

Essential Oils in Beekeeping

Note from Eugene: Keep in mind that even though we call some of these treatments “natural,” they are not natural to the bees. And you will need to be diligent if you want to use organic treatments. Find a reliable source of organic essential oils plus other products added.

Natural treatments consist of organic acids and essential oils. All essential oils must be food grade quality, with organic certification a plus. All are plant based, natural products generally readily found in health food stores.

It’s absolutely critical to follow recommended doses when using the natural treatments or you can kill your bees. As with essential oil use with humans, natural does not mean harmless. Doses are designed to be lethal to pests but not to the bees.

Why use essential oils in beekeeping?

“Beekeepers may wish to use the natural miticides for various reasons: as an alternative to, or in rotation with, synthetic miticides that are failing due to varroa resistance; to give the colonies a break from chemical sublethal effects or comb contamination; to avoid miticide toxicity to drones and queens; to meet “organic” production standards (when allowed); or due to personal preferences or concern about chemical residues in honey.”

Randy Oliver, *ScientificBeekeeping.com*

Essential Oils Used

There are over 100 oils that may be used in one form or another. The most common essential oils used in beekeeping are lemongrass, spearmint and thyme (thymol oil). Other oils such as wintergreen, eucalyptus (eucalyptol), peppermint, menthol, and tea tree oil are also used in some formulations and included here.

Lemon Grass: The smell of lemon grass is believed to closely mimic the attractant pheromone produced from a worker bee’s nasonov gland. Lemon Grass oil contains geranic acid, citral and geraniol; some of the components of nasonov pheromone. Lemon grass oil is used in a variety

of ways with honeybees. It is also used in supplemental food to stimulate the bees to eat the food, to help food from going bad (it has anti-fungal and anti-viral properties), in a spray bottle to calm the bees, and to introduce a new queen by giving all of the bees and queen the same smell. It is also commonly used in bait hives to attract swarms.

The biggest caveat to using lemon grass oil is that during periods of dearth, the smell may attract robber bees to the hives.

Thymol: Thymol, the oil from thyme plants, is one of the most used essential oils in the treatment of Varroa mites. It can be found in commercial products like Apiguard and ApiLife Var.

It works by confusing the mite and blocking it's pores. Used in combination with a screened bottom board the mites become confused, fall to the ground through the screen and are unable to climb back up into the hive. All of the mint family essential oils can be used to help with Varroa mite control.

It is antifungal and also used for treatment or prevention of Chalkbrood.

Eucalyptol: Used in preparations to control Varroa mites.

Menthol: Used for control of Tracheal mites.

Wintergreen: Used in grease patties for control of Tracheal mites. It is helpful against Small Hive Beetles.

Spearmint: Often used in conjunction with Lemon Grass oil during feeding to improve hive health. Also useful against Varroa mites and works in much the same way as Thymol oil.

Peppermint: General purpose pheromone masking scent that does not mimic any of the honeybee pheromones. (Any strong scented essential oil will work for this).

Tea Tree: Used in grease patties for control of mites. It can be interchanged with Wintergreen with no loss of effectiveness.

Essential Oil Therapy

Varroa Mites

Essential oils control Varroa in two ways, directly or through the blood of the bee.

When a varroa mite comes in direct contact with wintergreen or tea tree oil mixed in a grease patty, the mites usually die in a few minutes. The infected bee must however, walk across or feed on the patty. Therefore direct toxicity cannot be counted on to control these mites, it can only aid in controlling.

Studies suggest that mite reproduction can be inhibited when bees are fed a syrup containing essential oils. The oils are passed from bees to other bees and larva through trophallaxis (that is the direct transfer of food or fluids from one bee to another. Remember bees feed each other and create food for larvae). When the female varroa feeds on the larvae, she is poisoned.

Many beekeepers are using Thymol oil or crystals to treat for Varroa. The biggest problem is controlling the dosage. Thymol is lethal to bees at two to four times the concentration it takes to kill the mites. Thymol is temperature dependent. It is best used between 60 degrees F and 90 degrees F. Crystals evaporate too quickly in hot temperatures increasing exposure limits to bees. It must be applied two to three times. It is not registered in the US. The standard dosage is 8 to 12 mg of crystals in a small dish on the top bars of the hive. Dosage of oils is dependent on the purity of the oils and cannot be addressed here.

Tracheal Mites

Essential oils appear to impact breeding and control of Tracheal mites. This however, remains anecdotal as proper methods of observation have not been established. The best therapy remains the grease patties.

It is recommended that grease patties containing essential oils be kept in the hive throughout the winter and any season when honey collection for human consumption is not taking place.

If temperatures permit flight, syrups containing essential oils can be fed as long as honey collections are not being performed.

Small Hive Beetles

Traps or biological controls such as entomopathogenic nematodes are the most common non-pesticide paths to control. The nematodes are small roundworms native to the soils that attack the larva of the Small Hive Beetle in the soil reducing the population.

