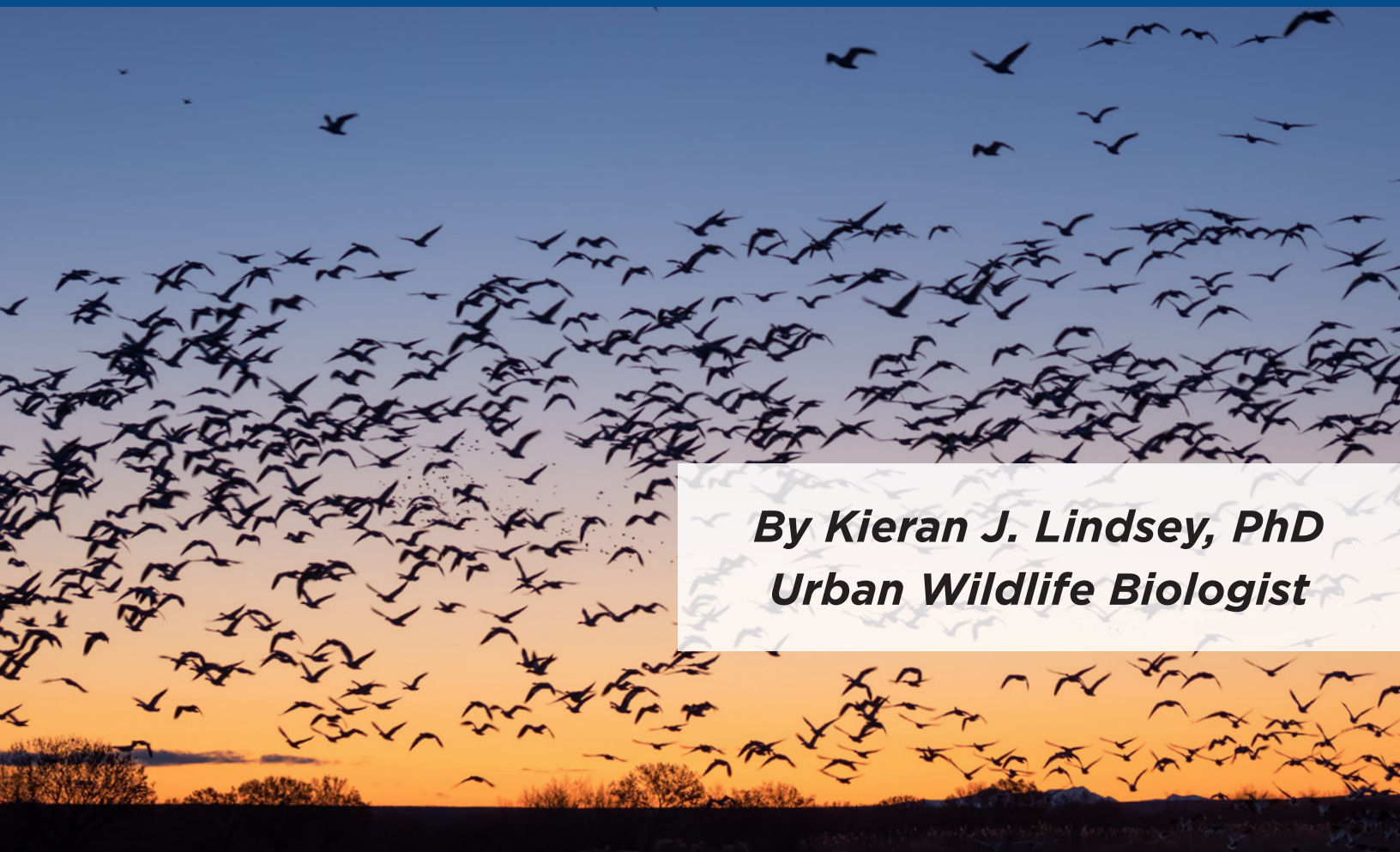
The Safety, Efficacy And Environmental Considerations For Implementing Methyl Anthranilate (MA) As A Bird Repellent.



