SYSTOX, A SYSTEMIC INSECTICIDE FOR PINEAPPLE MITE CONTROL

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Many newly set pineapple plants die from pineapple mite, Dolichotetranychus floridanus (Banks), infestations. Other infested plants remain small and produce very little or no fruit. Although this mite infests plants of all ages, it is a serious pest only on young ones. Nursery stock distributed or sold by nurserymen, or used by fruit producers, should be free of mites and other pests.

Control of the pineapple mite has not been entirely satisfactory to date. Fumigation of planting stock with two pounds of methyl bromide per 1,000 cubic feet, at 80°F. and normal atmospheric pressures, gave less than perfect control in various tests. Fumigation of planting stock with the same amount of methyl bromide at partial vacuum gave perfect mite control but killed some of the plants. Parathion, when used as recommended by Wolfenbarger and Spencer (1951) for control of pineapple mealybug, Pseudococcus brevipes (Ckll.), has not given satisfactory control of the pineapple mite.

Other miticidal chemicals were used as dips or sprays in various experiments for mite control. Aramite, azobenzene, D-N, EPN, Karathane, malathion, oil emulsions, Ovotran, parathion, selenium, sulfur and TEPP were tested at concentrations ordinarily used for mite control. Exposed mites were killed but those nearest the stalk between the tightly appressed leaves remained alive. Apparently all of these materials killed the mites with which they made contact. It was clear from these results that some method or miticidal material other than those used was needed for pineapple mite control.

Systox was used in the experiments herein reported. This material is one of the newer, organic, phosphatic pesticides, and acts systemically as discussed by Wilson (1951). A systemic pesticide is one that is absorbed by a plant, translocated within it and that kills pests on all parts of the plant. Thus this material offered another approach to the solution of the problem of pineapple mite control. Systox contains the diethoxythiophosphoric ester of 2-ethylmercaptoethanol as the active ingredient. Although selenium, an inorganic material, functions systemically also, it is such an extremely toxic material that it can be used only at very low concentrations. It was ineffective against the pineapple mite at the low concentrations tested.

Systox has been approved for use on cotton and certain ornamental plants. It has not been approved for use on pineapple plants, nor is it commercially available for such use. The results presented here are only of academic interest at present. They may be of practical value in pineapple production, provided Systox is approved for use on this plant.

Field Experiments. Two field experiments were conducted in cooperation with D. S. Radebaugh, Sebring, Florida. In one, the planting stock was dipped and set in regular beds in the field. In the other, small nursery plants were sprayed with the insecticide. The formulations of Systox used in these experiments contained three pounds of active ingredient per gallon, and the parathion formulation contained four pounds of active ingredient per gallon.

Dips were prepared containing one gallon, one-half gallon, and one and one-half cups of the Systox, formulation per 100 gallons of water. These were compared with one-half pint of the parathion formulation per 100 gallons of water. All plants were immersed in the dip, removed immediately, and set aside to drain and dry. The treated plants were placed in beds the day after they were dipped, along with untreated or check plants. Plants from each treatment were examined for living mites 26, 96 and 145 days after treatment. The six lower leaves were removed from each plant examined. A summary of the results is given in Table 1.

Plants dipped in one-half and one gallon of Systox per 100 gallons of water were freed of mite infestations for three months. Some infested plants were found 145 days after
Table 1. Pineapple Mite Control with Systox and Parathion Dips

<table>
<thead>
<tr>
<th>Treatment, Amt./100 gals.</th>
<th>No. plants examined</th>
<th>No. (percentage) plants infested</th>
<th>No. plants examined</th>
<th>No. (percentage) plants infested</th>
<th>No. plants examined</th>
<th>No. (percentage) plants infested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systox, 1 1/2 cups</td>
<td>24</td>
<td>0 (0%)</td>
<td>10</td>
<td>1 (10%)</td>
<td>10</td>
<td>1 (10%)</td>
</tr>
<tr>
<td>Systox, ½ gal.</td>
<td>6</td>
<td>0 (0%)</td>
<td>10</td>
<td>0 (0%)</td>
<td>10</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Systox, 1 gal.</td>
<td>6</td>
<td>0 (0%)</td>
<td>10</td>
<td>0 (0%)</td>
<td>10</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Parathion, ½ pt.</td>
<td>6</td>
<td>1 (17%)</td>
<td>10</td>
<td>2 (20%)</td>
<td>10</td>
<td>3 (30%)</td>
</tr>
<tr>
<td>Check</td>
<td>18</td>
<td>1 (61%)</td>
<td>10</td>
<td>7 (70%)</td>
<td>50</td>
<td>14 (47%)</td>
</tr>
</tbody>
</table>

Days after treatment

26  96  145

It was determined that an average of 2.5 ml. of Systox dip (one quart per 100 gallons of water) adhered to each pineapple plant dipped. This amount of Systox diluted with an equal quantity of water was applied to freshly cut bases of the plants in one treatment, to the upper leaf surfaces in a second, and to the lower leaf surfaces in a third. After the fluid had dried, the plants were placed in a box and put aside.

