



PAUL R. LEPAGE
GOVERNOR

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, FOOD AND RURAL RESOURCES
BOARD OF PESTICIDES CONTROL
28 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0028

SETH H. BRADSTREET III
ACTING COMMISSIONER
HENRY S. JENNINGS
DIRECTOR

To: Board of Pesticides Control Members
From: Mary Tomlinson, Pesticides Registrar/Water Quality Specialist
RE: Section 18 application for use of Avipel to Reduce Bird Predation of Corn Seed in Maine
Date: Feb. 4, 2011

Enclosed are the above referenced Section 18 application for use of Avipel Dry Powder Corn Seed Treatment and the proposed supplemental product label for your consideration. The Section 18 application limits use to one planting season on field and sweet corn. The request is in response to bird predation on corn through out Maine that has substantially reduced corn yield and, in severe cases, necessitated replanting affected crops. There are no other effective control products or methods available for control of bird predation. Avipel (formerly Avitec) has been approved for Section 18 use to repel birds in several other states. Arkion Life Science recently submitted a Section 3 label to the EPA for use of Avipel as a bird repellent.

Your package includes the additional following documents for your review.

- MSDS
- Letter of support from Doug Lawrence, Arkion Life Sciences, Dec. 3, 2009
- Letters of support from Jim Dill, David Handley, Richard Kersbergen, University of Maine Cooperative Extension, 2011
- Letter of support from Lauchlin Titus, AgMatters LLC, 2011
- Anthraquinone EPA Fact Sheet
- Field Report on use of Avitec
- Arkion Product Bulletin & Application Guide
- Arkion Avipel Bird Repellent Seed Treatment overview
- Arkion Bird Crop Damage Report Summary

Please review these materials and let me know if you have any questions.

**2011 FIFRA SECTION 18 EMERGENCY SPECIFIC EXEMPTION
FOR THE USE OF AVIPEL TO REDUCE BIRD PREDATION OF
CORN SEED IN MAINE**

General information requirements of 40 CFR 166.20(a, b) in an application
for a specific exemption.

TYPE OF EXEMPTION BEING REQUESTED

- ✓ SPECIFIC
- QUARANTINE
- PUBLIC HEALTH

SECTION 166.20(a)(1): IDENTITY OF CONTACT PERSONS

(i) Contact person:

This application to the Administrator of the Environmental Protection Agency (EPA) is for a specific exemption to authorize the use of Avipel (9,10-anthraquinone) as a seed treatment on corn seed to repel blackbird species and crows from eating freshly planted corn seed in Maine. This application is submitted by the Maine Board of Pesticides Control. Any questions related to this request should be addressed to:

Mary Tomlinson
Pesticide Registrar
Maine Board of Pesticides Control
Maine Department of Agriculture Food and Rural Resources
State House Station 28
Augusta, ME 04333-0028
mary.e.tomlinson@maine.gov
Phone: (207) 287-7544
Fax: (207) 287-7548

(ii) Qualified experts:

The following qualified experts are also available to answer questions:

Dr. Michael Braverman
IR-4 Project, Rutgers University
500 College Rd. East, Ste. 201W
Princeton, NJ 08540
(732) 932-9575 ext 4610

Richard Kersbergen
Extension Professor
Sustainable Dairy and Forage Systems
992 Waterville Rd
Waldo, ME 04915
207-342-5971
Richard.kersbergen@maine.edu

**SECTION 166.20(a)(2): DESCRIPTION OF PESTICIDE
PROPOSED FOR USE**

Common Chemical Name

(Active Ingredient): Anthraquinone

Trade Name(s) and EPA Reg. No.: Avipel Dry Powder Corn Seed Treatment (95% a.i.)

Registrant: Arkion Life Sciences, 3521 Silverside Road, Wilmington, DE 19810.

There is no EPA registration number as the proposed Section 3 label for Avipel has recently been submitted.

See the proposed Section 18 label.

SECTION 166.20(a)(3): DESCRIPTION OF PROPOSED USE

(i) Sites to be treated:

Corn seed planted in all Maine cropping areas is vulnerable to bird foraging or damage and could be potentially treated. Sweet corn is also commercially grown in Maine and is similarly vulnerable to bird predation. During recent growing seasons, corn growers experienced depredation in all areas of Maine. This depredation often caused substantial

stand loss leading to silage corn yield reduction, or in severe cases, caused growers to abandon the damaged crop and necessitated replanting. Silage corn production is very responsive to plant density and uniformity. Corn seed and plant stands are extremely vulnerable to relatively minor stand loss resulting from bird depredation. Stand loss of more than 10% is generally considered unacceptable. Maine growers planted 29,000 acres of silage corn in 2008 and 28,000 in 2009, based upon estimates generated by the USDA National Agricultural Statistics. Maine growers also planted about 2,000 acres of sweet corn in 2008 and 2009. The potential utilization of this seed treatment would depend primarily upon a grower's historical level of blackbird depredation, their risk management philosophy, and the expense and supply of the bird repellent seed treatment.

(ii) Method of Application:

Seed treatments will be used since bird depredation typically occurs between planting and early seedling stages. Corn seeds and seedlings may be vulnerable to depredation for a period generally ranging from 3 to 5 weeks after planting. This time is dependent upon soil temperatures during the spring, which primarily govern corn seed germination rate and early seedling growth. The most effective way to prevent damage and minimize exposure using the least amount of deterrent is to target the planted seed with a seed treatment application. The most common method of treating seed is expected to be the traditional planter box treatment where the required amount of active ingredient (a.i.) as a dry formulation is manually mixed with seed prior to filling the planter.

(iii) Rate of application (lbs of product /A):

Field corn and sweet corn – dry formulation: Use at a rate of one pouch per 42 pounds of seed [3.5 ounces per 42 pounds, or 3.3 ounces a.i. per 42 pounds of seed] as a dry mixture in the planter box as a seed treatment prior to planting.

(iv) Maximum number of applications:

One (1) per season.

(v) Total acreage to be treated:

Maine growers will likely plant about 28,000 plus acres of silage corn and a couple thousand acres of sweet corn in 2011 that are potentially susceptible to bird damage and may need a treatment. In reality, however, only a portion 10% (approx. 3,000 acres) of that amount may receive a treatment.

(vi) Total amount of pesticide proposed (active ingredient and product):

Assuming that 10% of Maine's silage and sweet corn acreage will be treated, 3960 oz (247.5 lbs) a.i. or 4200 oz (262.5 lbs) of total product will be used in the state of Maine.

(vii) Restrictions and requirements concerning the proposed use and the qualifications of applicators using the pesticide:

- Mixers / loaders and applicators treating seed must wear coveralls, protective eye wear, chemical resistant and waterproof gloves, shoes plus socks and respirator. Follow manufacture’s instructions for cleaning and maintaining personal protective equipment (PPE). If there are no instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.
- Applicable restrictions and requirements concerning the proposed use and the qualifications of applicators using Avipel are as follows:
 - Applicable directions, precautions and restrictions on the EPA approved Section 18 label must be followed.
 - This label must be in the possession of the user at the time of the pesticide application.
 - Avipel shall be applied only by licensed applicators or by persons under the direct supervision of a licensed applicator. The licensed applicator must be certified in the category applicable to the application of the restricted use pesticide.
 - Read and follow “DIRECTIONS FOR USE” and “MIXING INSTRUCTIONS” sections of the Avitec label for essential product performance information.

(viii) Duration of proposed use:

Corn is generally planted from early May to mid June in Maine. It is essential to treat corn seed prior to or during this planting season, as corn productivity and resulting profitability decline considerably when plantings are delayed.

(ix) Earliest possible harvest dates:

Corn grain harvest may begin as early as late-August and continue through late October, depending on seasonal temperatures and environmental conditions. Sweet corn harvest may begin as early as mid-July.

Section 166.20(a)(4): ALTERNATIVE METHODS OF CONTROL

There are no currently effective methods of control and an increased number of acres susceptible to blackbird damage in Maine. The lack of alternate methods of control has caused growers in these areas much concern in the past. While birds have been damaging corn in these areas for the past 20+ years, the damage costs due to birds is increasing due to unseasonably mild winters and a lack of effective control methods. The increased cost of corn seed also impacts the damage costs. Freshly planted corn fields offer an attractive food source for these native and overwintering blackbird and crow populations.

