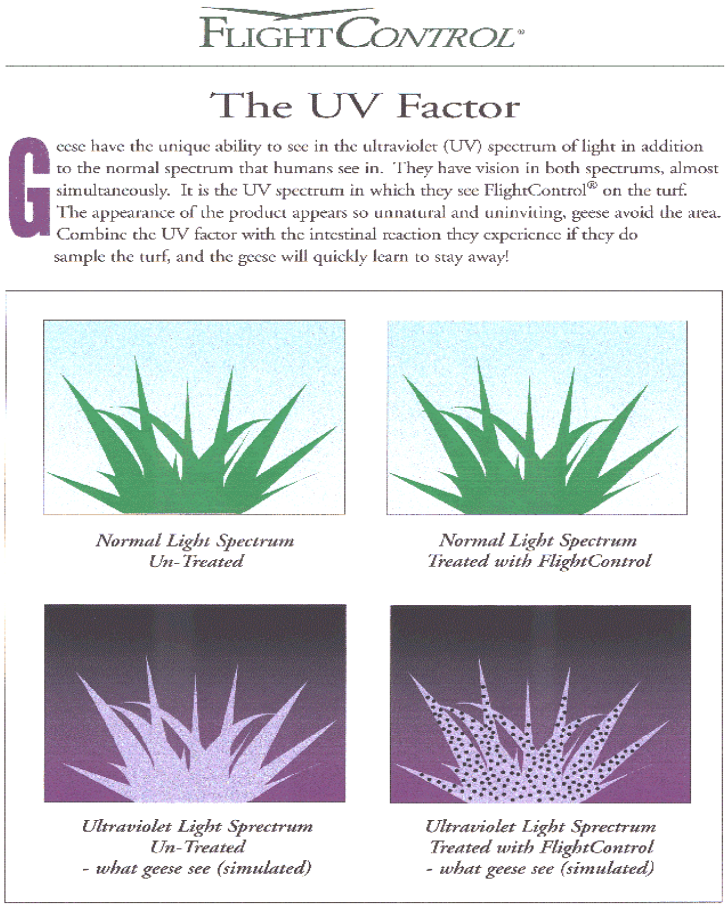

Figure 3. A Simulation of What Turf Would Look Like When Treated With Flight Control® and Viewed Under Normal Visual and UV Conditions Versus Untreated Grass Under the Same Conditions.

In addition to the visual observation, if a bird does sample the treated turf, the post-ingestional response is experienced making the bird feel very uncomfortable. A bird's assessment of the experience might be the similar to the following -- "the turf looked bad and then, after eating it, I feel bad... I think I will move to another food source". While this thought process may not be exactly what is going on in the bird's brain, the net result is that birds quickly learn that turf treated with Flight Control® is not good and they move on to alternative food sources or "greener pastures".

Where Can It Be Used?

Flight Control® is a multifunctional product. It can be used as a turf or ornamental lawn care treatment and it can also be used as a structural treatment.
The turf treatment requires the product be diluted with water and applied using some type of spray equipment.

The product can also be used to successfully repel birds from structures. Structural repellency occurs when birds come in contact with Flight Control® that has been applied to structures. The Flight Control® gets on the feathers and various other parts of the bird body, i.e. feet, beak, etc., and when the bird preens, the active ingredient gets into the gastric system once again initiating the post-ingestional response.

Experience has shown for best results, product should be applied at full strength using a brush, roller or some other application device. Applying the product at full strength to just the horizontal surfaces has worked the best. While Flight Control® has been used to successfully repel birds from structures, additional work is required to optimize the structural application technique.

Michael Avery, USDA/AHPHIS/WS Researcher in Gainesville, FL studied Flight Control® as an avian perching deterrent for three bird species, Red-winged black birds, Brown-headed cowbirds and Fish crows. Avery observed that during his test, each of the species displayed a significant preference for the untreated perch over the one coated with Flight Control® (29). His observations support field experiences that Flight Control® is an effective structure repellent.

How Is It Applied?

For typical turf applications, the product should be diluted with water and applied at a rate that achieves a minimum coverage of one half gallon of Flight Control® per acre. For small areas, a “back-pack” type sprayer can be used. For large areas, a boom sprayer with a large mixing tank is suggested. See Figure4.

Spray nozzles and pressure settings that provide a medium to small droplet size are required. See Figure5. To ensure good bonding of the anthraquinone to the turf, a good agricultural “sticker” is recommended.

Figure4 - An example of an All Terrain Vehicle (ATV) modified with a boom sprayer and a mixing tank. This system was used for the Flight Control® test at Portland Intl. Airport.

Figure5 - Example of a turf application of Flight Control® using a boom sprayer and fine atomization.

For structural applications, experience has shown the product should be applied at full strength, or only slightly diluted with water, to horizontal surfaces using a brush, roller or some other similar device. By applying Flight Control® at full or nearly full strength, the higher concentration of product on the surface ensures bird – product contact ultimately resulting in bird repellency.

Utilizing the turf spray application technique can lead to the anthraquinone running off the structure and leaving a somewhat messy appearance.

What Are The Actual Airport Experiences With Flight Control®?

