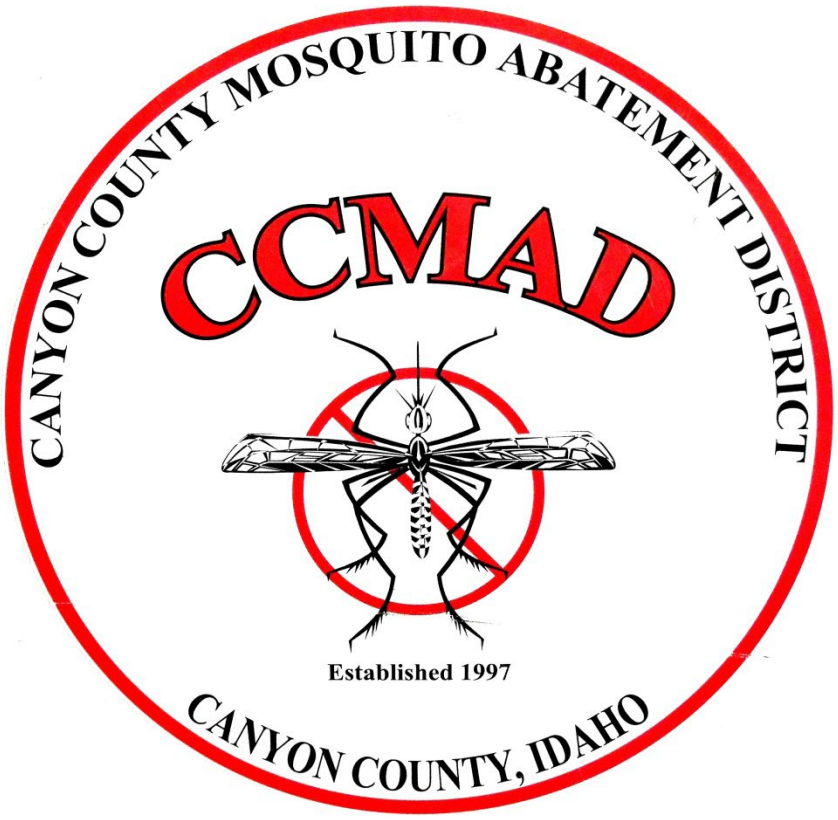


Pollinator Protection

Management Plan

Introduction

The Canyon County Mosquito Abatement District has mosquito control jurisdiction on 600 square miles of county property with over 260,000 in agriculture farm acres. About 84% of Canyon County land is allocated to some form of agricultural use. Canyon County, Idaho is one of the top five counties in honey production. Canyon County also ranks as one of the top counties in the nation in alfalfa seed production which is pollinated by leaf cutter bees.

Managed bees and wild pollinators are important to U.S. Agriculture. Many crops throughout the U.S. are dependent on insect pollinators such as Honey Bees, Leaf Cutter Bees, and native bee populations. Also, bee pollination accounts for 15-30 percent of the food we eat (USDA 2013). (North Dakota Pollinator Plan)

Canyon County Mosquito Abatement District recognizes the importance of bee pollination, the protection of this resource, and the role pollinators play in the agriculture economy of Canyon County.

This document addresses concerns Canyon County beekeepers have in regard to CCMAD, its mosquito control operations, and its impact on Honey Bee colonies. The geography of Canyon County, the presence of abundant irrigated agriculture, wetland habitat along the Boise and Snake River, along with the presence of significant wildlife management areas including Deer Flat National Wildlife Refuge, Fort Boise Wildlife Management Area, and Roswell Marsh Wildlife Management area makes the county a perfect production ground for mosquitoes.

Disease and Mosquito population surveillance is essential, and the Canyon County Mosquito Abatement District dedicates a significant portion of its operational budget towards this activity. Mosquito control operations are conducted when threshold levels are met in the larval mosquito population, adult mosquito population, and/or arbovirus disease activity. Once it is determined that control measures need to be implemented then there may be encounters and interaction with beekeepers and bee colonies.

Guidelines to Protect Pollinators:

Commercial Honey Bee and Leaf Cutter Bees pollinate a variety of crops from fruits and vegetables to valuable seed production. Also, native bee populations play an important role in pollination and their population also needs to be considered.

- **Minimizing pesticide exposure** is a high priority and can be accomplished by following Integrated Pest Management Principles (I.P.M.) and pesticide label directions. All pesticides used for mosquito control have in their precautionary statements in the Environmental Hazard Section of the pesticide label. These label directions are reviewed by all personnel on a regular basis.