(i) Currently registered pesticides

This application follows the application for Wisconsin in that the lack of products available for control has been reduced significantly over the past few years. Historically in Maine, several insecticide products have been used to protect corn seed from damaging insect populations. These include lindane planter box treatments and lindane treated seed, which are no longer commercially available. Diazinon, Counter, and Furadan (carbofuran) were also used. These products were used to control chinch bugs, various cutworms, corn rootworm, seed corn maggot, wireworm, and other insect pests. Lindane was reported to be a deterrent to birds when used at planting as an insecticide treatment. Diazinon treatments also protected corn from insects, but both these products have not been available for some time for control of insects on newly planted corn seed. The use of some planter box treatments also assisted in repelling bird depredation on newly planted corn. The newer seed treatment products registered for insect control on corn are more environmentally friendly and perceived as being safer, but they do not repel birds. These include imidacloprid, clothianidin, thiamethoxam, and permethrin.

(ii) Alternative Control Practices:

Physical deterrents such as cannons, dummies and reflective flagging are largely ineffective on blackbirds and crows, since they quickly become acclimated to these practices and large numbers of these devices would be necessary to have any impact at all in large acreage fields.

Increasing planting depth has also been tried as a potential deterrent. Cool wet soils and deep planting depth often results in loss of plants due to rots and seed decay.

To avoid corn damage, Maine corn growers must have access to an effective, environmentally acceptable method of bird repellency. Several repellents have been tested to reduce blackbird damage, but the only effective product that persists long enough to protect recently emerged corn seedling in the field is anthraquinone.

Section 166.20(a)(5): EFFICACY OF USE PROPOSED UNDER SECTION 18

Limonene (LIM), Methyl Anthranilate (MA), and 9, 10-anthraquinone (AQ) are possible replacements for the insecticide lindane as a deterrent to blackbird damage on corn seeds and young seedlings. A 1.0 % solution of AQ was effective as a crane deterrent while LIM and MA were not. Both MA and LIM metabolized in the soil too quickly to be effective during the entire period that corn plants were susceptible to crane damage.

In two trial periods, cranes did not damage the AQ treated fields, but there were approximately a 60% (Trial 1) and a 50% (Trial 2) reductions in corn seedlings per row foot in non-treated fields. Reports of the effectiveness of LIM, MA, and AQ seed treatments in deterring sand hill cranes are attached.

Section 166.20(a)(6): EXPECTED RESIDUE LEVELS IN FOOD

Michael Braverman at IR-4 is coordinating the residue program for anthraquinone. The residue program was conducted during 2006 and 2007. Texas samples have been analyzed for 2007. Results are shown in Section 8. During 2006, the trials were conducted at the 1X and 5X rates in the states of WI, MI, NY, OH and ND. In 2007, a trial was conducted at 1X and 10X at Weslaco, Texas.

In samples during 2006, there was not any parent or metabolite found in grain or any other fraction across several states. In 2007 studies, there were no residues in grain even at the 10X rate. The 1-OH metabolite was found at .012 ppm in stover at the 10X rate. The bottom line is that there have not been any detectable residues in grain from any sample from any state even when corn has been treated.

Section 166.20(a)(7): DISCUSSION OF RISK ASSESSMENT

HUMAN HEALTH

Anthraquinones, including 9,10-anthraquinone, are widespread in plants, including plants used for human consumption. The overall toxicological risk from human exposure to anthraquinone is considered negligible.

Toxicology Assessment

Acute Toxicity

For 9,10-anthraquinone the acute oral LD₅₀ in rats was >5000 mg/kg (Tox category IV); acute dermal LD₅₀ in rabbits was >5000 mg/kg (Tox category IV) and acute inhalation LC₅₀ in rats was > 2.11 mg/L (Tox category IV). Anthraquinone caused mild ocular irritation symptoms in rabbits which cleared by 72 hours post-instillation (Tox category III); anthraquinone caused slight dermal irritation in rabbits which cleared by 24 hours postdosing (Tox category III); and it was not a contact sensitizer in guinea pigs.

Mutagenicity and Developmental Toxicity

Anthraquinone did not induce positive increases in the number of revertants when tester strain cell cultures were dosed. Based on the data obtained from the mouse lymphoma forward mutation assay, anthraquinone did not induce a significant increase in mutant cells; no dose-response effects nor cell toxicity effects were observed. Based on the data obtained from the *in vivo* mouse microsomal assay, anthraquinone did not induce increases in micronucleated polychromatic erythrocytes; no bone marrow toxicity was observed for any dose. Based on the data obtained from the Chinese hamster ovary (CHO) chromosomal aberration assay, anthraquinone did not induce significant increases in chromosomal aberrations, polyploidy, and endoreduplication. Additionally, there were no visual signs of cell toxicity and no reduction in mitotic indices. These mutagenicity studies demonstrate that anthraquinone is not a mutagenic agent.

Subchronic Toxicity

A 90 - day feeding study was not required because of the nonfood use of anthraquinone. Also, the 90 - day dermal and inhalation toxicity studies are not required because the proposed use pattern does not result in prolonged exposure at concentrations that are likely to be toxic. The immunotoxicity study was waived based on the minimal potential for exposure and the low toxicity of anthraquinone.

Chronic Exposure and Oncogenicity Assessment

Chronic exposure studies are conditionally required to support nonfood uses only if the potential for adverse chronic effects are indicated based on 1) the subchronic effect levels established in Tier I subchronic oral, inhalation, or dermal studies, 2) the pesticide use pattern, or 3) the frequency and the level of repeated human exposure that is expected. Oncogenicity studies are required to support non-food uses only if the active ingredient

or any of its metabolites, degradation products, or impurities produce in Tier I studies morphologic effects in any organ that potentially could lead to neoplastic changes. The triggers for chronic exposure and oncogenicity studies were not met.

Effects on the Endocrine Systems

EPA does not require information on endocrine effects at this time. However, it was considered if the available information on this compound may have an effect in humans similar to an effect produced by a naturally occurring estrogen or other endocrine effects. There is no known evidence that anthraquinone acts as an endocrine disruptor in humans. No adverse effects to the endocrine system is known or expected.

Dose Response Assessment

No toxicological endpoints are identified.

Dietary Exposure and Risk Characterization

Dietary exposure is unlikely to occur because of the nonfood use of anthraquinone. In the absence of any toxicological endpoints, risk from the consumption of residues is not expected for the general population including infants and children.

Occupational, Residential, School and Day Care Exposure and Risk Characterization

Human exposure to anthraquinone is expected to be minimal in these areas.

Occupational Exposure

The possibility for dermal, eye and inhalation exposure is mitigated as long as the product is used according to label directions, which recommends allowing the material to dry before allowing human activity in the treated areas.

Residential, School and Day Care Exposure and Risk Characterization

No indoor residential, school, or day care uses currently appear on proposed labels.

Drinking Water Exposure

Exposure to anthraquinone in drinking water is not expected.

Acute and Chronic Dietary Risks for Sensitive Subpopulations Particularly Infants and Children

There are no food uses associated with the proposed use of the anthraquinone. Therefore, the acute dietary risks should be negligible based on the lack of exposure.

Aggregate Exposure from Multiple Routes Including Dermal, Oral, and Inhalation

Aggregate exposure would primarily occur in the mixer/loader/applicator subpopulations via dermal and inhalation routes. Risks associated with dermal and inhalation aggregate exposure are measured via the acute toxicity studies submitted to support registration. Because the inhalation toxicity studies for anthraquinone showed no toxicity, the risks anticipated for this route of exposure are considered minimal. Results of the acute dermal study indicated low toxicity, and no significant dermal irritation. Based on these results,

the anticipated risks from dermal exposure are also considered minimal. Therefore, the risks from aggregate exposure via dermal and inhalation exposure are a compilation of two low risk exposure scenarios and are considered negligible.

Cumulative Effects

Anthraquinone is not toxic and therefore there would be no expected cumulative effects from common mechanisms of toxicity.

Risk Characterization

EPA has considered anthraquinone in light of the relevant safety factors in FQPA and FIFRA. A determination has been made that no unreasonable adverse effects to the U. S. population in general, and to infants and children in particular, will result from the use of anthraquinone when label instructions are followed.

Therefore, the relatively minor increment in use as a result of the approval of these section 18 requests would not be expected to measurably increase risk.

