



Creating Value Through Innovative Solutions

Surround is marketed by NovaSource, a business unit of Tessenderlo Kerley, Inc. Phoenix, Ariz. NovaSource was created to develop and market off-patent and novel crop protection products. Our mission is to create value for our customers by providing innovative solutions for their crop protection needs. We employ a global network of formulation technologists, active ingredient suppliers, and specialized marketing partners, all with unique capabilities to develop exceptional product offerings. Concentrating on niche segments, we serve the agriculture, horticulture, turf, forestry, and aquatic, markets. Our goal is to deliver products that provide a sound business benefit to our customers.



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Surround®. Protection You Can See. Performance You Can Trust.



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

The use of Surround® WP in agricultural crop protection applications is covered by US Patents 6,027,740; 6,069,112; 6,110,867 and 6,156,327.

CONDITIONS OF SALE – LIMITED WARRANTY AND LIMITATIONS OF LIABILITY AND REMEDIES

Failure to strictly follow label directions may cause injury to crops, animals, man or the environment. Tessenderlo Kerley, Inc. (TKI) warrants that the product conforms to the chemical description on the label and is reasonably fit for the purpose referred to in the directions for use when properly applied in normal weather conditions. TKI makes no other warranty or representation of any kind, express or implied, concerning the product, including no implied warranty of merchantability or fitness for any particular purpose. The exclusive remedy against TKI for any cause of action relating to the handling or use of the product is a claim for actual out-of-pocket damages, and in no event shall TKI be liable for special, indirect, incidental or consequential damages or expense of any nature, including, but not limited to, loss of profits or income, whether or not based on the negligence of TKI, breach of warranty, strict liability in tort, or any other cause of action. TKI and the seller offer the product, and the buyer and users accept it, subject to the foregoing conditions of sale and limitations of warranty, liability and remedies.

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Surround® Crop Protectant for Plant Surface Protection

Surround®

Crop Protectant



Plant surface protection means higher packouts of better quality pineapples

Sunburn and heat stress can take a toll on pineapple plants and fruit by increasing rejections and lowering yields, resulting in significant economic losses. As part of a planned treatment program, Surround® Crop Protectant can reduce losses from sunburn damage and heat stress, resulting in higher packouts of better quality fruit. That adds up to greater profitability.

Protection you can see. Performance you can trust.

Surround represents a breakthrough opportunity for plant surface protection. Surround covers plant surfaces with a protective white film – a layer of highly engineered kaolin particles that reflect harmful infrared and ultraviolet radiation. The advanced particle film technology behind Surround Crop Protectant was co-developed with the U.S. Department of Agriculture and can significantly reduce losses from sunburn, bleaching and heat stress.

Surround is designed for its ability to:

- Reflect the sun’s heat without inhibiting photosynthesis
- Provide good coverage
- Provide controlled adhesion to the plant canopy and fruit
- Mix easily in water
- Be applied with most agricultural spray equipment
- Wash off the fruit with high pressure water sprays

Sunburned fruit is wasted fruit

High temperatures and solar radiation can damage pineapple plants and fruit, resulting in significant financial losses. In pineapples, sunburn can occur whenever the sun’s rays are strong and temperatures exceed approximately 90°F (32°C). External sunburn, or bleaching, manifests as bleached, yellow-white skin that turns pale gray/brown with damage to the tissue underneath. Damaged areas are susceptible to infection. Internal sunburn, or “boiling,” is thought to be the result of high air temperatures. Highly translucent fruit appear to be most susceptible to internal sunburn, which renders the fruit unfit for commercial use.



Internal sunburn damage, or “boiling,” can occur when developing pineapples are exposed to high air temperatures. Damage is only visible in fruit that has been cut.

Proven to reduce sunburn damage

Since 2000, growers around the world have successfully used Surround to manage sunburn and heat stress in many tree fruit, vine and vegetable crops. Replicated trials in Australia, South Africa, and Costa Rica show that sequential applications of Surround significantly reduce the incidence of external and internal sunburn in pineapples.