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Executive Summary

Businesses in an array of industries need an affordable in-flight bird repellent that doesn't require ingestion, is resistant to habituation, and removes the incentive for birds to visit areas of concern. Automated delivery of vaporized methyl anthranilate (methyl 2-aminobenzoate, aka MA) is a humane, effective solution that addresses all of these concerns and is also proven to be safe for humans, birds, and the environment.

Key findings of this report include:

Vaporized MA is a safe avian control option

- MA is a plant-based compound with a long history of use as a flavor additive for foods and beverages, and as an aromatic used extensively in perfumery. As such, the US Department of Agriculture (USDA) and the Food and Drug Administration (FDA) have approved MA as "generally recognized as safe" (GRAS).
- MA has been thoroughly studied, peer reviewed, and registered with the US Environmental Protection Agency (USEPA) for use as a bird repellent since 1985. USEPA has determined a "reasonable certainty that no harm will result to the general population" as a result of inhalation exposure to MA when used as a vaporized bird repellent.

- USEPA has also determined that MA will have "no effect" on currently listed threatened or endangered animal or plant species, or any designated critical habitat. The agency has no concerns for any non-target terrestrial organisms when label instructions are followed, and the Risk Quotient (RQ) is well below any Level of Concern (LOC) for non-target fish and aquatic invertebrates.

Vaporized MA is a humane avian control option

- When birds converge near airports, transit depots, hospitals, power utilities, factories, warehouses, food processing facilities, and restaurants, the well being of birds and people can be at risk.
- One of the first studies of vaporized MA was motivated by the search for a humane alternative to existing protocols (e.g., scare tactics and lethal methods) that would effectively repel birds in flight, protecting vulnerable avian populations from contact with hazardous waste.
- As a vapor, MA is a chemosensory avian irritant that causes a temporary, non-toxic physiological response. Numerous studies have confirmed that, even at low concentrations, MA vapor causes a quick in-flight avoidance response that improves with repeated exposure.
- Toxicity is more easily measured than suffering, and yet the public expects avian control solutions that are both effective and humane. Independent researchers developed a set of criteria for evaluating whether bird repellents are humane, and MA vapor has been found to meet this standard.

Vaporized MA is an effective avian control option

- In the mid-1980s, liquid MA was found to be an effective repellent for several bird species of interest in certain agricultural settings. However, liquid MA is prohibitively expensive when used on large treatment areas. Furthermore, there are many avian conflict situations that do not involve feeding activity, as well as circumstances where the use of liquids is contraindicated (e.g., near electrical utility substations).

- Automated delivery of vaporized MA is more broadly applicable, more effective, and less expensive than liquid MA, as well as easier to use for large treatment areas.
- Many studies have examined the use of MA vapor for avian control on various bird species. One representative example, Engeman et al. (2002), found MA vapor to be a highly effective and practical means of dispersing large numbers of birds from takeoff and approach lines at Homestead Air Reserve Station near Miami, Florida.

Introduction

Renowned biologist and naturalist E.O. Wilson[1] coined the term biophilia to describe the innate humane love of nature, and nowhere is the supporting evidence for this stronger than in backyards, parks, and arboreta. Over 86 million Americans self-identify as wildlife watchers, and the overwhelming majority (82%) enjoy watching birds close to home. Bird lovers invest more than just time and effort in their hobby; they also spend billions of dollars annually.[2] Yet, even avian enthusiasts recognize there are circumstances that call for humane management, such as: when proximity to wild birds creates potential for disease or parasite transmission to humans, their companion animals, and livestock; when wild birds cause damage to equipment, buildings, and food crops; or in locations that are hazardous for the birds themselves.[3] The latter circumstance is of particular importance given recent findings regarding dramatic declines in global bird populations.[4]

Standard bird control methods include exclusion (e.g., physical barriers, netting, screening), and scare tactics (e.g., flashing lights, flagging, pyrotechnics, bioacoustics, effigies). Some areas and situations are not well suited to either of these approaches, which may be expensive, time-consuming to install and maintain, or both. Birds often learn to adjust to and/or ignore many forms of scare tactics in a relatively short period of time, whereas human residents near the treatment areas tend to find techniques such as pyrotechnics and flashing lights increasingly annoying and unacceptable.[5,6]