THREATENED AND ENDANGERED SPECIES

There are few federally listed threatened and endangered birds, mammals and plants that occur perennially or seasonally, in Maine, and none that will be adversely affected by a bird repellent.

Recent AQ feeding study (2006) in sandhill cranes by International Crane Foundation (ICF) using treated whole kernel corn (0.5% AQ) concluded that birds were able to taste the chemical and find it repelling. Birds ingesting AQ-corn did not appear to be in any physical distress as evidenced from clinical chemistry and physical examination data. Further observations in the field by ICF in Wisconsin determining efficacy of AQ to repel sandhill cranes from germinating corn revealed that overall most birds avoided AQ-corn at 0.5% level. This dose level had maximum efficacy without any adverse effect on the birds. Under Section 18 use, the efficacy was being monitored in this area from 2006 to 2007 growing seasons.

In a most recent EUP field study by International Crane Foundation, AQ-corn (AQ) was planted on 4 ha next to 9.31 ha planted with non-treated seed (Lacy et al. 2007). At either 1% or 0.5% level, AQ was the only chemical found with desired chemical repellent characteristics protecting the corn seeds. Moreover, 0.5% AQ concentration was found adequate to persist throughout the vulnerable period of corn kernel. This study demonstrates that fields planted with treated seed altered the foraging behavior of cranes and reduced seed predation as a result of taste deterrence.

BENEFICIAL ORGANISMS

The pesticide anthraquinone works as a taste deterrent and has been effectively used to repel avian species from croplands and other areas (e.g. airports). It has been promoted as an environmentally friendly replacement for the recalcitrant pesticide lindane.

Anthraquinones occur naturally in some plants, fungi, lichens, and insects. Ecotoxicity data was not provided by the manufacturer for review, but other sources show this compound to have a favorable toxicological profile. It has little toxicity to avian species, and is practically non-toxic to mammals, fish, and daphnids. Thus risks to beneficial and non-target species is minimal due to the lack of toxicity, use pattern, and mitigating label language. However, all efforts should be made to not apply this product directly to water, to areas where surface water is present or to inter-tidal areas below the mean high water mark. Do not contaminate water when disposing of equipment rinsate. Use of anthraquinone as directed in this FIFRA Section 18 application to repel avian species is not likely to pose any serious risk to Maine ecological communities.

ENVIRONMENTAL FATE

After review of the manufacturer's data dealing with standard fate studies, no adverse effects are expected to Maine's ecosystems with use of this product. Data indicates that this polyaromatic as expected is very insoluble in water and very immobile. Hydrolysis, photolysis, and aerobic and anaerobic soil degradation tests indicate this compound degrades primarily photolytically and under anaerobic conditions. Standard precautions are warranted even though contamination of Maine surface and groundwater is not likely to be an issue. Contamination of water should be avoided when disposing of equipment wash waters. With the precautions and restrictions proposed on the label, this pesticide can be used effectively and safely. After review of the proposed use and information, label language is sufficient to mitigate and minimize potential risks to native Maine wildlife and the environment.

Section 166.20(a)(8): COORDINATION WITH OTHER AFFECTED FEDERAL, STATE AND LOCAL AGENCIES

The Maine Department of Agriculture's Board of Pesticides Control and the Maine Cooperative Extension Service have cooperated in the preparation of this petition. USDA-APHIS has been consulted and supports this application. Other state and federal agencies will be informed, if necessary, when the exemption is approved.

Section 166.20(a)(9): NOTIFICATION OF REGISTRANT

Arkion Life Sciences has been notified of this agency's intent regarding this application (see letter of support).

Section 166.20(a)(10): ENFORCEMENT PROGRAM

The Maine Board of Pesticides Control (BPC) is the State Lead Agency for the regulation of pesticides. The BPC will monitor the application of the exempted pesticide as needed to determine that the provisions of the specific exemption are being followed.

Section 166.20(a)(11): REPEAT USES

This is the first year Maine has applied for this specific exemption.

Section 166.25(b)(ii): PROGRESS TOWARDS REGISTRATION

Anthraquinone is registered with EPA under a section 3 label (Flight Control Plus) to repel geese. IR-4 is conducting residue trials in several states for Section 3 registrations. Arkion Life Sciences has recently filed a Section 3 label for use of Avipel on corn seed.

Section 166.20(b): NAME OF PEST

Scientific and Common Name of the Pest:

Blackbird species (family Icteridae): brown-headed cowbird (*Molothrus aster*), common grackle (*Quiscalus quiscula*), Brewer's blackbird (*Euphagus cyanocephalus*), red-winged blackbird (*agelaius phoeniceus*); American crow (*Corvus brachyrhynchos*)

**Section 166.20(b)(2): DISCUSSION OF EVENTS OR
CIRCUMSTANCES WHICH BROUGHT ABOUT THE
EMERGENCY SITUATION**

High populations of many blackbird species and crows overwinter or are native in the Maine, and recent mild winters has allowed larger populations of nuisance bird to persist.

Historically in Maine, several insecticide products have been used to protect corn seed from damaging insect populations. These included lindane planter box treatments and lindane treated seed, which are no longer available. Diazinon, Counter, and Furadan (carbofuran) were also used. These products were used to control chinch bugs, various cutworms, southern corn rootworm, seed corn maggot, wireworm, and other insect pests. Lindane was reported to be a deterrent to birds when used at planting as an insecticide treatment. Diazinon treatments also protected corn from insects but both these products have not been available for some time for control of insects on newly planted corn seed. The use of some planter box treatments also assisted in repelling bird depredation on newly planted corn, but are no longer available. The newer seed treatment products registered for insect control on corn are more environmentally friendly and perceived as being more safe, but they do not repel birds. These include imidacloprid, clothianidin, thiamethoxam, and permethrin.

Section 166.20(b) (4): DISCUSSION OF ECONOMIC LOSS

Bird predation during the corn seed germination and plant establishment stages may cause substantial stand loss leading to considerable yield reductions, or in severe cases, cause growers to abandon the damaged crop and require replanting. Corn grain yield is very responsive to plant density and uniformity. Therefore, corn seed and plant stands are extremely vulnerable to relatively minor stand loss resulting from bird depredation.

Bird predation of corn seed produces non-uniform stand reduction – as birds opportunistically feed down a planter row, extracting numerous adjacent seeds within a row. Corn seeds are typically spaced about six-inches apart down a row. Consequently, if a single bird extracts 6 to 10 adjacent seeds, then they produce large three to five foot skips with no plants within a row. Furthermore, corn has relatively poor compensatory ability for stand reduction compared to other crops, because corn does not possess the physiological capability to branch or tiller, like sorghum, soybeans, cotton, wheat, or rice. As a result, corn’s compensatory ability is primarily limited to enhancing ear size, which severely restricts the plant’s ability to offset stand reduction. If a grower suffers severe stand loss (more than 25% stand reduction), he or she suffers this monetary loss, and

must replant as well. The planting process is very expensive (\$80 to \$110/acre) and accounts for about 20% of the total budget to grow a corn crop. Not only does a grower suffer the monetary loss associated with planting a crop twice, but replanted corn includes additional expense of pesticide application or tillage (\$20-\$25/acre) to control remaining plants from the failed stand and is normally far less productive and very inconsistent, compared to normal plantings, because sensitive corn reproductive stages occur later in the summer, or not at all given Maine's narrow window for planting

Section 166.20(b) (ii) & (iii): ESTIMATED REVENUES FOR THE SITE TO BE TREATED

Estimated net and gross revenues for the site without the use of the proposed pesticide but with the next best alternative:

There is no alternative product.