Timing of pesticide Applications (minimize bee exposure):

Insect Species	Peak Flight Activity	Optimal Temperature
Mosquitoes	Sunset-11:00 PM and ½ hr. before sunrise	>80º
Honey Bee	9:00 AM-4:30 PM	70º-80º
Leaf Cutter Bee	1200 N -5:00 PM	80º

Mosquito U.LV. (Fogging) treatments commence approximately ½ before sundown or sun up.

New Label Language

In August 2014, EPA announced label changes to better protect bees.

The Bee icon will appear on the label in the "Directions for Use" section.

Special precautionary statements that all applicators will need to be aware of:

- **Old language**: "for crops in bloom, do not apply this product to target crops or weeds in bloom.
- **New language**: "Do not apply while bees are foraging. Do not apply to plants that are flowering. "Only apply after flowers have fallen off."

Note: Label language will carry an exception for public health emergencies or intervention.

Use of least toxic pesticides. The Canyon County Mosquito Abatement District emphasizes pesticide the use of the least toxic pesticides for the safety of the environment, constituents, and possible "non- target" organisms (such as aquatic organisms, other than mosquito larvae), beneficial insects, and bees.

The Most Common Causes for Pesticide Bee Poisoning

- Residual insecticides are applied when bees are foraging
- Residual insecticides are applied to bee-pollinating crops.
- Insecticides area applied to blooming weeds in orchards or field margins.
- Residual insecticides drift onto blooming plants.
- Bees collect insecticide contaminated pollen.
- Bees collect insecticide contaminated nectar from plants treated with systemic pesticides.
- Bees collecting residual insecticide contaminated water.
- Beekeepers and Pesticide Applicators (private and professional) do not adequately communicate.

List of Pesticides used by CCMAD (Low Risk Materials):

- Bacillus thuringiensis israelensis (Bti) products
- Bacillus sphaericus (Bs) products
- Methoprene (insect growth regulators) products
- Sumithrin based insecticides with all crop labels. (Anvil 10-10, Duet)
- Etenophenprox based insecticides with all crop labels. (Zenivex E-4)

Use of larvicide products first: Treating one acer of standing water can reduce the use of using a mosquito adult control spray over 100 acres.

Source reduction: Draining standing water and encouraging proper irrigation practices that can prevent standing water situations.

Education and Communication: Bee Keepers and Mosquito Control personnel can work together to minimize pesticide exposure to bees and potential pollinator poisoning. In the five years that Canyon County Mosquito and treatments over 500,000 acres with no adverse incidents of bee mortality.

Factors that will help reduce bee mortality:

- Timing of mosquito adulticide applications between hours of sundown and sunrise. (peak mosquito flight time)
- Creating a bee friendly spray program: Example: Targeted residual yard spray treatments that have minimal drift.
- Contact with registered bee keepers for location of hives.
- Working with beekeepers in identifying areas that need to be treated. CCMAD active surveillance program can target "hot spots". Treatment and surveillance teams can then evaluate treatment areas and reduce the use of pesticides when needed.
- CCMAD discourages the location of bee colonies in residential areas where the probability of exposure to mosquito sprays is highest.
- Do not cover bee colonies with plastic or other covers when spray events occur. This practice can lead to "overheating of colonies" and cause bee mortality. If bee colonies are to be covered use wet burlap.
- Communication of when, where, and how pesticide applications will take place.
- In the event of a mosquito/arbovirus disease outbreak, public safety takes precedence.

Colony Collapse Disorder or CCD

It seems important to include this condition when discussing pollinator protection processes.

From the USDA news and events:

> *"When it comes to solving the puzzling syndrome known as colony collapse disorder, which has been attacking honey bee colonies since 2006, the best that can be said is there is good news and bad news. The good news is that the rate of honey bee losses seems to have leveled off rather than continuing to increase. The bad news is that the cause or causes of CCD remain unclear."*

Possible Causes:

- **Pathogens:** In one study, Nosema protozoan: Present in 55% of CDC infected colonies has this organism present compared to 28% of non-CDC infected colonies. Also, there

was a co-infection of other pathogens such as: varrora mites and tracheal mites. There is wide spread resistance to the chemicals beekeepers use to control these mites within the hive. New virus species have been found in the U.S. and several have been associated with CCD.

