

# IMPROVE BANANA YIELDS BY REDUCING HEAT STRESS

**Surround®**  
Agricultural Crop Protectant

Sunlight is essential for banana growth and fruit production, but excessive exposure to solar radiation can result in heat stress to both young banana plants during establishment and to mature plants during the lifetime of this perennial crop. The highly engineered kaolin particles in Surround® WP Agricultural Crop Protectant reflect infrared and ultraviolet radiation, significantly reducing heat stress and excessive light damage. A visual symptom of adverse plant stress is banana leaves hanging limply from the central leaf vein in a wilted condition. By reflecting excessive radiation, SURROUND maintains plants in more optimum and productive growing conditions.

## CORBANA Test Results

The multi-year, multi-generation CORBANA trial was conducted in Costa Rica under heavy rainfall, water shortage conditions and high and low temperatures. In order to minimize the effect of stress on cv Grande Naine banana plants, SURROUND behavior on productivity and quality was evaluated at rates of 3% and 5% every 8 days, and 5% every 15 days compared to a control treatment in mixtures with fungicides for black sigatoka (*Mycosphaerella fijiensis*) control. Vegetative and productivity variables were evaluated for four generations at the CORBANA Research Center from 2011 to 2014.

Results showed greater vegetative vigor and a lower interval of days between planting to flowering (12 to 15 fewer days) in banana plants applied with SURROUND, and higher return rates (number of fruit per hectare per year) — even under conditions of water stress and low and high temperatures where observed. Treatments with SURROUND had greater numbers of hands per bunch (0.1 to 0.6 more hands) and an increase in fruit weight (plus 1.1 to 2.0 kg/bunch) with respect to the control treatment. The fruit yield index or “ratio” was higher (plus 0.15) in plants applied with SURROUND compared to the control treatment. Evaluation of the bunch profile showed higher net weight of the fruits in the treatments applied with SURROUND (plus 0.4 to 3.4 kg/bunch).

SURROUND effectively reduced stress conditions in banana plants under adverse weather conditions such as drought and high and low temperature, translating to significantly increased productivity.

Results from other on-farm demonstration trials further validate the benefits of using SURROUND for banana plant establishment and overall productivity. In another trial conducted in 2012 in Costa Rica, SURROUND applied at 5% w/v every 15 days (Table 2) produced increased vegetative growth in mother and daughter plants at the time of shooting.

**Table 1. SURROUND increased yield, first generation.**  
(CORBANA, Costa Rica, 2012-2013, SURROUND at 5% w/v every 8 days)

Variable	SURROUND WP	Control
Number of Hands/Bunch	7.00	6.65
Bunch Weight (kg)	26.29	24.80
Yield Ratio (Boxes/Bunch)	1.25	1.16
Days Avg. from Planting to Flowering	245.00	239.00
Accum. Avg. Days from Planting to Flowering	13.00	

**Table 2. SURROUND increased vegetative growth in mother and daughter plants at the time of shooting**  
(Bioagro, DeLeyte Farm, Costa Rica, 2012, SURROUND at 5% w/v every 15 days)

Variable	SURROUND WP	Control
Mother Plant Leaves Number	13.05a	12.60b
Daughter Plant Height (cm)	153.50a	137.57b
Daughter Plant Leaves Number	9.64a	8.32b
Days from Transplant to Shooting	171.00a	177.00b

Means followed by different letters are significantly different ( $p < 0.05$ ).



Bananas planted October 2011 and treated with SURROUND every 8 days in standard Sigatoka program (11 applications).



Untreated Control

Both photo's taken 2/23/2013 at similar distance and angle.



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## The Science of Reflecting Light and Heat

SURROUND was co-developed with scientists at the U.S. Department of Agriculture (USDA). It is registered in the United States by the Environmental Protection Agency (EPA) and kaolin is Annex I listed in the European Union by the European Food Safety Authority (EFSA), therefore, use of SURROUND for export markets is free of tolerance complications. SURROUND's patented kaolin particles reflect excessive infrared and ultraviolet radiation from the plant canopy, and do so more efficiently than other solar protectant products. A recent study evaluating the solar reflectance capabilities of various products shows SURROUND is superior at reflecting the most damaging wavelengths of solar radiation compared to the other products tested.

## Guidelines for Use

- **Concentration:** Use 5% weight/volume in typical spray volume for banana crop protection.
- **Timing:** Initiate applications for heat stress at transplanting and continue weekly or biweekly thereafter in the normal Sigatoka disease control and crop protection program.
- **Mode of Application:** Back pack sprayer, motorized sprayer, or aircraft aerial sprayer. Calibrate sprayer and spray according to standard banana spray program volume.
- **Tank Mixing:** SURROUND may be mixed and applied with fungicides, insecticides, and foliar fertilizers because it is chemically and toxicologically inert. However as a precaution, prior to tankmixing, conduct a small jar test for signs of physical incompatibility.
- **Post Harvest:** After harvest but before bananas are wet, ensure there are no white residues by visually inspecting bunches. Trace residues can be removed by gently wiping with a cloth.



**Important: Always read the label before buying and follow label instructions when using this product.**

The use of Surround® in agricultural crop protection may be covered by patents held by Tessenderlo Kerley, Inc. For more information, visit [novasource.com](http://novasource.com).

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