FIFRA SECTION 18

FOR DISTRIBUTION AND USE ON CORN SEED IN THE STATE OF MAINE ONLY DURING
2011 PURSUANT TO SECTION 18 OF FIFRA, AS AMENDED

Avipel[®] Dry Powder Corn Seed Treatment

Effective: March 1, 2011 – July 30, 2011

**For the protection of Field and Sweet Corn seed
against consumption by Grackles and Black Birds.**

ACTIVE INGREDIENT

9, 10-Anthraquinone95%
OTHER INGREDIENTS 5%
Total 100%

KEEP OUT OF REACH OF CHILDREN CAUTION

NOT A PLANT FOOD INGREDIENT
Active Ingredient: 9, 10-Anthraquinone

FIRST AID

If inhaled:	<ul style="list-style-type: none">• Move person to fresh air.• If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible.• Call a Poison Control Center or Doctor for further treatment advice.
If on skin or clothing:	<ul style="list-style-type: none">• Take off contaminated clothing.• Rinse skin immediately with plenty of water for 15-20 minutes.• Call a Poison Control Center or Doctor for treatment advice.
If in eyes:	<ul style="list-style-type: none">• Hold eye open and rinse slowly and gently with water for 15-20 minutes.• Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.• Call a Poison Control Center or Doctor for treatment advice.
If swallowed:	<ul style="list-style-type: none">• Call Poison Control Center or Doctor immediately for treatment advice.• Have person sip a glass of water if able to swallow.• Do not induce vomiting unless told to do so by the Poison Control Center or Doctor.• Do not give anything by mouth to an unconscious person.
FOR MEDICAL EMERGENCIES INVOLVING THIS PRODUCT, CALL TOLL FREE 1-800-535-5053. HAVE THE PRODUCT CONTAINER OR LABEL AVAILABLE WHEN SEEKING TREATMENT ADVICE.	
See side panel for additional precautionary statements.	

MANUFACTURED BY:
ARKION[®] LIFE SCIENCES LLC
551 Mews Drive Suite J
New Castle, DE 19720

EPA Establishment No.: 84123-TN-001

EPA File Symbol: XX-XX-XX

NET CONTENTS: 3.5 Ounces

DATE OF MANUFACTURE: _____

DL Feb 15, 2011

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION

Harmful if swallowed. Harmful if absorbed through skin. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling. Harmful if inhaled. Avoid breathing dust. Remove contaminated clothing and wash clothing before re-use. Causes moderate eye irritation. Avoid contact with eyes or clothing.

PERSONAL PROTECTIVE EQUIPMENT: When handling Avipel, use long-sleeved shirt and long pants, socks, shoes, chemical resistant gloves and goggles. Use a dust/mist filtering respirator (MSHA/NIOSH approval number prefix TC-21C), or a NIOSH approved respirator with any N, R, P or HE filter.

ENVIRONMENTAL HAZARDS:

Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA. Do not contaminate water by cleaning of equipment or disposal of waste. Apply this product only as specified on this label.

The use of Avipel in agricultural applications is protected by US Patents 6,328,986; 5,885,604; 5,922,774

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Do not use treated seed for food or feed purposes or process for oil. Treat only those seeds needed for immediate use, minimizing the interval between treatment and planting.

I. GENERAL INFORMATION

Avipel forms a bird repellent coating on Corn seeds. Birds may sample treated seeds but they will avoid additional consumption. **Thorough, uniform and consistent coverage** is essential for full protection from bird depredation. Use only at the recommended labeled rate. Lower amounts may not give desired control.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Reformulation or repackaging of this product is prohibited. Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult agency responsible for pesticide regulation.

The Maine Department of Agriculture, Board of Pesticide Control, must be informed immediately of any adverse effects that may result from the use of this product.

RATES: Field and Sweet Corn: Use at a rate of one pouch, 3.5 ounces per 42 pounds of seed (3.3 ounces a.i. per 42 pounds of seed), as a dry mixture in the planter box as a seed treatment prior to planting.

MIXING INSTRUCTIONS: For best results, fill planter box only half full of seed, add half the required amount of **Avipel** and mix thoroughly with a stick or paddle. Add the remainder of the seed and **Avipel** and mix again so that all seeds are covered. **DO NOT MIX WITH BARE HANDS.** Use only at the recommended rate. Lower amounts may not give desired control.

Agricultural Use Restrictions

Use this product only in accordance with its labeling and Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard. Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 4 hours. "Exception: if the product is soil-injected or soil-incorporated, the Worker Protection Standard, under certain circumstances, allows workers to enter the treated areas if there will be no contact with anything that has been treated." PPE required for early entry to treated areas that is permitted under the Worker Production Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is: coveralls, waterproof gloves, shoes plus socks, protective eyewear.

User Safety Recommendations: Users Should: Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. Remove PPE immediately after handling the product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

Pesticide Disposal: Improper disposal of excess pesticide or reconstituted concentrate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instruction, contact your State Pesticide or Environmental Control Agency or the Hazardous Waste representative at the nearest EPA Regional Office for guidance. Arkion[®] also can be contacted for guidance on the disposal of pesticide wastes.

Container Disposal: Dispose of in a sanitary landfill or incinerator or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

GENERAL: Any unused or unregistered product must either be returned to the manufacturer or distributor (unopened containers) or disposed of in accordance with the Resource Conservation and Recovery Act regulations following the expiration of the emergency exemption.

CONDITIONS OF SALE AND WARRANTY:

Arkion[®] warrants that the product conforms to its chemical description and is reasonably fit for the purpose stated on the label only when used in accordance with label directions under normal conditions of use. Since timing, method of application, weather and ground conditions, mixture with other chemicals, and other factors affecting the use of this product are beyond our control, no warranty is given concerning the use of this product contrary to label directions, or under conditions which are abnormal or not reasonably foreseeable.

ARKION[®] MAKES NO OTHER WARRANTIES EITHER EXPRESS OR IMPLIED WARRANTIES INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE.

Handling, storage and use of the product by Buyer or User are beyond the control of Arkion[®] and Seller. Risks such as ineffectiveness or other directions will be assumed by the Buyer or User.

IN NO CASE WILL ARKION[®] OR SELLER BE HELD LIABLE FOR CONSEQUENTIAL, SPECIAL OR INDIRECT DAMAGES RESULTING FROM THE HANDLING, STORAGE OR USE OF THIS PRODUCT, NOR HELD RESPONSIBLE FOR INJURY OR LOSS AS A RESULT OF THE HANDLING OR USE OF THIS PRODUCT.

Avipel[®] and Arkion[®] are registered trademarks of Arkion[®] Life Sciences LLC, 551 Mews Drive, Suite J, New Castle, DE 19720.

MATERIAL SAFETY DATA SHEET

Manufactured By Arkion® Life Sciences LLC
551 Mews Drive – Suite J
New Castle, DE 19720 • 1-800-468-6324

In case of emergency endangering health or the environment involving this product, call INFOTRAC AT 1-800-535-5053.

I. CHEMICAL PRODUCT/COMPANY IDENTIFICATION

PRODUCT NAME: AVIPEL dry seed treatment
PRODUCT CODE: 062488

II. COMPOSITION: INFORMATION ON INGREDIENTS

CHEMICAL NAME: * 95% 9,10 Anthraquinone (CAS #84-65-1)
5% Inert Ingredients

* All percentages are approximate.

III. HAZARDS IDENTIFICATION

This product contains no ingredients listed or defined as hazardous under the Federal OSHA Hazard Communication Standard, 29 CFR 1910.1200.

HUMAN HEALTH DATA

ROUTE(S) OF ENTRY: Skin contact; Eye contact

HUMAN EFFECTS AND

SYMPTOMS OF OVEREXPOSURE: (This data is based on active ingredient)

ACUTE SKIN CONTACT: On the basis of animal toxicity testing (see Section XI), we expect this product to be non-irritating to the skin.

ACUTE EYE CONTACT: On the basis of animal toxicity testing (see Section XI), we expect this product to be non-irritating to the eyes.

ACUTE INGESTION: Ingestion may cause a laxative effect and produce a greenish or bluish colored urine. On the basis of animal toxicity testing (see Section XI), we expect this product to be essentially non-toxic by ingestion.

CHRONIC EFFECTS OF EXPOSURE: No applicable information was found concerning any adverse chronic health effects to humans resulting from long-term repeated overexposure to this product.

CARCINOGENICITY: None of the components listed by NTP, IARC, or regulated as a carcinogen by OSHA.

MEDICAL CONDITIONS:

AGGRAVATED EXPOSURE: None known.

IV. FIRST AID MEASURES

FIRST AID FOR EYES: Immediately flush eyes with large amounts of water, occasionally lifting upper and lower lids, until no evidence of chemical remains (at least 15-20 minutes). Get medical attention.

FIRST AID FOR SKIN: In case of contact, remove product mechanically and wash skin with soap or mild detergent and water. Remove contaminated clothing. Call a physician if irritation occurs. Wash clothing before reuse.

