

# Oxalic Acid for the Treatment of *Varroa*

## Oxalic acid

Weak organic acid

## Treatment Methods

### Trickling

#### Efficacy

Optimal concentration	3.5% (2.5% acid)	>95%
Dose	5 ml (milliliters)	(3 µl/bee, strong colonies)

1. 35 g hydrated oxalic acid plus 20.5 oz sugar plus 20 oz water (2.5% oxalic acid) volume = 1 liter (33.2 oz)

#### **2. 5-6 ml per occupied seam**

Treat only broodless colonies when temperatures are above 32° F (0°C). Use freshly made solutions or those stored no longer than 6 months at a maximum of 59 °F (15 °C). Wear gloves and safety goggles during treatment. Can be caustic to screened bottom boards

Oxalic acid dihydrate is available inexpensively at hardware and paint stores as a wood bleaching agent. However, oxalic acid of stated purity 99% or greater recommended. Readily available through Amazon.

**Amount of oxalic acid dihydrate and 1:1 sugar solution needed to treat specified number of colonies at 3.5% strength. Amount needed will depend on colony population size and time of year.**

<u>No. of colonies</u>	<u>1:1 Sugar solution</u>	<u>Oxalic acid crystals (&gt;95%purity)</u>
5	0.25 L (1 cup); 8.3 oz	8.75 g (1.6 teaspoons); 0.312 oz
10	0.50 L (2 cups); 16.7 oz	17.5 g (3.2 teaspoons); 0.639 oz
20	1.00 L (4 cups) 33.3 oz	35 g (6.25 teaspoons); 1.25 oz

**Note:** Use lukewarm sugar solution to dissolve. May need to use distilled water if calcium content of tap water is elevated. **One level teaspoon of oxalic acid dihydrate weighs 5.6 grams.** Store oxalic acid refrigerated for no longer than six months. One fluid oz (ounce) volume equals 29.6 ml (milliliters); One oz weight equals 28.3 g (grams).

#### **Tolerability**

Single autumn treatment well tolerated. Multiple autumn or summer treatments poorly tolerated.

## Vaporizer (Varrox)

## **Efficacy**

Optimal amount                      1-2 g in closed hive                      >90%

Place 1-2 g of oxalic acid dihydrate into the vaporizer depending upon size/number of brood boxes. Seal hive including entrance. Open floors should be shut. Connect vaporizer to 12V battery for 2.5 minutes. Wait 2 minutes before removing the vaporizer (hot). Seal hive for additional 10 minutes. Exercise extreme care when around oxalic acid fumes. A recent study found that two autumn treatments separated by 3 weeks improved efficacy.

**Tolerability**                      Excellent

## **Spraying**

### **Efficacy**

A single treatment of broodless colonies with 2.5-4 ml of 3% oxalic acid per comb side can be greater than 97% effective.

### **Tolerability**

Single treatments well tolerated but multiple treatments can result in worker, brood and queen mortality.

## **Recommendations for the trickling treatment with oxalic acid**

Trickle 5-6 ml per occupied bee space.

### **Timing of the treatment:**

In broodless colonies (November-December)

### **Remarks:**

- Carry out one treatment only in autumn
- Trickle the solution directly onto bees between the frames
- Treat with lukewarm solution
- Carry out treatment at an out door temperature of above 4°C (34°F)
- Use only freshly made-up solutions or those stored for no more than 6 months at a maximum of 15°C (59°F)
- The spray treatment with oxalic is well tolerated by bees ( 30 g OA dihydrate/liter water, 3-4 ml per occupied frame side) and represents an alternative to the trickling method
- Wear gloves and safety goggles during treatment
- May need to protect screened bottom boards from caustic action of OA

**NOTE:** A recent study has show that two autumn treatments, 3 weeks apart, with 3.2% oxalic acid in sugar syrup significantly decreased the incidence of Nosema ceranae infection and improved overwinter survival.

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