Wax Moths

A strong hive is the best defense. Prevention is not to give them more territory than they can guard, in other words, don't leave a lot of drawn comb on a hive that is small and struggling.

Wax moth traps can help keep the wax moth population under control (but also will capture other bees, wasps, and flying insects).

Bacillus thuringiensis, subsp. *Aizawazi*. Is one of the most effective biological controls available for wax moth control. Two products are currently available: Certan in Canada or Xentari in the US. Xentari is labeled for use against moth larvae (but not wax moth per se). This kills the larva of the wax moth.

Xentari is a dry flowable powder and is available from Amazon. This is mixed with water and sprayed on the woodenware of the hives. The wax moths contact the Bt which infects their larva and break the breeding cycle. Bt seems to have no ill effects on the bees and studies have supported this view.

Two tablespoons of powder can treat 100 to 110 frames of wax to be stored.

More here: <http://www.ext.colostate.edu/pubs/insect/05556.html>

Bt may be used to protect stored comb as well, but spraying comb filled with pollen does not work well. Freezing used comb is an effective way to keep wax moths from destroying stored comb. Another method for protecting stored comb is to use Paradichlorobenzene (PDB) moth crystals in storage. PDB is considered a carcinogen so not for all beekeepers.

Useful Recipes for Beekeeping

Sugar Syrups: By Weight not by Volume

1:1 one part sugar, one part water. Can be used for supplemental spring feeding and to encourage the drawing of comb.

2:1 two parts sugar, and one part water. Used for fall feeding and if bees do not have enough honey stores

1:2 one part sugar, two parts water. Can be used to stimulate brood rearing by simulating nectar flow.

Bee Candy: Measured by Volume

Fondant

4 parts white sugar, 4 parts 2:1 syrup, 3 parts water

Boil water and slowly add sugar and syrup. Continue heating until mixture reaches 238 degrees F. Allow to cool until slightly warm to the touch, begin to mix and aerate the solution. As air is entrained the color should lighten. Put into dishes or mold for later use.

Grease Patties

Simple Grease Patty: one part solid vegetable shortening and two parts white sugar.

Mix well until combined, split into ¼ cup portions and store in freezer between wax paper sheets.

Grease Patty with Essential Oil: (by weight) one pound solid vegetable shortening, three pounds sugar.

- Add a hint of food grade essential oils provide odor and to attract the bees.

Pollen Substitute

Dry Pollen: (by weight) 3 parts soy flour*, 1 part Brewer's yeast, 1 part Nonfat Dry Milk, (not Instant Milk).

Sift the powders together and use. If the bees don't take the substitute, fresh pollen may be available. If not try adding 1 teaspoon of Vitamin C per 5 cups of mix. To boost the nutritional value, if you collect any pollen from your hives, you can add a small amount to the dry pollen substitute mix.

Easy Pollen Patty: Combine the dry mix with enough 2:1 syrup to make a dough. Roll out and store between wax paper sheets.

For added nutrition, use honey from your hives with the dry mix to make the patty.

***Make Your Own Soy Flour:** put soybeans in a blender and run it until beans are powdered. Sift.

General Purpose Essential Oil Mixture: Homemade Honey-B-Healthy Substitute

5 cups water

2 ½ pounds of sugar

1/8 teaspoon lecithin granules (used as emulsifier)

15 drops Spearmint oil

15 drops Lemon Grass oil

Boil water, dissolve sugar, remove from heat and quickly add lecithin and essential oils. Stir until everything is evenly combined. Hint: put in blender because lecithin can be hard to stir in. The solution should have a strong scent and should not be left open around bees. Cool before using.

Dosage:

1 teaspoon per quart of 1:1 syrup for stimulating brood rearing, pollen collection, and early spring development.

2 teaspoons per quart of 1:1 syrup to improve health, cases of dysentery, chalkbrood, and other stress problems in bees.

4 teaspoons per quart of 1:1 syrup when introducing new queens (you will need to drizzle this over them or they won't eat it on their own).

Do not feed during honey flow if honey is used for human consumption.

Useful for building up packages, nucs, and swarms

Scent Masking Syrup

Nearly any essential oils (except Lemongrass) can be mixed with 1:1 syrup to mask undesired scents in the hive. The masking syrup can be used for introducing a new queen or when combining two hives.

Add the desired amount of oil to the syrup. The stronger the scent the better it masks odors. Blend in blender.

Easy scent masking syrup: crush two peppermint candies for every two cups of prepared solution.

Disclaimer: I prepared this handout. Any mistakes are mine. I have checked the information across 5 websites and with beekeepers I trust. The information used is essentially the same.

A couple of reference sites:

<http://www.motheearthnews.com/homesteading-and-livestock/using-essential-oils-for-honeybees-zbcbz1403.aspx>

https://en.wikibooks.org/wiki/Beekeeping/Guide_to_Essential_Oils