FIRST AID FOR INGESTION: If swallowed, call a physician immediately.

V. FIRE AND EXPLOSION DATA

FIRE & EXPLOSION HAZARDS: Minimal
EXTINGUISHING MEDIA: Water Spray. Foam. Dry Chemical. CO₂. Halon

SPECIAL FIRE FIGHTING PROCEDURES:

Wear self-contained breathing apparatus. Wear full protective equipment. Use water spray.
Cool tank/container with water spray.

If area is heavily exposed to fire and if conditions permit, let fire burn itself out, since water may increase the area contaminated.

VI. ACCIDENTAL RELEASE MEASURES

SPILL OR LEAK PROCEDURES: Utilize protective clothing and equipment (see Section VII). Spills should be taken up mechanically and placed into labelled, closable containers. Avoid generation of dust. Spill area can be washed with water. Collect wash water for approved disposal.

VII. HANDLING AND STORAGE

STORAGE TEMPERATURE: Less than 122 F (50 C), and above freezing.
 SHELF LIFE: Five (5) years - Estimated.
 SPECIAL SENSITIVITY: None known.
 HANDLING/STORAGE PRECAUTIONS: Avoid getting in eyes or on skin. Wash thoroughly after handling. Store in a dry place away from excessive heat. Reseal containers immediately after use. Store away from food and beverages.

VIII. EXPOSURE CONTROL/PERSONAL PROTECTION

EYE PROTECTION: Safety glasses or goggles are recommended.
 SKIN PROTECTION: Rubber gloves and other protective clothing as appropriate to prevent skin contact.
 RESPIRATOR: None.
 ADDITIONAL PROTECTIVE MEASURES: Emergency showers and eye wash stations should be available. Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees on the safe use and handling of the product.

IX. PHYSICAL DATA

SOLUBILITY IN WATER: Miscible
 ODOR: Weak Aromatic
 FORM: Liquid
 COLOR: Light Tan
 pH: 7.5-8.5

X. STABILITY AND REACTIVITY

STABILITY: This is a stable material.
 HAZARDOUS POLYMERIZATION: Will not occur.
 INCOMPATIBILITIES: None known.
 INSTABILITY CONDITIONS: Stable at normal temperatures and storage conditions.
 DECOMPOSITION TEMPERATURE: Greater than 518 F (270 C).
 DECOMPOSITION PRODUCTS: Thermal decomposition may product potentially toxic and/or hazardous gases.

XI. TOXICOLOGICAL INFORMATION

ANIMAL DATA - Active Ingredient shows low toxicity by all routes of exposure.

ACUTE TOXICITY

ORAL: Rat LD₅₀ - >5,000 mg/kg; FIFRA Category IV
 DERMAL: Rat LD₅₀ - >5,000 mg/kg; FIFRA Category IV
 INHALATION: Rat LC₅₀ - >2.04mg/l; FIFRA Category IV
 EYE IRRITATION: Rabbit; mild irritation; all animals free of irritation in 72 hours; FIFRA Category III
 SKIN IRRITATION: Rabbit; slight irritation; all animals free of irritation in 24 hours; FIFRA Category III

No skin allergy was observed in guinea pigs following repeated skin exposure.

XII. ECOLOGICAL INFORMATION

AQUATIC TOXICITY LC50: 5,300 mg/l (pimephales promelae)

XIII. DISPOSAL CONSIDERATIONS

Treatment, storage, transportation and disposal must be in accordance with applicable Federal, State/Provincial and Local Regulations.

CONTAINER DISPOSAL: Triple rinse (or equivalent) the container. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

XIV. TRANSPORTATION INFORMATION

D.O.T. SHIPPING NAME: None
 D.O.T. HAZARD CLASS: Non-regulated
 PRODUCT RQ (lbs.): None
 D.O.T LABEL: Non-regulated
 D.O.T. PLACARD: Non-regulated
 PRODUCT LABEL: AVIPEL

XV. REGULATORY INFORMATION

OSHA STATUS: This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.
 TSCA STATUS: On TSCA Inventory
 CERCLA REPORTABLE QUANTITY: None

SARA TITLE III:
 SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES: None

SECTION 311/312 HAZARDOUS CATEGORIES: Non-hazardous under Section 311/312

SECTION 313 TOXIC CHEMICALS: None

RCRA STATUS: If discarded in its purchased form, this product would not be a hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. (40 CFR 261.20-24)

XVI. OTHER INFORMATION

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on regulatory requirements you should contact the appropriate agency in your state.

NEW JERSEY: The active ingredient is contained on the New Jersey Hazardous Substance List, NJ1

PENNSYLVANIA: The active ingredient is considered Pennsylvania Non-hazardous, PA3

CALIFORNIA PROPOSITION 65: To the best of our knowledge, this product contains no levels of listed substances, which the state of California has found to cause cancer, birth defects or other reproductive effects.

MASSACHUSETTS SUBSTANCE LIST (MSL): Hazardous substances and extraordinary hazardous substances on the MSL must be identified when present in products. To the best of our knowledge, this product contains no substances at a level which could require reporting under the statute.

NFPA 704M RATINGS:	Health 1	Flammability 1	Reactivity 0	
	0 = Insignificant	1 = Slight	2 = Moderate	3 = High
			4 = Extreme	
HMIS RATINGS:	Health 1	Flammability 1	Reactivity 0	Other B
	0 = Minimal	1 = Slight	2 = Moderate	3 = Serious
			4 = Severe	B = Safety Glasses, gloves

XVII. APPROVALS

PREPARED BY: K. E. Ballinger
 APPROVAL DATE: 11/13/08
 SUPERSEDES DATE: 05/03/07
 MSDS NUMBER: 062488

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551 Mews Drive, Suite J
New Castle, DE 19720
302-504-7420
Fax: 302-655-3546
www.ArkionLS.com

January 3, 2011

Mr. Richard Kersbergen
Professor Sustainable Dairy and Forage Systems
University of Maine Extension
992 Waterville Road
Waldo, ME 04915

Subject: 2011 Section 18 use of Avipel (9, 10 anthraquinone) to control Grackles and Black Birds depredation of corn seed.

Dear Richard Kersbergen:

Arkion Life Science filed a Section 3 label for use of Avipel on corn seed in December with EPA which should make the Section 18 application process easier for 2011.

Our company supports the efforts for the Section 18 in Maine. We are standing by for your decision to (issue) (renew) the Section 18 and hope to be able to mobilize manufacturing and distribution resources in time to meet the demand for 2011.

Regards,

A handwritten signature in cursive script that reads "Doug Lawrence".

Doug Lawrence
Product Manager
AQ - Agriculture Products
515/231-3944

cc: Kenneth E. Ballinger, Jr.
Vice President
Arkion Life Sciences LLC

Providing Tomorrow's Innovative Solution's Today®

AgMatters LLC
Lauchlin W. Titus, CPAg, CCA
1063 Main Street
Vassalboro, ME 04989
Office 207 873-2108 Cell 207 314-2655
ltitus1@myfairpoint.net

February 8, 2011

Mary E. Tomlinson
Pesticide Registrar/Water Quality Specialist
Maine Board of Pesticides Control
28 State House Station
Augusta, ME 04333

RE: Avipel Section 18 Registration Request

I am writing in support of the Section 18 registration request for the product Avipel for use on corn seed to reduce bird damage to planted corn crops.

As a Certified Professional Agronomist providing private crop consulting services to Maine farmers I have diagnosed bird damage on multiple fields, multiple farms, every single year. Sometimes the damage is extensive and requires replanting the corn crop or an alternative emergency forage crop. This late planting of course results in additional expense and a subsequent reduction in yield due to later planting. Fields that do not reach a critical threshold for replanting still suffer significant loss of production due to reduced plant population in the field. Weed control is reduced in fields that do not reach full canopy closure as a result of the reduced population as well. This results in the use of additional herbicide products or more tillage in the production year as well as more weed pressure in future years from weeds that go to seed.

The extent of damage varies from year to year in direct relation to planting dates and growing conditions that are all weather related. On average, I estimate that a few hundred acres of corn, both field and sweet, are replanted each year due to bird pulling of the planted seed. Several thousand acres have reduced yields as described above. This is a fairly significant portion of the approximately thirty thousand acres of corn planted in Maine each year (28,703 acres per NASS 2007 Census of Agriculture).

