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# Thyme Guard as a potential formulation to treat Citrus Greening

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# Thyme Guard – Physical Characterization

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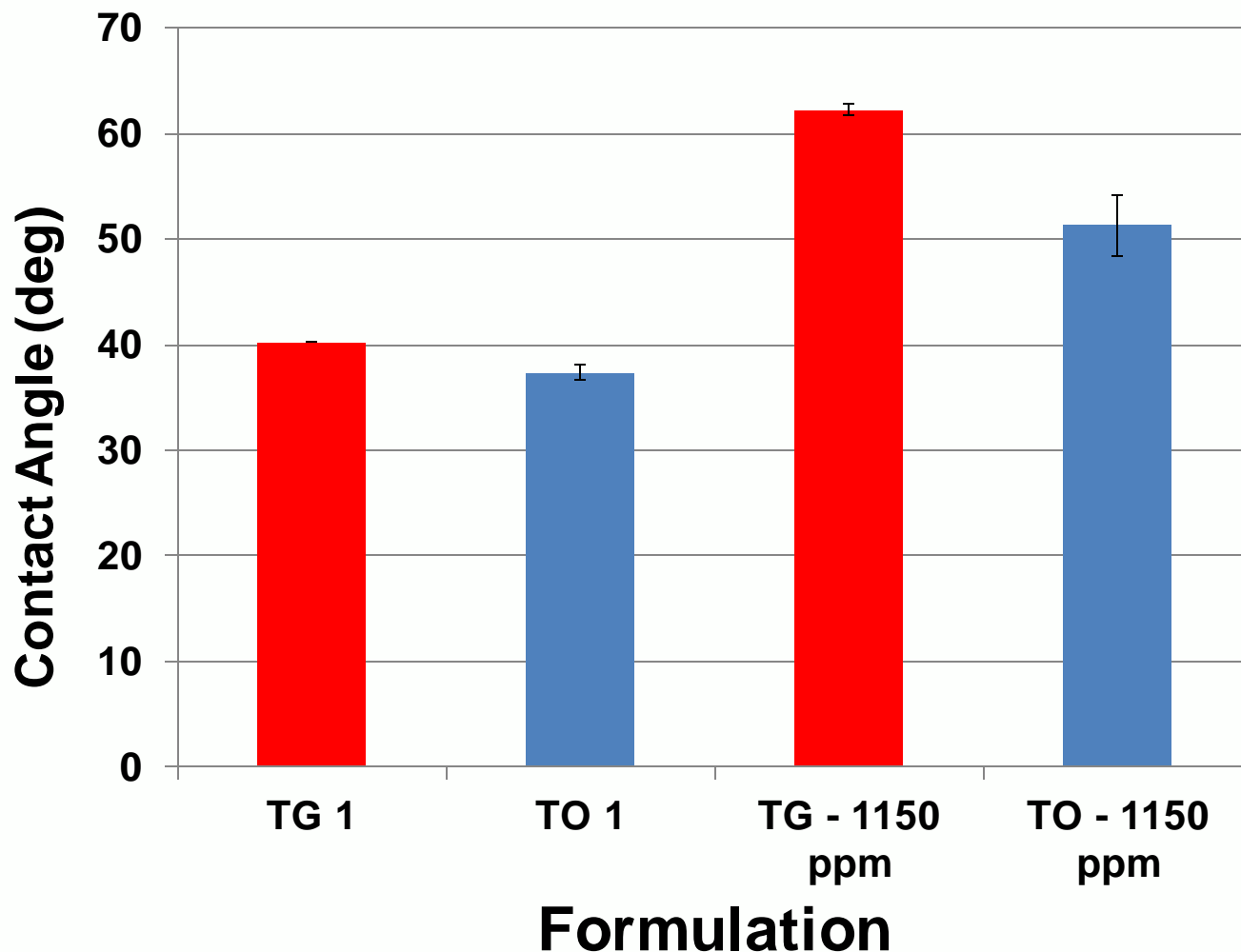
The following samples received from Agro Research International

- Thyme Guard 1 and 2 (two formulations – details unknown)
- Agro thyme oil (essential oil extract)

## Results from Thyme Guard formulations:

- **Droplet size as measured by dynamic light scattering**
  - Thyme Guard droplet size: ~10 nm
  - After dilution of thyme guard to 1150 ppm ( as recommend on product label for application) the droplet size was found to vary (37 – 110 nm)
- **Thyme Guard is optically clear - thus seems to be a microemulsion**
- **Stability**
  - Thyme Guard is stable at low (-5 °C) and high (55 °C) temperature
  - On dilution, it goes through phase changes. However it is a clear one phase system at 1150 ppm (recommended dilution for field application)

# Thyme Guard – Contact angle comparison



**TG 1: Thyme Guard 1**  
**TO 1: Thyme oil formulation @ PERC**  
**TG – 1150 ppm: Diluted Thyme Guard 1**  
**TG – 1150 ppm: Diluted TO 1 formulation**

*Contact angle measured with Parafilm since it is similar to cuticle surface\**

- **PERC formulation has better spreading profile**
- **Spreading can be enhanced by using spreader – sticker type adjuvants**

# Thyme Guard – Bacterial Inhibition comparison

- Thyme guard and agro thyme oil formulations used for comparison:
  1. *Thyme Guard 1*
  2. *Thyme Guard 2*
  3. *Thyme oil formulation developed at PERC*
  4. *Agro thyme oil formulation developed at PERC*
  5. *Controls for (3) & (4)*
- The bacterial inhibition of thyme guard and agro thyme oil was high (>90%) at all tested dilutions (up to 10 ppm of thyme oil loading in broth) and equivalent to our thyme oil formulation

<b>Thyme oil conc = 100 ppm</b>	<b>% Bacterial Inhibition</b>
Thyme Guard 1	100.93
Thyme Guard 2	94.53
Thyme oil formulation @ PERC	96.85
Agro thyme oil formulation @ PERC	97.05
Control for 3 & 4	97.12

# Thyme Guard – Particle size comparison

