GROWERTALKS

Pest Management

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# Biofungicides Derived From Plant Extracts

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One of the easiest types of biopesticides to successfully use are those derived from plants. Since they're essentially chemicals, the need to keep them alive is eliminated. On the other hand, since some of them are oils, you need to test mixtures for compatibility and crop safety.

Table 1 shows some of the information on the labels of the five products covered in this article. While I included the FRAC listing for these products, two of them haven't been categorized. It appears that neither thyme oil product is EPA-registered. Be sure to read labels carefully and follow their directions to stay legal and achieve the best results.

## Regalia

One of the first products to launch in this category was Regalia. It was originally developed by BASF (mid-1990s) and eventually landed with Marrone Bio Innovations. I worked on this plant extract in the early 1990s. Regalia was created from Reynoutria sachalinensis (giant knotweed) and causes the plants to activate an internal defense system that prevents growth of certain fungi, especially powdery mildew and gray mold. The extract is approved for use on ornamental plants grown in greenhouses.

## Triact 70

During the same timeframe, extracts from the neem tree were under development as insecticides and also tested for disease control capacity. The extract from neem tree oil is currently sold as Triact 70 through OHP. We worked on Triact 90 and then Triact 70 in the 1990s in Northern California. (Table 2 shows all the trials I could find. I decided to group the trials by disease type.)

## EcoSwing

EcoSwing is a botanical fungicide created using proprietary plant extracts that's been a leader in fungicidal control of several key pathogens globally for many years. The product is OMRI-listed, has a caution label and a four-hour REI.

EcoSwing should be applied at the first sign of infection or when conditions are conducive to disease. Apply 1.5 to 2 pints per acre (usually agreed as 100 gal. for container production). It's important to get good coverage and a spreader sticker adjuvant is recommended. Repeat applications every seven to 10 days for best results.

*Pictured: EcoSwing gave very good prevention of daylily rust. • Triact 70 gave very good control of poinsettia powdery mildew.*

EcoSwing's primary mode of action is to act as a contact desiccant and cell wall disruptor to the fungal hyphae. This is shown with very good results on many powdery mildew diseases (gerbera daisy and zinnia). Preliminary research also suggests that EcoSwing may aid in triggering the plant's natural defense mechanisms against bacterial and fungal pathogens. These are referred to at times as Systemic Acquired Resistance or SAR.

This helps explain the differences between pathogens and crops that become apparent as more and more trials are reported. It's typical for products that trigger a SAR reaction to work better on some crops than others. If the only action were as a desiccant and cell wall disruptor, not all of the pathogens from bacteria to rust to mildews would have an equal chance to respond.

## Proud 3 and PathoCURB

The first thyme oil product was Proud 3 and was evaluated by IR-4. Proud 3 is from Huma Gro and consisted of 5.6% thyme oil. It was trialed at 1% as the use rate against a wide range of pathogens, including Botrytis, bacteria, powdery mildew and Pythium. Overall results were not very good on any of the pathogens tested. It was also found to be phytotoxic and resulted in an increase in disease in a few trials.

The second thyme oil product included in IR-4 trials was PathoCURB by Kemin Industries (it was originally called Tril-21). In a few trials, both Proud 3 and PathoCURB were included. PathoCURB is 15.5% thyme oil and was tested at 0.5% on a variety of bacterial and fungal foliar diseases.

Trials results for PathoCURB were not very different than those for Proud 3. Many trials were conducted on various species of Botrytis on a variety of crops with almost no positive results. As with the other thyme oil product, phytotoxicity was reported occasionally and sometimes disease was worse with the application of PathoCURB than the inoculated control.

Table 2 lists results of trials on ornamentals and many other crops for the five products discussed above. I used the same standards for level of control as I have for results, which were often variable due to differences in the many pathogens and crops tested. It was also common to see variable results from none to good on a single type of disease on a single crop. The bacteria column included trials on Pseudomonas and Xanthomonas. **GT**

Table 1. Table information on some plant-based biopesticides.

| Product | Manufacturer | Active ingredient | FRAC code | REI |
|---|---|---|---|---|
| **EcoSwing Botanical Fungicide** | Gowan | Extract of *Swinglea glutinosa* | Not classified | 4 hours |
| **PathoCURB** | Kemin Industries | Thyme oil | BM01 | 0 hours |
| **Proud 3** | Huma Gro | Thyme oil | ? | ? |
| **Regalia Biofungicide** | Marrone Bio Innovations | Extract of *Reynoutria sachalinensis* | P5 | 4 hours |
| **Triact 70** | OHP | Clarified hydrophobic extract of neem oil | NC-FRAC M-IRAC | 4 hours |

Table 2. Summary of trial results for some plant-based biopesticides on all crops for diseases.

| Product | Alternaria | Bacteria | Botrytis | Cercospora | Colletotrichum | Downy mildew | Myrothcium | Powdery mildew | Rust |
|---|---|---|---|---|---|---|---|---|---|
| **EcoSwing** | | none/ excellent | good | | | some | | some/ excellent | very good/ excellent |
| **PathoCURB** | none | none | none | | some | | | | |
| **Proud 3** | | none/very good | none | | | | none | some/ excellent | |
| **Regalia** | none/some | none/good | none/ some | some | none | none/ good | | none/very good | |
| **Triact 70** | none/some | none/some | some/ good | slight/some | some/good | none | | good/ excellent | very good/ excellent |