

Mosquito Spraying Essential To Keep America Healthy

The introduction and spread of West Nile virus in the United States has reawakened an appreciation of mosquitoes as vectors of diseases. I use the term "reawakened" advisedly, for mosquito-borne diseases were once quite prevalent in the United States, and, indeed, played a major part in shaping our nation's destiny. Dengue fever, long a scourge in the tropics worldwide, was in fact first described by Dr. Benjamin Rush in Philadelphia in 1780. Yellow fever caused more than 100,000 deaths in 135 separate epidemics in the United States from 1793 until 1900. As late as 1934, there were 125,566 cases of malaria.

These diseases no longer claim victims in the United States as a matter of course, largely because of the exemplary efforts of organized mosquito control agencies, in conjunction with an enlightened and effective public health infrastructure.

As early as 1905, mosquito control pioneers recognized the value of a diversified approach, by integrating surveillance, source reduction, personal protection, and chemical and biological control. Early control methods consisted of ditching, draining, and/or filling marshes, applying oils to water to kill immature mosquitoes, and insecticide sprays against adults.

Soon, citizen groups began conducting referenda to establish special taxing districts to fund organized mosquito control activities. The first districts were established in New Jersey in 1912. California and Florida followed suit in 1915 and 1925, respectively. In the

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by Joseph M. Conlon

ensuing years, mosquito control personnel refined their methods through applied research, and assisted federal and state agencies in developing certification criteria to ensure conformance to stringent safety standards. The result: the most technically proficient, professional vector control agencies in the world.

Stringent Regulations

This success did not come about in a regulatory vacuum. Since its inception, the Environmental Protection Agency

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(EPA) has regulated mosquito control through enforcement of standards instituted by the Federal Insecticide, Fungicide, and Rodenticide Act. This legislation mandated documentation of extensive testing for public health insecticides, according to EPA guidelines, prior to their registration and use. These data requirements are among the most stringent in the federal government and are met through research by established scientists in federal, state, and private institutions.

This process costs a registrant several million dollars per product, but ensures that the public health insecticides

available for mosquito control do not represent health or environmental risks when used as directed. Indeed, the five or six adult mosquitocides currently available are the selected survivors of literally hundreds of products developed for these uses over the years. The dosages at which these products are legally dispensed are at least *100-fold less* than the point at which public health and environmental safety merit consideration.

In fact, literature posted on the websites of the EPA Office of Pesticide Programs, Centers for Disease Control and Prevention (CDC), American Association of Pesticide Safety Educators, and National Pesticide Telecommunications Network emphasizes that proper use of mosquitocides by established mosquito control agencies does not put the general public or the environment at unreasonable risk from runoff, leaching, or drift when used according to label specifications. (For the federal government's position on risks associated with mosquito control insecticides, visit the website <http://www.epa.gov/pesticides>.)

Even with these safeguards, organized mosquito control agencies often go to extraordinary lengths to accommodate individuals who, for varying reasons, prefer that their property not be sprayed with approved public health insecticides. When surveys indicate the need for adult sprays, they are approved, planned, and conducted with special regard to the concerns of chemically sensitive persons. Personal notification of chemically sensitive individuals of spray times, in addition to using Global Positioning Systems (GPS)/Global Information Systems (GIS) technology to reduce the likelihood of drift over unauthorized areas, are but a few of the means utilized to ensure mosquito control serves the entire public spectrum.

The integrated mosquito management methods currently employed by organized control districts and endorsed by the Centers for Disease Control and EPA are comprehensive and specifically

tailored to safely counter each stage of the mosquito life cycle. Larval control through water management and source reduction, where compatible with other land management uses, is a prudent pest management alternative—as is use of the EPA-approved larvicides currently available.

When source elimination or larval control measures are clearly inadequate, or in the case of imminent disease, the EPA and CDC have emphasized, in a published joint statement, the need for application of adult mosquitoicides by certified applicators trained in the special handling characteristics of these products. The extremely small droplet aerosols utilized in adult mosquito control are designed to have an impact primarily on adult mosquitoes that are on the wing at the time of the application. Degradation of these small droplets is rapid, leaving little or no residue in the target area at ground level. For these reasons, the use of very low application rates for these products, generally less than 4 grams active ingredient per acre, are possible.

Ensuring Safety

Since 1980, well over 2,000 peer-reviewed scientific studies in various national and international refereed journals have documented the safety and efficacy of these public health insecticides at label rates.

Despite intense pressures from environmentalists to eliminate the use of public health insecticides, the Centers for Disease Control and Prevention, the World Health Organization, and other public health organizations all agree that it is essential that these products remain available for disease prevention. These agencies also agree that editorial or irresponsible misrepresentation of the risks involved must not lead to the greater risk of not having these insecticides available when truly needed. Such insecticides must remain available for the control of vectors in the times of even greater public health emergency that are sure to come.