Trials confirm reduced damage

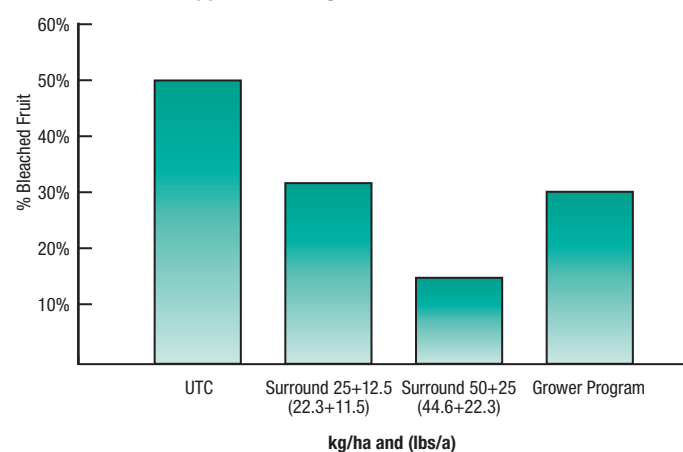
Australia

Based on an Australian study, two different Surround programs reduced bleaching of fruit significantly when compared to the untreated control.

Waste reduction

	kg/ha and (lbs/a)		
	1st Spray	2nd Spray	% Bleaching
Surround Program 1	25 (22.3)	12.5 (11.15)	32
Surround Program 2	50 (44.6)	25 (22.3)	15

Reduction of Pineapple Bleaching



South Africa

In a study in South Africa, Surround® reduced the incidence of sunburn by an average of 46 percent.

Internal sunburn reduction

Treatment	Site 1	Site 2	Site 3	Mean
Surround® WP	16.9	11.7	36.7	21.7
Control	29.3	30.0	61.7	40.3
% Reduction	42.3	61.1	40.6	46.1

Costa Rica

In a study in the hot dry conditions of western Costa Rica, Surround cut fruit waste nearly in half (48.9 percent), contributing to higher yields. Applications of Surround also prevented leaf yellowing. The absence of leaf damage appears to have contributed to increased yields as manifested in larger fruit – more 4/box and 5/box fruit. In addition, Surround-treated plots had more healthy fruit, even in borders along roads and drainage areas.

Waste reduction

Treatment lbs/A (Treatment kg/h)	Total Waste (% of harvested fruits)	Percent Waste Reduction as compared to the untreated control
0	11.0	--
57 (64)	8.8	20.5
82 (92)	5.6	48.9



Untreated leaves (left) showed sunburn damage. Plants treated with Surround® showed no leaf damage from sunburn.

Engineered particles protect against heat stress

Prolonged exposure to high temperatures and intense solar radiation can damage fruit and stress the entire plant. Surround is proven to keep plants cooler. In trials where temperatures regularly exceeded 90-95°F (32-35°C) Surround reduced the temperature of treated leaves by 5-9°F (3-5°C).

Apply Surround early for maximum plant surface protection

Per label instructions, begin applying Surround to plants and fruit prior to the onset of high temperatures or at the onset of the dry season. Reapply at intervals no longer than 30 days. Shorter intervals may be needed depending on weather and the amount of Surround remaining on the plants from earlier treatments. For sunburn protection, fruit and other plant surfaces should be thoroughly



covered with one to two full-rate applications before conditions leading to sunburn occur.

Application recommendations

Surround can be applied using conventional application equipment, and Surround can be tank-mixed with most commonly used fungicides or pesticides. Concentrations are 3 percent to 5 percent in the amount of water typically used per hectare.

- Calibrate sprayer and spray according to plant row volume
- Spray to “near drip” coverage (before the point of runoff)
- Reapply to reestablish coverage after heavy rain, wind, erosion or new growth
- Always add Surround before other tank mix materials

Remove Surround at the packing plant

Surround is made from specially formulated kaolin, an inert, naturally occurring mineral that is used in cosmetics and toothpaste, and which is approved by the U.S. Food and Drug Administration (FDA) for use as a food additive up to 2.5 percent.



Surround residues should present no concerns for processed (canned) pineapple. However, residual white Surround deposits must be removed from fresh market pineapples. High pressure water sprays installed in the packing plant prior to waxing have proven extremely effective and are recommended by Tessenlerlo Kerley.