

Extraction of Limonene From Orange Peels and Effect of Limonene on Mealy Bugs and Scale Insects

Srikanth Munuru

M.Sc.Scholar, Department of Biotechnology, Andhra University, Visakhapatnam
Corresponding author: htnakirs15@gmail.com

ARTICLE ID: 027

Abstract

In agriculture, pests and insects are causing large affect to the yield which is bring great loss to the farmers. Usage of chemical insecticides and pesticides leads threat to individuals who feed on it this is due to the chemicals accumulated on the crop which is causing dangerous health complications. This problem can be sorted by using organic insecticides and pesticides which are made up of different plant sources. One of such organic insecticides is limonene extracted from orange peels. The limonene is extracted from the orange peels and its effect on mealy bugs and scale insects is observed. Two methods were carried out i.e. one –minute dip method and spraying method, on plants which are affected with mealy bugs and scales effective results were seen in both methods. For plants with mealy bugs affect, it took 10 days for spraying method and 7 days for one-minute dip method to eradicate the insects. For plants with scales affect, it took 14 days in spraying method and 10 days for one minute dip method to eradicate the insects.

Introduction

In present scenario there is a great disadvantage by using chemical pesticides and insecticides. These chemical pesticides and insecticides which sprayed on plants to remove pests and insects are eluted into soil which persistent as soil contaminants, whose impact may endure for decades and adversely affect soil conservation. This chemical passes from soil to water, and in turn to air and our food. The use of pesticides decreases the soil biodiversity. Usage of the chemical pesticides and insecticides will affect the growth of the some micro organisms which helps in plant growth. This can be reduced by using extracts of plant sources like leaves, fruits, roots, flowers as pesticides and insecticides. One of such organic pesticide is limonene which is extracted from orange peels.

Limonene a natural cyclic monoterpene extracted from citrus rind D-Limonene is a major component of the aromatic scents. It contributes to the characteristic odour of orange peel, orange juice and other citrus fruits. As the main fragrance of citrus peels, D-limonene is used in food manufacturing and some medicines. D-Limonene is used as effective insecticide, pesticide, and herbicide. It is added to cleaning products, such as hand cleansers to give a lemon or orange fragrance.

The orange peels not only containing limonene its also rich in vitamin C, folate, vitamin B6, calcium and other essential nutrients. The rind of the oranges contains a good amount of polyphenols that protect against several diseases. The extracts taken from this orange peels can enhance growth of the plant by providing nutrients and also eradicate the pests and insects. This extracts can be prepared by using any kinds of citrus fruits which contain limonene. Using the waste from the fruits and preparing organic pesticides benefits farmers to grow the crop with good yield, and can earn good profits in agricultural field this also gives organic food which is free from chemicals.

Mealy bugs and scales are harmful pests of agriculture and ornamental gardens, reducing the strength of the plants by removing the sap, secreting toxic enzymes and transmit plant diseases. They feed on sugarcane, grapes, pineapple, papaya, and ornamental plants like marigold, jasmine, hibiscus, sunflower and orchids. Mealy bugs are insects in the family Pseudococcidae. They attach themselves to the plant and secrete a powdery wax layer used for protection while they suck the plant juices. Mealy bugs only tend to be serious pests in the presence of ants because the ants protect them from predators and parasites. Scales are small insects which comprise the super family Coccoidea Scale insects are herbivores, piercing plant tissues with their mouthparts and remaining in one place, feeding on sap. The excess fluid they imbibe is secreted as honeydew on which sooty mold tends to grow. The insects often have a mutualistic relationship with ants, which feed on the honeydew and protect them from predators.

Limonene extraction from Orange peels

- Fresh orange peels of any variety are chosen or any other peels of citrus fruits can also be used.

- Weigh 500 grams of chopped orange peels and boil with 1000ml of distilled water/ normal fresh water.
- Filter the extract using a cheese cloth. This extract can be used in different dilutions depending on severity of the insects or pests.
- There is another method for extraction i.e. solar drying the orange peels and storing them for long time by making them into powder this is boiled whenever there is requirement.

Composition of orange peels

Parameters	Value% (dry basis)
Cellulose	9.21
Hemi cellulose	10.50
Acid detergent lignin	0.84
Total sugars	16.9
Protein	6.50
Pectin	42.50
Ash	2-3

Polyphenolics, fat and other extractives make up for the remainder of the composition

Effect of limonene on mealy bugs and scales

The extract of orange peel which consists of limonene compound is applied to the affected plants by one minute dip method and spraying method. One-minute dip method was carried out by dipping the affected area of leaf or stem in a beaker containing limonene of desired concentrations. Branch tips (10 cm in length) dipped into beakers holding treatment solutions (or water) for 1 min, once a day. Spraying method is carried by spraying different dilutions of the limonene extracted on the leaves and stems. Both dip and spray methods were used, because dipping which are generally more effective, might be used for harvested commodities such as fruits, vegetables or cut flowers, whereas sprays would be more practical for potted plants.



Affected by mealy bugs and scales

The two methods were carried out for plants which are affected with mealy bugs and scales effective results were seen in both methods. For plants with mealy bugs affect, it took 10 days in spraying method and 7 days for one-minute dip method to eradicate the insects. For plants with scales affect, it took 14 days in spraying method and 10 days for one minute dip method to eradicate the insects.



Reduce in insects affect after usage of limonene

Conclusion

The use of organic insecticides and pesticides in agriculture leads to good yield and profitable productivity to farmers. It may not show fast results like chemical insecticides but it shows effective results after some time period of usage. As they are from plant sources which are considered as organic wastes they don't pollute the soil, air and water and do not cause any threat to environment like chemical insecticides. And these orange peels also contain some essential nutrients which helps the plants growth.