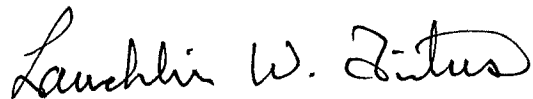
There have been no products available and labeled for use in Maine for several years (over ten?) to deter birds from eating planted corn seed. The problem is so severe on some fields on some farms that the growers have been willing to try various options presented to them via word of mouth. Legal options tried with varying degrees of success have been to use a "pop-up" application of liquid fertilizer over the seed in the furrow at planting time and/or the high rate of seed treatment (treated field corn seed can be purchased with two treatment options--low rate and high rate). These options are fairly expensive and not consistent in the degree to which they prevent birds from pulling corn seed.

I have been in a sweet corn field that had: scarecrows, scare eyes, noisemakers, reflective tape, fake owls---all of the above in the same field---and crows pulling corn in the midst of all of this. This field of sweet corn was planted three times. The grower covered the field with a spun fiber row cover the last time he planted to give the corn a chance to get out of the ground. That is a HUGE expense--hundreds of dollars per acre.

Not all Maine corn fields will be treated. Each farmer knows well the fields that are subject year after year to bird pulling. This is partly related to soil type, exposure, planting date, and distance from roads and structures. Please do not limit or restrict farmers ability to use the product where it needs to be used.

I have been told by colleagues who work in Vermont that the use of Avipel in 2010 in that state was very successful. I look forward to being able to recommend this product to Maine farmers for 2011 and beyond.

Sincerely yours,

A handwritten signature in black ink that reads "Lauchlin W. Titus". The signature is written in a cursive, flowing style with a large initial 'L' and a prominent flourish at the end.

Lauchlin W. Titus



Putting Knowledge to Work with the People of Maine

<http://umext.maine.edu>

Pest Management Office
491 College Avenue
Orono, ME 04473-1295
1-800-287-0279 (within Maine)
207-581-3880
207-581-3881 (fax)

Feb 4, 2011

To: Mary Tomlinson/ Maine Board of Pesticides Control

From: Dr. James Dill, University of Maine Pest Management Specialist

Re: Section 18 Request Avipel

I am writing to support the Section 18 application for the use of Avipel (Anthraquinone) for field and sweet corn in 2011.

Both Maine Sweet corn growers and silage corn growers face predation bird problems every year. Many locations see damage ranging from slight to almost 50-60 percent of the stand population. Many techniques, such as planting deeper have been suggested with little success, especially in areas that seem to be more prone to problems. We often suffer severe stand loss at our University research facility (Rogers Farm) in Orono. What complicates the situation is our short growing season and the inability for corn growers to re-plant without suffering yield and crop losses that can be quite significant.

I have heard from Vermont growers that Avipel was very successful in repelling bird predation last year. Data from other states and use of the active ingredient for other uses (turf) has shown very good efficacy.

Please let me know if you have any questions or concerns that I might be able to address.

Sincerely,

A handwritten signature in black ink that reads 'James F. Dill'. The signature is written in a cursive style with a long, sweeping underline that extends to the left.

James F. Dill, PhD
Pest Management Specialist

A Member of the University of Maine System

The Land Grant University of the State of Maine and the U.S. Department of Agriculture cooperating
Cooperative Extension provides equal opportunities in programs and employment



Putting Knowledge to Work with the People of Maine

February 4, 2011

Henry Jennings
Director
Maine Board of Pesticides Control
28 State House Station
Augusta, ME 04333-0028

Highmoor Farm
P.O. Box 179
Monmouth, ME 04259-0179
Tel. (207) 933-2100
Fax (207) 933-4647
dhandley@umext.maine.edu

Dear Henry:

I would like to express my support for the application of a Section 18 Emergency Exemption for the use of Anthraquinone (Avipel) in Maine as a seed treatment on corn seed to prevent blackbirds and crows from eating planted corn seed. I have been working with Maine farmers since 1983, coordinating a statewide integrated pest management program for sweet corn and testing new varieties and pest management techniques. Blackbirds and crows have always been a significant problem for sweet corn growers, as they pull up seeds and seedlings shortly after planting, often substantially reducing the plant stand and consequently the yield of the planting. Sweet corn is one of the most important fresh market vegetable crops grown in Maine. It is in very high demand during the summer months, and leads the state in acreage planted for any retail vegetable crop. However, because production costs can be high, profit margins for this crop are usually tight and losses due to bird predation often have significant economic impact. In recent years this problem has become more significant statewide. The loss of bird repellent seed treatment products over the years, in addition to changes in other pesticide uses (insecticides and fungicides) have left growers with no effective, legal options to deter birds from planted corn seed with the exception of visual and noise deterrents, which have been largely ineffective. Having an effective chemical seed treatment deterrent will have a significant beneficial impact on Maine sweet corn production and thus improve farm profitability, while imposing negligible environmental or human risk. I strongly support this application and encourage the Board of Pesticides Control to support the registration of this product.

Please feel free to contact me with any questions.

Sincerely,

David T. Handley, Ph. D.
Vegetable & Small Fruit Specialist
Cooperating Professor of Horticulture

www.umext.maine.edu

The University of Maine and the U.S. Department of Agriculture cooperating.
Cooperative Extension provides equal opportunities in programs and employment.

A Member of the University of Maine System

Tomlinson, Mary E

From: svg1@roadrunner.com
Sent: Monday, February 14, 2011 1:29 PM
To: Tomlinson, Mary E; Jim
Cc: Jim; Nate; Skin
Subject: Avipel

Mary:

My name is Spencer Greatorex and I work for North East Ag Sales Inc. I am a CCA working with dairy farmers in Maine. One of the biggest issues when raising corn silage for feed is crow or bird damage to corn fields. Over the past few years I have seen many acres destroyed by birds in the form of pulling the corn plants after they germinate and start to grow. It is very frustrating to go through the preparation and planting the field to only come back a week or two later and see half or more of the corn pulled or missing. It costs a lot of money and time to re plant and the re plant will be late maturing. This product AVIPEL works and prevents the bird damage . It was used in Vermont last year and did an excellent job preventing bird damage. I feel we need this product in the state of Maine. I would hope the board will approve a section 18 to allow us to use this product in the state of Maine this coming planting season. Thanks for your consideration.

Spencer Greatorex
341-1375



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 » Anthraquinone (122701) Fact Sheet

Anthraquinone (122701) Fact Sheet

Issued: 12/98

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[Restricted & Canceled Uses](#)

[Pesticide Tolerances](#)

[Registration Information Sources](#)

I. Description of the Active Pesticide

Generic Names of the Active Ingredient: 9,10-anthraquinone

OPP Chemical Code: 22701

Year of Initial Registration: 1998

Pesticide Type: Repellent

Trade Name of End-Use Product: Flight ControlI

U.S. Registrant:

Environmental Biocontrol, Intl
 3521 Silverside Rd., Suite 1-L.
 Wilmington, DE 19810

II. Use Sites, Target Pests, and Application Methods

- **Target Pests:** Geese
- **Use Sites:** Terrestrial areas at or near airports, commercial sites, industrial sites, municipal sites or in developed urban areas, golf courses, ornamental nurseries and conifer nurseries, landfills and dumpsites, building roofs, window sills and ledges.
- **Application Timing:** Applications should be made when geese have been determined to be a nuisance. Repeat applications at a weekly intervals.

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III. Science Findings

A. Human Health Effects

The information submitted in support of the application for registration of anthraquinone adequately satisfies the requirements set forth in 40 CFR 158.690 (c) for biochemical pesticides for nonfood outdoor uses. The overall toxicological risk from human exposure to anthraquinone is considered negligible.