The plants were examined 13 days after treatments for mites. Leaves were removed from each plant until a living mite was found or until the plants had been torn apart. A summary of the results is given in Table 2.

Table 2. Pineapple Mite Control with Systox and Parathion—Wettable Sulfur Treatments.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>No. dead mites to 1st living one</th>
<th>Pctg. of plants infested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systox dip</td>
<td>—</td>
<td>0</td>
</tr>
<tr>
<td>Systox, base of plants</td>
<td>150:1</td>
<td>40</td>
</tr>
<tr>
<td>Systox, on upper leaf surfaces</td>
<td>8:1</td>
<td>100</td>
</tr>
<tr>
<td>Systox, on lower leaf surfaces</td>
<td>7:1</td>
<td>100</td>
</tr>
<tr>
<td>Parathion-w. sulfur dip, 1/3 pt. + 10 lbs./100 gal.</td>
<td>7:1</td>
<td>100</td>
</tr>
<tr>
<td>Check</td>
<td>3:1</td>
<td>100</td>
</tr>
</tbody>
</table>

Systox dip was superior to all other treatments. Parathion plus wettable sulfur dip was not effective in reducing the percentage of infested plants. Systox placed on freshly cut bases of plants was more effective than the same amount placed on either the upper or lower leaf surfaces. This indicates that translocation occurred, since Systox placed at the base of plants killed mites on leaves which had not been treated previously.

Observations On Pineapple Mealybug. Plants treated with either Systox or parathion were free of the pineapple mealybug when examined, although some were infested at the time of treatment. All observations in connection with these experiments indicate that Systox is as effective as parathion for mealybug control.

Laboratory Experiment. A laboratory experiment was conducted to compare localized applications of equal amounts of Systox with a Systox dip, with a parathion wettable sulfur dip, and an untreated check.

![Fig. 1. Pineapple mite infestations. Arrows point to infested areas which enlarge and coalesce to kill leaves and young plants.](image-url)
**Systox and Its Residue in Fruit.** Some Systox is a systemic pesticide and as such is translocated in the plant, one may question its use on food-crop plants. It should be clearly understood that Systox has not been approved for use on pineapples at this time.

**Summary.** Dipping pineapple planting stock in Systox, at one quart or more per 100 gallons of water, gave complete control of the pineapple mite up to five months after treatment. Spraying or drenching plants in beds with Systox concentrations of one pint to one gallon of Systox per 100 gallons of water gave poor control or none at all. Systox dips were more effective than dips of para-thion or parathion combined with wettable sulfur. This material has not been approved for use on pineapple plants.

**Precautions**

Systox, an organic phosphatic insecticide, is toxic to man and other animals. Caution must be exercised by those using it. Avoid contact with the insecticide or wetting of skin and clothing. Wear rubber gloves, aprons, or other protection during the dipping process. Approved masks are recommended.

**REFERENCES**


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**GRAFTED CASUARINA TREES FOR USE AS WINDBREAKS OR ORNAMENTALS**

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No trees have proved more satisfactory as windbreaks in Southern Florida than the Casuarinas. Two species are commonly grown for this purpose, the tall, slender *Casuarina equisetifolia* L., and the shorter, thicker, *C. lepidophloia* F. Muell. Other species grown in the state include *C. cunninghamiana* Miq., *C. glauca* Sieber, and *C. stricta* Ait. All are tall trees of rapid growth.

Casuarinas are used rather extensively as ornamentals. They are used for closely clipped hedges; for specimen trees, either untrimmed or trimmed; and for street and highway planting.

Casuarinas thrive on a wide range of soils, but they are attacked and usually killed by a root rot caused by a gill fungus, *Clitocybe tabescens* (Scop. ex. Fr.) Bres. This fungus is an active parasite of many species of living trees, but also flourishes as a saprophyte in old roots or stumps of trees, especially oaks. Thorough removal of tree roots, especially oak roots, when clearing timbered land prior to planting, is the only method of avoiding this trouble.

Casuarina trees are leafless except for minute scales at the nodes of the branchlets. These branchlets resemble the needle-like leaves of pine trees. The flowers are unisexual and the fruit is a small cone containing numerous winged seeds. *C. equisetifolia* seeds freely and in many places has become naturalized. *C. lepidophloia* has not been known to produce seed in Florida, but suckers freely from the roots, particularly on rocky soils. This suckering habit is a serious objection to its use on limestone soils. In *C. equisetifolia* the branches are mostly at nearly right angles to the trunk and are not closely spaced, so that old specimens have a rather thin or open top. *C. lepidophloia* has more upright branches spaced closer together to form a denser top that is more ornamental and better for windbreaks. It is also somewhat harder to cold.

The combination of a top of *C. lepidophloia* which does not produce seed on the non-suck ing root system of *C. equisetifolia* might be more desirable than either species for use in windbreaks or as an ornamental. This combination, first made by grafting in 1946, has thus far proved to be compatible.

The side graft used successfully is not difficult and is used widely in nursery practice for propagating many fruit trees and orna-