The complexities involved in effectively and safely controlling the few dozen harmful species among the 167 different mosquitoes found in the United States are often profoundly misunderstood and serve as fertile ground for the defiantly ignorant. A number of articles have recently been published through various media outlets that have taken the mosquito control profession to task for any number of real or imagined shortfalls regarding the use of public health insecticides.

I do not question the activists' commitment to a healthy environment for their families. But medical history has shown that the Nature that Mitchel Cohen quotes as saying, "O, get your filthy sprays off of me" is the same Nature whose malaria each year claims 1 of every 17 child deaths worldwide and has to date killed upwards of 150 people in the current U.S. West Nile virus outbreak. These deaths are documented, not surmised or extrapolated from suspect laboratory studies.

Our mission is to prevent or mitigate these diseases by whatever acceptable means we have available. Twenty years in the vector control profession have convinced me that killing adult mosquito populations should be an integral part of an effective, environmentally sensitive mosquito-borne disease control program—and both the U.S. Centers for Disease Control and Prevention and the World Health Organization agree.

Mosquitoes Vs. Human Health

I challenge dissenting activists to look at the website on encephalitis

(<http://communities.msn.com/EncephalitisGlobal>) and observe the very real tragedy of mosquito-borne encephalitis as related by survivors of these devastating diseases. Their pain is real—not "associated" or "extrapolated." To dismiss their distress as an acceptable price for the prohibition of legally registered pesticides is grossly irresponsible and inimical to humanity's most noble instincts.

There are certainly risks associated with operating spray equipment, be it through normal operations or the nefarious means of terrorists. However, these *hypothetical* risks are minuscule compared to the far more established risks such as mosquito-borne diseases. We cannot allow resources to be diverted to the hypothetical, while immediate hazards are left to take their human toll.

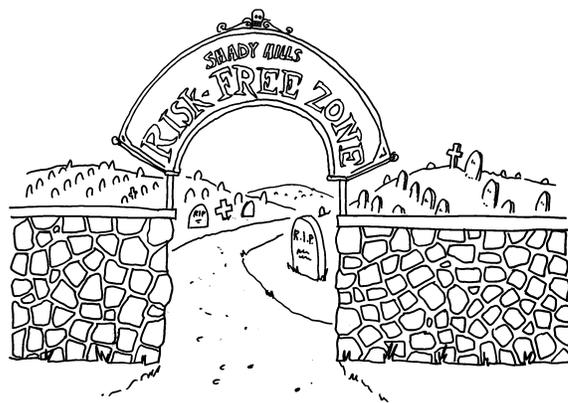
A particularly insidious ploy of the anti-pesticide lobby involves pressuring municipalities to spray only *after* human cases of disease have been identified. Although we should not conduct adult mosquitociding operations unless there is compelling reason to do so, the discovery of infected mosquito pools alone establishes an imminent danger of West Nile virus transmission to human beings, requiring corrective action. Furthermore, the 3 to 12 day incubation period in humans for West Nile virus indicates potential transmission occurring during this period, where mosquitoes are infective prior to appearance of human disease.

Allowing human disease transmission when we have the means to interrupt it is unacceptable to any entity charged with safeguarding the public's health.

Save the Mosquitoes?

A number of articles have quoted National Park Service employees as saying that mosquitoes serve a vital ecological function. This is not informed scientific opinion on the question. It is misleading to imply that mosquitoes occupy some irreplaceable, unassailable niche in the ecosystem. Although we should not grat-

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Viewpoint

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itously attempt to remove any species from its natural element, there is ample evidence that other species would fill the mosquito void.

Furthermore, mosquitoes most assuredly do *not* serve as important food sources for birds and bats—as even a cursory review of the peer-reviewed scientific literature on the subject readily shows. In fact, the U.S. Fish and Wildlife Service, realizing that current institutional policy required review, has hired an entomologist to produce a handbook on mosquito control in wildlife refuges in order to bring some expertise to bear on the process.

All pesticides, whether natural or synthetic can be dangerous if used improperly, but any assertion that they are, by nature, a threat to public health misrepresents the true risk. The vast bulk of chemical pesticides to which human beings are exposed are *naturally occurring* in the fruits and vegetables they eat, and for these and every other chemical some level is toxic.

The fact is, that there are more natural carcinogens by weight in a single cup of coffee than potentially carcinogenic synthetic pesticide residues in the average American diet in a year. This doesn't mean that coffee is dangerous, but rather that worst-case risk assessments do not represent the true risks involved. Indeed, Dr. Bruce Ames, developer of the most widely used carcinogenicity test available today, has estimated that Americans consume approximately 1.5 grams of *natural* pesticides per day—which is approximately 10,000 times more than they are exposed to by way of synthetic pesticides. [See Bruce Ames, "Environmental Pollution and the Causes of Human Cancer," *21st Century*, Sept.-Oct. 1989, p. 40.]