1. Toxicology Assessment

Adequate mammalian toxicology data are available and support registration of the active ingredient 9, 10-anthraquinone.

a. Acute Toxicity

The registrant submitted acceptable acute toxicity studies for both the Technical Grade Active Ingredient (TGAI) and the end-use product. For the TGAI: (i) acute oral LD₅₀ in rats was >5000 mg/kg (Tox category IV); (ii) acute dermal LD₅₀ in rabbits was >5000 mg/kg (Tox category IV) and (iii) acute inhalation LC₅₀ in rats was > 2.11 mg/L (Tox category IV). For the end-use product: (i) acute oral LD₅₀ in rats was >5000 mg/kg (Tox category IV); (ii) acute dermal LD₅₀ in rats was >5000 mg/kg (Tox category IV); (iii) acute inhalation LC₅₀ in rats was > 2.04 mg/L (Tox category IV); (iv) the EP caused mild ocular irritation symptoms in rabbits which cleared by 72 hours post-instillation (Tox category III); (v) the EP caused slight dermal irritation symptoms in rabbits which cleared by 24 hours postdosing (Tox category III); and (vi) the EP was shown not to be a contact sensitizer in guinea pigs using the Buehler Method.

b. Mutagenicity and Developmental Toxicity

The registrant submitted acceptable mammalian mutagenicity studies for the TGAI. Based on the data obtained from the *Salmonella typhimurium*/*Escherichia coli* microsome reverse mutation assay, anthraquinone technical did not induce positive increases in the number of revertants when tester strain cell cultures were dosed with the a.i. at 15.7 to 500 Fg/culture plate. Based on the data obtained from the mouse lymphoma forward mutation assay, anthraquinone technical did not induce a significant increase in mutant cells relative to controls; no dose-response effects nor cell toxicity effects were observed. Based on the data obtained from the *in vivo* mouse microsomal assay, anthraquinone technical (orally fed to mice at 1250, 2500, 5000 mg/kg) did not induce increases in micronucleated PCEs (polychromatic erythrocytes) relative to vehicle controls; no bone marrow toxicity [measured as a decrease in PCE:NCE (normochromatic erythrocytes) ratio] was observed for any dose of test substance. Based on the data obtained from the Chinese hamster ovary (CHO) chromosomal aberration assay, anthraquinone technical did not induce significant increases in chromosomal aberrations, polyploidy, and endoreduplication. Additionally, there were no visual signs of cell toxicity and no reduction in mitotic indices relative to controls. The mutagenicity studies described above demonstrate that anthraquinone was not a mutagenic agent.

c. Subchronic Toxicity

A 90 - day feeding study was not required because of the nonfood use of anthraquinone. Moreover, the 90 - day dermal and inhalation toxicity studies are not required because the proposed use pattern does not result in prolonged exposure at concentrations that are likely to be toxic. The immunotoxicity study (cellular immune response study) was waived based on the minimal potential for exposure and the low toxicity of anthraquinone shown in the studies submitted.

d. Chronic Exposure and Oncogenicity Assessment

Chronic exposure studies are conditionally required to support nonfood uses only if the potential for adverse chronic effects are indicated based on 1) the subchronic effect levels established in Tier I subchronic oral, inhalation, or dermal studies, 2) the pesticide use pattern, or 3) the

frequency and the level of repeated human exposure that is expected. Oncogenicity studies are required to support non-food uses only if the active ingredient or any of its metabolites, degradation products, or impurities produce in Tier I studies morphologic effects in any organ that potentially could lead to neoplastic changes. The triggers for chronic exposure and oncogenicity studies were not met.

e. **Effects on the Endocrine Systems**

The agency is not requiring information on the endocrine effects of this compound at this time. Congress has allowed 3 years after August 3, 1996, for the Agency to implement a screening program with respect to endocrine effects. However, BPPD has considered, among other relevant factors, available information concerning whether this biochemical compound may have an effect in humans similar to an effect produced by a naturally occurring estrogen or other endocrine effects. There is no known evidence so far that active ingredient act as an endocrine disruption in humans. No adverse effects to the endocrine system is known or expected.

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2. **Dose Response Assessment**

No toxicological endpoints are identified.

3. **Dietary Exposure and Risk Characterization**

Dietary exposure is unlikely to occur because of the nonfood use of anthraquinone. In the absence of any toxicological endpoints, risk from the consumption of residues is not expected for the general population including infants and children.

4. **Occupational, Residential, School and Day Care Exposure and Risk Characterization**

Humans exposure to anthraquinone is expected to be minimal in these area.

a. **Occupational Exposure**

Based on its low toxicity and use practice (repellent of a vertebrate pest), anthraquinone is not subject to the Worker Protection Standards (WPS). Moreover, the possibility for dermal, eye and inhalation exposure, is mitigated as long as the product is used according to label directions which recommends allowing the material to dry before allowing human activity in the treated areas.

b. **Residential, School and Day Care Exposure and Risk Characterization**

No indoor residential, school, or day care uses currently appear on proposed labels.

5. **Drinking Water Exposure**

Exposure to anthraquinone in drinking water is not expected.

6. **Acute and Chronic Dietary Risks for Sensitive Subpopulations Particularly Infants and Children**

There are no food uses associated with the proposed use of the anthraquinone. Therefore, the acute dietary risks should be negligible based on the lack of exposure.

7. **Aggregate Exposure from Multiple Routes Including Dermal, Oral, and**

Inhalation

Aggregate exposure would primarily occur in the mixer/loader/applicator subpopulations via dermal and inhalation routes. Risks associated with dermal and inhalation aggregate exposure are measured via the acute toxicity studies submitted to support registration. Because the inhalation toxicity studies for anthraquinone showed no toxicity (Toxicity Category IV), the risks anticipated for this route of exposure are considered minimal. Results of the acute dermal study indicated low toxicity (Toxicity Category IV), and no significant dermal irritation (Toxicity Category IV). Based on these results, the anticipated risks from dermal exposure are also considered minimal. Therefore, the risks from aggregate exposure via dermal and inhalation exposure are a compilation of two low risk exposure scenarios and are considered negligible.

8. Cumulative Effects

Anthraquinone is not toxic and therefore there would be no expected cumulative effects from common mechanisms of toxicity.

9. Risk Characterization

The Agency has considered anthraquinone in light of the relevant safety factors in FQPA and FIFRA. A determination has been made that no unreasonable adverse effects to the U. S. population in general, and to infants and children in particular, will result from the use of anthraquinone when label instructions are followed.

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B. Environmental Assessment

1. Ecological Effects Hazard Assessment

The registrant submitted acceptable ecotoxicity/non-target organism studies. Based on the data, the LD₅₀ is >3000 mg a.i./kg body weight for Bobwhite quail orally dosed with anthraquinone technical (99.2%). Based on the data for a 24, 48, 72, and 96-hour study, the anthraquinone LC₅₀ is >190 Fg/L for bluegill sunfish; the no observable effects concentration (NOEC) is >190 Fg/L. The 24, 48, 72, and 96-hour anthraquinone rainbow trout LC₅₀ is >150 Fg/L; the no observable effects concentration (NOEC) is >150 Fg/L. Based on the data, the 48 hour daphnia LC₅₀ is >240 Fg/L and the NOEC is >240 Fg/L; all daphnids survived the study period and no sublethal effects were observed. The studies described above indicate that the TGAI is slightly toxic to Bobwhite quail, non-toxic to bluegill sunfish and rainbow trout, and non-toxic to freshwater daphnids.

2. Environmental Fate and Ground Water Data

The need for environmental fate and groundwater data (Tier II, (40 CFR Section 158.690(d)(2)(vii through xv)) was not triggered because of practically non-toxic results indicated in Tier I studies. Risk to nontarget species is minimal due to the lack of toxicity, use pattern, and application methods.

3. Ecological Exposure and Risk Characterization

A potential for exposure exists to nontarget wildlife with terrestrial spray applications. However, test results indicate that the compound is practically nontoxic to freshwater fish, and, at most, slightly toxic to aquatic invertebrates and to Bobwhite quail. EPA also believes that low toxicity, and mitigating label language present minimal to nonexistent risk to wildlife.

C. Efficary Data

The use of the product in airports is intended to disperse birds that may pose threats to airplanes. Efficacy data were submitted to support claims of anthraquinone's ability to repel blackbirds, geese, cowbirds, robins, starlings, pigeons, horned lark and gulls. However, the review of the data indicated anthraquinone's repellency for **geese only**. Effects on the other bird species are not supported by the studies submitted. Because anthraquinone is not persistent in the environment (as demonstrated by the data), regular applications are required to keep the geese away.

IV. Summary of Data Gaps

There are no data gaps for the use of Anthraquinone.