- **Increased Genetic Diversity is needed:** U.S. Honey bee colonies need increased genetic diversity. Genetic variations improve bee's ability to keep body temperature steady even if the surrounding environment is different.
- **Transportation stresses from migratory beekeeping:** Pollination service beekeeping transport bee colonies thousands of miles during the growing season. For honey bees, orientation to their hives is essential and being regularly relocated is stressful.
- **Monoculture:** Wild honey bees forage on a wide variety of nectar sources. Honey bees used for commercial pollination are mostly limited to one crop at a time, and it is possible that they may suffer nutritional deficiencies that may stress their immune system.
- **Poor Nutrition among Honey Bee Colonies:** Nutrition has a major impact on individual bee and colony longevity. A nutrition poor diet can make bees more susceptible to harm form disease and parasites. Bees need better forage and a variety of plants to support colony health.
- **Pesticides**: There are many classes of pesticides to which honey bees can become exposed. Among those classes that have been singled out are the neonicotinoids. One issue with making this link is in France and Germany where the neonicotinoids were banned in 2008, there are still CCD issues.

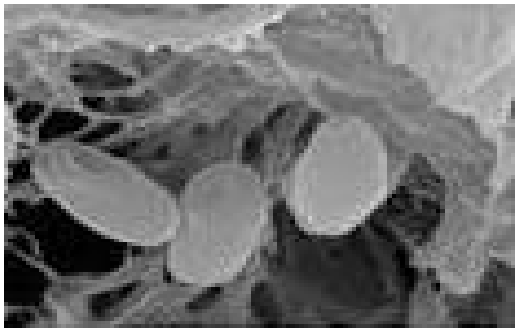
Information Sharing and Cooperation between beekeepers and pesticide users is essential. Coordinated communication between pesticide applicators in agriculture, urban and public health still needs to be improved.

2012 Pathogen Study of Apiaries in Idaho:

Varrora mites: A 2012 survey revealed that 87.5 % of honey bee colonies in Idaho were infested with Varrora mites. Rate of infection was 0.6 mites/100 bees.

Honey bee varroa mite *Varroa destructo*. (Photo: Scott Bauer, USDA Agricultural Research Service, Bugwood.org)

Nosema species fungi spores: A 2012 Idaho survey revealed 0.6 million spores per bee. Spore counts > 1 million spores per bee are thought to cause damage, colonies above this threshold should consider treatment. 61.1% of all Idaho apiaries revealed the presence of this fungi spore.



Black Queen Cell Virus

Present in 88.9% of Idaho Apiaries.

Associated with Nosema disease

Healthy Queen Cell

Deformed Wing Virus (DMV):

Main Vector is Varroa Mite: The virus is induced into the developing pupae with main symptoms being deformed wings. The virus was present in 88.9% of all apiaries tested in 2012 Idaho survey.

Conclusion

Practices that are part of Canyon County Mosquito Abatement District Standard Operating Procedures to reduce the risk of pollinator and bee damage include:

- Most pesticides used to control flying mosquitoes are applied in evening hours starting shortly after sunset or in early morning hours before sunrise.
- Drift by other applications such as yard sprays is minimized by lower pressure applications, applicator training and choices of low-risk insecticides.
- Beekeepers are identified and notified when applications are made prior to applications. No treatment zones are in place near known bee colony locations.
- Products are chosen that are "low risk" to bees.
- Integrated Pest Management principles are in place using trapping and mosquito (arbovirus) surveillance data as threshold levels for conducting mosquito control activities.

Information on this document provided by the following sources:

- North Dakota Pollinator Plan 2014
- Honey Bees and Pesticides Part I and Part II, 1983
- USDA Honey Bee Survey in Idaho, 2012
- Growing Idaho Newsletter Pioneer/DuPont, May 2013
- North American Pollinator Protection Campaign, Pollinator Friendly Practices
- USDA Agricultural Research Service Publication, "Colony Collapse Disorder, An Incomplete Puzzle"
- University of Florida IFAS Publication 149 "Mosquito Control and Beekeepers"
- How to Reduce Bee Poisoning, PNW Extension Publication 591
- Bayer Crop Science Newsletter: "Focus on Bees"
- Bee Now "the Bee Health Magazine" Bayer Crop Science, 2015
- The Impact of Irrigated Agriculture and the Economic Base of Canyon County, Idaho, December 2009
- Scientific Beekeeping webpage: www.scientificbeekeeping.com