Improved Formulations of Extract of *Reynoutria sachalinensis* for Control of Foliar Diseases

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Biofungicide

- **Source:**
  Extract from giant knotweed *Reynoutria sachalinensis*.

- **Efficacy:**
  Control of powdery mildew, leaf spots, blights.

- **Active Ingredients:**
  
  ![Chemical structure](image)

  - R=H  Emodin
  - R=CH₃O  Physcion

- **Market:**
  Currently sold in US and Ecuador.
Mode of Action - ISR Inducer

- **Immune Response:** Non-pathogenic triggers that induce the plant’s immune system to produce phytoalexins, PR proteins, phenolics, antioxidants.

- **Strengthening:** Induces papillae formation.

- **Systemic Effect:** Translaminar movement to untreated portion of leaf.
Formulation Improvements

**Regalia® SC** (5% a.i.)
- Modification of Milsana formulation with improved physical characteristics.
- For conventional production.
- Registered nationwide but sold primarily in California.

After rinse
Regalia at 1% dilution (commercial rate)

Aggregation of Milsana
New Formulation

Regalia® (MOI or MBI-10605)

- 5% active ingredient
- Additional crops and expanded diseases.
- For conventional and organic production – NOP compliant.
- REI = 4 hours, PHI = 0 days.
- Rainfast in 1 hour. Additional surfactant is not critical to efficacy.
- Greenhouse Use – Labeled for greenhouse use on edible crops.
- Registered and sold in most states. Registration pending in CA, NY, TX, WV.
Regalia® is Rainfast in only 1 hour.

1All Regalia applications at 1.0% v/v.
Bacterial Spot on Tomato
Glades Crop Care
Hobe Sound, FL, 2009

Disease Severity (1-10)

- Regalia 0.5% v/v 29oz
- Regalia 1.0% v/v 58oz
- Kocide 2000 1.5lb+Maneb 75DF+Regalia 1.0% v/v
- Bravo WeatherStik 1.5pt+Regalia 1.0% v/v
- Regalia 1.0% v/v alt. w/Kocide 2000 1.5lb+Maneb 75DF 1.5lb
- Regalia 1.0% v/v alt. w/Bravo WeatherStik 1.5pt
- Kocide 2000 1.5lb+Maneb 75DF 1.5lb alt. w/WeatherStik 1.5pt
- Untreated Control

02/18/2009
03/04/2009
Regalia® plus copper is as effective as maneb plus copper for controlling Walnut Blight.

Walnut Blight
Devencenzi, Ag Pest Mgmt. & Research
Woodland, CA, 2009

% Walnut Blight

- Regalia® 1% v/v
- Regalia® 1% v/v + Nu-Cop® 50DF
- Regalia® 1% v/v + Manex + Nu-Cop® 50DF
- Manex + Nu-Cop® 50 DF
- Untreated Control
Regalia® is a proven component in Late Blight control programs in tomato.

Late Blight on Tomatoes
P.D. Roberts, R.M. Muchovej, R.E. Systma
Univ. of Florida, 2009

Mean Lesion Number

1Mean Lesion Number – Lesions per plot on May 4, 2009.
Regalia® shows significant suppression of Downy Mildew, even at low rates.
Regalia® is effective at suppressing Downy Mildew in ornamentals.

Downy Mildew on Viburnum
IR-4 Project, 2009

Incidence¹

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Incidence</th>
<th>Days</th>
<th>Dilution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regalia® 7 days</td>
<td>d</td>
<td>7</td>
<td>4 qts/100 gal (1% v/v)</td>
</tr>
<tr>
<td>Heritage® 7 days</td>
<td>cd</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Heritage® 14 days</td>
<td>bcd</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Statute SC® 14 days</td>
<td>b</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Untreated Control</td>
<td>a</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹Incidence = # of diseased leaves / total # of leaves.
Regalia® is effective at suppressing Downy Mildew in ornamentals.

![Graph showing Downy Mildew on Viburnum IR-4 Project, 2009](chart.png)

**Downy Mildew on Viburnum**

**IR-4 Project, 2009**

- **Regalia®**
  - 7 days
  - 4 qts/100 gal
  - 1% v/v

- **Heritage®**
  - 7 days

- **Stature SC®**
  - 14 days

- **Heritage®**
  - 14 days

- **Untreated Control**

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1Area Under Disease Pressure Curve.
Future Formulations

Regalia® Maxx (MOI or MBI-106020)

• 20% active ingredient. Formulation similar to MBI-10605 with higher level of active ingredient.

• Growers use lower rates. Less cost in packaging and shipping.

• For conventional and organic production – NOP compliant.

• Registration package at EPA.

• Market introduction in 2010.
Regalia® Maxx is proven to be as effective as Manzate® at controlling Early Blight on tomatoes.

Early Blight on Tomatoes

Universidad Autonoma de Sinaloa
Sinaloa, Mexico, 2009

% Infection after 4th Application

- Manzate® 200DF (4 app.)
- Regalia® Maxx 17.1 fl. oz per acre (4 app.)
- Regalia® Maxx 13.7 fl. oz per acre (4 app.)
- Regalia® Maxx 8.6 fl. oz per acre (4 app.)
- Untreated Control

Comparative effectiveness of treatments:
- Untreated Control: a
- Regalia® Maxx 8.6 fl. oz per acre (4 app.): ab
- Regalia® Maxx 13.7 fl. oz per acre (4 app.): b
- Regalia® Maxx 17.1 fl. oz per acre (4 app.): c
- Manzate® 200DF (4 app.): c
Conclusions

New Formulations of Regalia®

• Improved solubility of Reynoutria extract.
• Improved formulation quality – better mixing.
• Expanding knowledge base for disease control.
• NOP compliance.
Future Research with Regalia®

- **Additional Crops** - Focus on fruits, nuts, berries.
- **Field Crops** – Such as wheat, soybeans and peanuts.
- **Lower Use Rates** - Investigate lower use rates on fruiting vegetables in tank-mix scenarios.
Thank you!

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