V. Additional Contact Information

[Ombudsman, Biopesticides and Pollution Prevention Division](#) (7511P)
Office of Pesticide Programs
Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460

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Crop Damage Caused by Birds: 2008-2009 Report

Bird depredation of planted cereal grain is increasing in the US. Pesticides with avicidal properties have been reduced. This has contributed to three states with different bird species experiencing economic loss greater than 20% in planted corn. On a per acre basis, the loss is between \$60 and \$80, depending on the state. Avipel[®] is showing effective protection without toxicity to birds. Field experience with Avipel[®] for 2008 and 2009 is reviewed with mechanism of action and economics for the grower.

Avian Depredation to Planted Cereal Crops

Bird damage to planted corn, sunflower, canola and rice seed is growing. National statistics on the damage is not tracked by NASS (National Agriculture Statistical Service) or other government agencies, because birds have not been classified as an agricultural pest. Certain species are used, however, as monitors for pesticide safety by regulatory bodies. As a result of the extensive toxicity testing done on birds, several well known pesticides used to control insects have been removed from use because of avian toxicity (Measurol, Furadan[®], Lindane).

Several states have monitored significant changes in bird damage. Wisconsin observed a direct correlation between increased corn field damage from cranes and cessation of Lindane use as an insecticide treatment. Crane populations continue to grow as a result of aggressive restoration of breeding flocks and habitat. Within one mile of a Wisconsin wetland where cranes feed in newly planted corn fields, 20% or more of the crop is being destroyed. Of the 3.5 million acres of corn planted in Wisconsin, 2.7 million acres are within the potential feeding range of cranes.



Juvenile and sub-adult cranes in a marauding flock feed heavily in early morning and early evening.

South Dakota is dealing with a pheasant population that continues to grow with successful habitat restoration. The cropland reserve program (CRP) has set aside significant land areas adjacent to corn fields. Cover and nesting sites have been provided in the process and with the loss of products containing Lindane, Furadan[®] and Measurool, crop loss has increased. Early spring does not offer birds much dietary diversity, and the liquid starch found in corn seed is essential to birds' reproductive health. In 2008, around 20% of the corn fields in South Dakota had noticeable bird damage that could vary from 5% stand loss to over 50%. Replanting in the Dakotas is a risky venture due to the short season. The economic impact of reduced stand is compounded by the necessity of additional weed control as well as yield loss. Using Avipel[®] is an effective way to keep planted corn seed off the pheasant's menu.

Mississippi has increased corn acreage substantially in the last two years at the expense of cotton. With over 750,000 acres in corn, migrating blackbirds, grackles, crows and cowbirds have found corn seed to be a very attractive source of starch for the energy needed during the migration north. The narrow planting window in the delta region happens to coincide perfectly with spring migration, and losses to birds have now been estimated by the state to be high. Twenty-five percent of the planted corn is experiencing from 10-15% stand loss and 5% of the corn is experiencing greater than 25% stand loss. Tillage practices plus narrow planting time work against any replanting in Mississippi, so crop yield is directly affected. As in South Dakota, increased weed control adds to the input cost of fields experiencing bird depredation.

Crop Loss Summaries for Representative States 2008-2009

Acres Damaged by Birds and Cost to Replant

State	Bird Species	Affected Acres, %	Stand Loss, %	Replant Cost per Acre
Mississippi	Blackbird	25%	10-15%	\$100-\$120
	Grackle			
	Cowbird	5%	>25%	
	Starling Crow			
South Dakota	Pheasant	15-20%	8-10%	\$80-\$100
Wisconsin	Crane	74%	5-20%	\$80-\$100

Revenue and Stand Loss Caused by Birds Excluding Cost to Replant

State	% Acres Affected by Birds	% Stand Loss	2009 Yield per Acre	Value per Acre	Bird Cost per Acre
Mississippi	30%	14.6% average	150 bu.	\$555	\$81 Average
South Dakota	15-20%	8-10%	153 bu.	\$566	\$51
Wisconsin	74%	5-20%	153 bu.	\$566	\$71

Typical Examples of Bird Damage in the Field

In 2010, more data will be gathered on bird damage to rice, sunflower, canola, sorghum, and other cereal grains in addition to corn. Differentiating damage caused by birds from that of rodents can be difficult. The following photos can be used as representative samples of damage caused by different bird species.

Crane Damage, Wisconsin



This is a photo of typical crane damage. Notice how only one plant was missed in a row. Cranes seem to learn the planting distance of seed and often do not wait for the seed to sprout. With a large powerful bill, cranes have no problem penetrating any soil type to dislodge the seed, squeeze it, and swallow the soft endosperm. Discarded seed without the endosperm can often be found in the vicinity of the damage.

Pheasant Damage, South Dakota



This picture shows damage commonly done by pheasants. Often a large hole is present where the pheasant has first dug for the seed with its claws prior to consuming the endosperm. Notice the damage continues down a row for some distance. Much of the pheasant damage occurs at the borders with CRP land, fence row and areas around pot holes. In cases where Avipel[®] was used only on the field's borders, pheasants went deeper into the field in search of untreated seed.

Blackbird Damage, Mississippi



As shown here, Blackbird damage often shows a lot of probing and breaking of the soil surface on either side of where the seed was planted. Blackbirds in great numbers will concentrate on patches of unprotected field. The dry Avipel[®] hopper box formulation has worked well to protect these fields.

Avipel's Mode of Action and Cost

Seed treated with Avipel[®] causes a gut reaction in birds. Birds learn quickly to avoid treated seed by observing other birds in a process called learned avoidance as studied in the early 1980's by Mason and Reidinger. Avipel[®] has been successfully used to protect seed in over a million acres of treatment in 8 states since 2006. The label is currently under emergency exemption Section 18 use; the full Section 3 label will be ready for submission to the EPA in early 2010.



The dotted line indicates treated and untreated sections of this test field; but, even without the line, it's easy to see where cranes have been feeding. The protected half of the field was untouched.

Retail per acre cost for Avipel® ranges from \$3.79 to \$5.37, depending on corn seeding rate and seed count per bag.

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<http://www.arkionls.com/bird-damage-2008-09.htm>



Avipel® Corn Seed Treatment — A Bird Repellent Product Bulletin & Application Guide

AVIPEL® effectively protects newly planted seed and seedlings from attack from a variety of birds. This will insure a more uniform stand and, therefore, the potential for increased yields.

AVIPEL® is available in two formulations: a Liquid and a Hopper Box (dry) formulation. With either formulation you select, when applied properly, Avipel forms a bird repellent coating on corn seed. Therefore, thorough, uniform and consistent coverage is essential to ensure acceptable product performance. Both Avipel formulations protect newly planted seed and seedlings from attack from a variety of bird species. However, under certain circumstances, such as when fields located around and near sand hill crane wildlife refuges are planted with corn, Avipel Liquid has proven to be more effective than the Hopper Box formulation because a more uniform coverage can be obtained.

AVIPEL® Liquid Corn Seed Treatment — Application*

AVIPEL® is a cost effective treatment that reduces the risk of costly replanting due to bird damage. The liquid formulation permits treating seed ahead of the busy planting season.

AVIPEL® may be applied as a water-based slurry either alone, with other compatible seed treatment materials, or sequentially with other registered crop protection products. Apply water-based slurry through a standard slurry, mist-type or batch treater. Prior to mixing, potential tank mix partners, which may include pesticides, colorants, dyes and polymers, should be tested for physical compatibility with Avipel.

Application rate is 13.5 fluid ounces of Avipel per 100 pounds of seed. One gallon will treat approximately 980 pounds of seed.

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Always follow label directions.

*Contact your local Ag retailer, seed company or seed company representative for the location of qualified local seed treaters in your area.

AVIPEL® Hopper Box Corn Seed Treatment — Application

Thorough, uniform and consistent coverage is essential for full protection from bird depredation. Use only at the recommended labeled rate. Lower amounts will not give desired control.

Use at a rate of one pouch (3.5 ounces) per 42 pounds of seed as a dry mixture in the planter box as a seed treatment prior to planting.

For best results, fill planter box only half full of seed, add half the required amount of Avipel and mix thoroughly with a stick or paddle. Add the remainder of the seed and Avipel and mix again so that all seeds are covered. **DO NOT MIX WITH BARE HANDS.**

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Always follow label directions.

For technical assistance:

Arkion Life Sciences LLC, Customer Service: (800) 468-6324 or go to www.ArkionLS.com

Providing Tomorrow's Innovative Solutions Today®

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