The search for safe, effective chemical repellents led researchers back to the natural world. Plants have developed chemical defenses, protecting tasty leaves, roots, and fruits by exploiting animal sensory systems. For example, mammals (including humans) are acutely sensitive to capsaicin, the chemical that gives chilies their heat and pungency[5] that's used as an ingredient in self-defense pepper-sprays. Plant-based chemical repellents have been used in animal control applications for decades, usually to impart a flavor or odor animals find distasteful. Birds aren't sensitive to capsaicin but researchers have discovered an alternative.[5]

Methyl anthranilate (methyl 2-aminobenzoate, aka MA) is a naturally derived plant-based compound found in concord grapes, as well as many other fruits, flowers, and even tea leaves. Approved as "generally recognized as safe" (GRAS) by the US Department of Agriculture (USDA) and the Food and Drug Administration (FDA), MA is used as a common flavor additive in chewing gum, candy, soft drinks, and Kool-Aid,[7] while it's aromatic properties are employed extensively in modern perfumery.[8] So it may come as a surprise that this ingredient, found in so many of the foods, beverages, and personal care products people use without issue every day, is a potent bird repellent.[9,10,11]

The Limitations of Liquid Format Methyl Anthranilate

At lower concentrations (2,000 to 3,000 ppm), people enjoy the pleasantly sweet and fruity flavor and aroma of MA—that's why the compound is used in so many foods, beverages, and even perfumes. Birds, on the other hand, detest the flavor, even at much lower levels.[12,13] In the mid-1980s, this avian aversion to MA prompted researchers to investigate the promise of liquid anthranilate (dimethyl and methyl) as a feeding deterrent in agricultural applications. At relatively low concentrations, MA was found to significantly reduced consumption of livestock feed by several bird species of interest, such as starlings, grackles, pigeons, blackbirds, and cowbirds.[14,15,16]

Other studies include tests of liquid MA applied to grass as a foraging repellent for Canada geese (*Branta canadensis*),[17] to blueberry plants to discourage fruit-eating birds,[18] to sprouting rice as a feeding deterrent for blackbirds,[19] and to wood siding to prevent damage by woodpeckers.[20] Odor aversion plays a role in the efficacy of MA as an avian repellent, although perhaps to a lesser degree than taste[16] for certain species, such as starlings, odor doesn't appear to be a primary factor in avoidance response.[11]

Despite its effectiveness in certain agricultural settings, liquid MA has a number of limitations. Liquid MA is prohibitively expensive when used on large treatment areas. There are many avian conflict situations that do not involve feeding activity. Moreover, certain surfaces simply cannot get wet—for example, liquids, including MA, are prohibited near certain equipment found in electrical utility substations. Yet, when birds congregate, nest, and roost in and around airports and airplane hangars, transit depots, hospitals, power utilities, factories, warehouses, food processing facilities, and restaurants, the well being of birds and people can be threatened. As such, a viable alternative to spraying liquid MA is clearly needed.

Methyl Anthranilate Vapor Increase Avian Control Options

A critical need exists for a safe, humane, effective, and economical in-flight repellent that doesn't require ingestion, is resistant to habituation, and removes the incentive for birds to visit areas of concern.[5] Automated delivery of vaporized MA makes application over large areas easier, more effective, and less expensive than other approaches. Plus, as a vapor, MA is a chemosensory irritant that acts upon the trigeminal nerve in birds, causing a temporary, non-toxic physiological response. Birds immediately react to avoid MA vapor and do not habituate to the compound over time.

Since much of the early research focused on MA as an avian feeding deterrent in agricultural and horticultural settings, it's all the more interesting that an early study of vaporized MA[5] was motivated by the goal of finding a humane but effective repellent that would target birds in flight, protecting these vulnerable populations from contact with hazardous industrial waste sites. When the behavioral response of starlings was tested using a vapor of commercially available MA, researchers observed that, even at low concentrations, MA vapor met all of the criteria listed above, causing a temporary irritation, a quick in-flight avoidance response, and no habituation after repeated exposure.