A. Reagan National Airport, Washington, DC

Following a limited field trial of Flight Control® at Reagan National Airport in the fall of 1998, a decision was made to expand the application of the product to all turf areas on the airport grounds, approximately 200 acres. At the same time, bird surveys continued to be conducted by USDA personnel to monitor the performance of the product.

A comparison of bird survey data for November 1999 (Flight Control® treated) versus November, 1997 (no Flight Control®) showed the use of Flight Control® to have had a significant effect on the repellency of birds on the turf at Reagan National Airport (30). The reduction of European Starlings between November, 1997 and November, 1999 was particularly noteworthy.

In November, 1997, the average number of European Starlings feeding on turf averaged 87 per survey day. Following treatment of the airport with Flight Control® in November, 1999, the average number of starlings feeding on turf was reduced to 40; a reduction of over fifty percent. Similarly, the number of European Starlings flying over untreated grass in November 1997 was 370 while in November, 1999, the average number of European Starlings flying over Flight Control® treated grass was 30 -- a 92 percent reduction in bird presence.

European Starling Bird Survey Data for November 1997 and 1999 are listed below in Table 1.

B. Portland Intl. Airport, Portland, OR

In November, 1999, a Flight Control® field trial was conducted by personnel at the Portland Intl. Airport in Portland, OR (31). Prior to the application of the product, a field of approximately 50 acres was partitioned into five sections and goose presence was monitored in all sections for four weeks.

Table 1 Average Daily Bird Survey Data for European Starlings at Washington National Airport (DCA) during November 1997 and 1999.

	November, 1997 Pre-treatment	November, 1999 Post-Treatment	% Bird Reduction
Survey Dates	11/4 and 11/19	11/9 and 11/18	
Starlings – Feeding	87	40	54
Starlings – Flying	370	30	92
Starlings – Total	457	70	85

In late November, an application of Flight Control® was applied to two ten-acre plots. The product was applied using a small boom sprayer attached to an All Terrain Vehicle (ATV) with a 25-gallon supply tank. (See Figure No. 3) Flight Control® was diluted with water and applied to the turf at a delivery rate of one half gallon of Flight Control® per acre. An agricultural sticker was used to enhance the adhesion of the Flight Control® to the turf.

Following the application, the treated and untreated areas were monitored for goose presence. During the first week, no geese were observed in the treated area, however, goose presence was observed in the untreated area.

During the second week, some goose presence was observed on the treated area approximately 13 percent of the time. During week three, goose presence in the treated areas increased to approximately 19 percent. During week four, goose presence in the treated areas increased to 20 percent. Of particular interest is the fact that during the testing period, a significant amount of rain was received in the Portland area and Goose repellency was still observed.

A summary of goose presence during the trial is described in Table 2.

Table 2 - Goose Sightings in Treated Areas versus Control Areas at Various Times after Application of Flight Control®. (31)

Treatment Period	Percent Sightings in the Treated Area	Percent Sightings in the Untreated Area
Post Treatment – Week 1	0	100
Post Treatment – Week 2	13	87
Post Treatment – Week 3	19	81
Post Treatment – Week 4	20	80

Note: Specific details pertaining to the trial are presented in a paper authored by Ms. Sharon Gordon, Port of Portland, Portland, OR, and presented at the IBSC Meeting held in Amsterdam, Netherlands in April, 2000.

Based on the data in Table 2, Flight Control® again demonstrated its ability to function as an effective bird repellent in the test conducted at the Portland Intl. Airport, Portland, OR.

C. Detroit Metropolitan Airport, Detroit, MI

While no bird survey data were collected during this structural application of Flight Control® at the Detroit Metropolitan Airport (DTW), in Detroit, Michigan, the product did demonstrate effective bird repellency (32). A description of the structural test at Detroit Metropolitan Airport is presented below.

Frequent bird-dropping complaints from passengers and baggage check-in personnel outside of Terminal No. One were reported to Detroit Metropolitan Airport Maintenance Personnel. The problem dealt with large numbers of birds perching and roosting on the window ledges and soffits above the baggage check-in areas in Terminal No. One.

Because of the complaints, maintenance personnel decided to try Flight Control® and determine if the product would reduce the bird-dropping complaints.

In mid-November an application of Flight Control® was applied to various window ledges and soffit areas of Terminal One. The product was applied using turf application guidelines, i.e. spray application. See Figure No. 6 for a picture of the application area.

Over the next two and one half months, no bird dropping complaints were received from passengers or baggage check-in personnel. During the month of February, approximately three months after the initial application of Flight Control®, a few bird-dropping complaints were reported to Maintenance Personnel signifying the time to re-apply the product.

The experience at Detroit Metropolitan Airport further demonstrates the fact that Flight Control® is an effective bird repellent for structures.

Figure 6. A picture of the ledges in Terminal One at Detroit Metropolitan Airport (DTW) where birds perched and roosted resulting in complaints from passengers and baggage check-in personnel. Once Flight Control® was applied, complaints stopped for nearly three months.

Conclusions:

Experiences reported in this paper have demonstrated the efficacy of Flight Control® as a chemical bird repellent for turf and structural applications. While differences exit between the turf and the structural application protocols, the bottom line remains the same – the product, when properly applied, is an effective bird repellent.

If you are looking for a way to increase the effectiveness of your bird management program, then Flight Control®, a new, non-toxic, chemical bird repellent should be seriously considered.

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