This is meant to place the exposure dynamic from the application of synthetic pesticides in its true perspective. The constellation of adverse effects reported from pesticides in activist documents represent exposures *several thousand orders of magnitude in excess* of those expected from even repeated applications at label rates. The *post hoc* fallacies that are often derived therewith from selective citations of scientific stud-

ies do nothing to further the health and general welfare of the public.

Pernicious 'Precaution'

A singularly pernicious argument is often made by denigrating comparative risk assessments in favor of the "Precautionary Principle." The requirement for proof of absolute absence of importune effects from pesticides over the long term represents an unreachable standard. One could easily make the same case with regard to antibiotics that have demonstrably saved several millions of lives at the cost of a few hundred fatal anaphylactic reactions.

A "Precautionary Principle" writ large would effectively preclude the development and/or use of all chemical substances and products, whether they are produced by industrial means or discovered in our rain forests. To bolster their argument, activists often aver that pesticides are "never" applied as planned. Mistakes are surely made, but all human endeavors would be eliminated if subject to this zero-defects criterion.

Mosquito control professionals take great pride in ensuring that pesticides, when needed, are applied using technology that ensures effective targetting, dosage, and droplet spectrum—applied by individuals trained and certified in their use. GPS/GIS-monitored spray routes and spray output, droplet analysis, equipment calibration, comprehensive equipment maintenance schedules, and continuing education requirements are integral facets of any effective mosquito abatement program and are strongly endorsed by all members of the American Mosquito Control Association (AMCA).

Ground spraying can be difficult. However, a great deal of research has been conducted upon the production of a specified spray droplet spectrum, meteorological conditions conducive to optimal control, efficacy of treatments under a variety of conditions, and the fate of released droplets. Operations are timed to activity periods of the target to ensure maximum contact with the target and minimal impact upon non-targets. Ultra low volume operations are not conducted when mosquito targets are resting or are otherwise unavailable.

Population dynamics of vector mosquito species are extraordinarily complex and are only now beginning to be under-

stood. In this light, estimations of control efficacy are inexact at best. Nonetheless, there is a large body of scientific literature demonstrating significantly reduced trap counts after adult mosquitocide applications. Given that the magnitude of questing mosquito populations constitutes a crucial variable in vector-borne disease transmission models, we should utilize all approved means to reduce these indices below the transmission threshold.

I agree with the Centers for Disease Control that applications of this type should not be the sole means of control in an urban setting. But that is not to argue that adult mosquitocides should not be used at all. Even a 30 percent kill rate would still have a significant impact on disease transmission.

More Defiant Ignorance

The assertion that spraying may increase mosquito populations because of reductions in natural predator populations strains credulity and displays a profound ignorance of natural controls on mosquito populations. Furthermore, EPA's pesticide registration process is specifically geared to ensure that non-target effects are documented and minimized within a health and environmental cost-benefit context. Mosquitocides are thus required to be formulated and applied in such a way to maximize contact with the target and minimize drift off-target.

I know of no mosquito abatement district that possesses the excess resources that would allow them to use expensive pesticides indiscriminately, particularly with their attendant potential liability issues. In my experience, mosquito control professionals welcome the help natural predators give them and, indeed, have developed entire control programs, where feasible, to utilize natural control measures. Unfortunately, the equilibrium attained through natural predator/prey relationships is generally skewed toward a preponderance of the latter—and this may account for prey (mosquito) population levels far in excess of disease transmission levels. The "silver bullet" sought through the use of natural predators in the control of pests has been elusive, with some rather spectacular failures tempering the goal of their use as exclusive controls.

West Nile virus has now spread to 42 states in addition to the District of Columbia and has accounted for almost

3,000 human cases and 150 fatalities. There is little doubt its emergence initially caught the public health community by surprise, underscoring the need for established mosquito control programs to meet unforeseen threats. Disease prevention through preparedness remains the mosquito control profession's primary focus, and is fully consistent with the very finest traditions of public health. Yet, the continued increase in worldwide tourism and trade virtually guarantees further challenges from exotic diseases requiring

ready control expertise to prevent their establishment and spread.

Should these emerging mosquito-borne diseases of man and animals settle into the American public health landscape, particularly as an unintended consequence of environmental policy initiatives, we will have only ourselves to blame, for we have the means to control these diseases within our grasp. We must remain prepared to accept and meet these challenges—our citizens and our nation's wildlife deserve no less.

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