Other research has confirmed that vaporized MA minimized habituation and increased efficacy.[21,22] A representative study, published by Engeman et al. (2002),[23] examined the ability of MA vapor to reduce bird-aircraft strikes at Homestead Air Reserve Station near Miami, Florida. Applied by fogger, MA vapor proved to be a highly effective and practical means of dispersing large numbers of migrating swallows (*Hirundo rustica, Tachycineta bicolor*) and killdeer (*Charadrius vociferus*) from the takeoff and approach lines, replacing traditional scare tactics and lethal methods that included shooting the birds.

A Non-Toxic Solution for Humans, Birds, and the Environment

Any discussion of wild bird control options should consider the potential for harm these methods pose to the birds themselves, other wildlife, and the habitat we all share. Exclusion methods, such as netting, wire spikes, and electric shock strips, aren't intended to be lethal but they can result in injuries or even kill birds. Auditory scare tactics, such as pyrotechnics, lasers, and bioacoustic sounds are designed to be non-lethal techniques but may inadvertently lead to bird deaths, and humans can find flashing lights and loud noises quite distressing as well. Lethal methods such as shooting can pose a threat to non-targets and even endangered species. Several toxic chemical repellents have been pulled from the market or allowed to drop off the U.S. Environmental Protection Agency (USEPA) registry due to unintended side effects.[24,25]

One benefit of using MA as an avian repellent is its long human safety record as a flavoring additive. This naturally occurring plant-based compound is present in many fruit-bearing plants, including grapes, oranges, and cherries, as well as cocoa, black tea, and even flowers, at higher levels than in MA vapor repellent formulations. MA was first registered with the USEPA for use as a bird repellent in 1985. The compound has been thoroughly tested and peer reviewed, and the EPA has determined a "reasonable certainty that no harm will result to the general population" as a result of inhalation exposure to MA when used as a vaporized bird repellent. MA is easily metabolized by the intestines and liver, it degrades rapidly into non-toxic components such as anthranilic acid, and is considered generally recognized as safe (GRAS) by the FDA.[26]

Numerous studies, referenced elsewhere in this paper, demonstrate that while MA does act as an avian irritant, the compound is non-toxic, non-lethal, and humane. Additionally, USEPA determined that MA will have "no effect" on currently listed threatened or endangered animal or plant species, or any designated critical habitat. USEPA has no concerns for any non-target organisms, including mammals, birds, terrestrial insects, and plants, when label instructions are followed, and the Risk Quotient (RQ) is well below any Level of Concern (LOC) for non-target fish and aquatic invertebrates.[27]

Toxicity can be measured more easily than suffering, and yet the public increasingly demands that bird management programs provide solutions that are both effective and humane.[28] Stevens and Clark[5] articulated a useful criteria for evaluating humane, effective bird repellents: compounds that alter behavior in response to transient exposure, but do not produce long lasting physiological effects. As a result of their work with starlings, these researchers determined that MA vapor met their humane criteria.

A Win-Win Solution for Protecting Birds and Humans

Birds perform important environmental functions while also adding color and music to our lives. Yet even bird enthusiasts understand the need for management under circumstances that pose a threat to the safety of people, birds, or both. That said, the public expects avian control programs to provide solutions that are safe and humane, and businesses expect viable, cost-effective treatment options that work. Automated delivery of vaporized methyl anthranilate offers an effective, affordable avian control solution that protects birds, is safe for humans, and doesn't harm the environment.

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About BirdBuffer

BirdBuffer is focused on solving the public health, safety and damage to critical facilities, caused by pest birds. Without it, our customers face economic loss, serious health & safety risks and facility damage. We help facility managers, health and safety professionals and maintenance teams, eliminate these issues. BirdBuffer's products include a pa tented technology which delivers tiny particles of MA to an area of up to one acre per machine, and provides the most efficient, safe and humane option for eliminating bird problems.

Please contact us for a free consultation about how BirdBuffer can solve your pest bird problem long-term.

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