

SPF (Skin Protection Factor)

Not a proven measurement for sunburn protection in plants.

Several sunburn products on the market make claims regarding SPF ratings. SPF is a multiple for determining how long a product will protect human skin from burning in comparison to leaving the skin untreated.

SPF only measures the level of protection against UVb rays, which have been proven harmful to human skin. Because research shows that in plants sunburn is caused by a combination of UV (a & b), visible and infrared radiation reaching plant surfaces, the SPF factor rating is not a viable measurement of sunburn protection in horticultural applications.

As noted in this issue of *NovaSource Reporter*, a recent study has found that Surround reflects all three wavelengths of incoming light radiation significantly better than competitive sunburn protection products, not just the UVb measured by Skin Protection Factors.

The study, taken together with research that sunburn in plants is caused by multiple sources of light radiation, refutes claims by the manufacturers of some sunburn products regarding SPF ratings.

Almond Drought Management Meeting Provides Forum for Two Surround Presentations

Researchers share potential benefits for mitigating heat stress and improving water use efficiency.

A LATE MARCH MEETING ON STRATEGIES for managing almonds under the current drought environment featured two presentations by academic researchers on the benefits of Surround® for reducing heat stress and increasing water use efficiency in almonds and other crops.

More than 300 almond growers and consultants attended the meeting by UC Cooperative Extension at Panoche Creek Packing in Kerman, Calif.

Dr. Michael Glenn, with the USDA's Appalachian Fruit Research Station in Kearneysville, W. Va., shared his years of research on reflective particle films such as Surround and its potential impact on water use and photosynthesis under extremely high heat and water stress conditions.

With surface water deliveries well below normal, growers within many federal water districts are seeking ways to preserve their trees and hopefully retain a crop under reduced and often poor-quality irrigations.

Glenn, a plant research pioneer in particle film technology, conducted a field trial on Surround in apples under high stress conditions. He found that when temperatures were above 100 degrees F, Surround applications of 25 pounds per acre in 100 gallons of water reduced canopy temperatures within the orchard canopy by as much as 8 degrees, helping to maintain plant transpiration and photosynthesis longer and increase productivity.

“Studies show that Surround is highly reflective to UV wavelengths and reduces solar

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UCCE farm advisor Brent Holtz, center, and Michael Glenn, right, a researcher with the USDA's Appalachian Fruit Research Station, discuss Surround with attendees at a March meeting on drought management for almonds.

New Study Provides Insight Into the Cause of Sunburn in Plants

RECENT RESEARCH INTO THE CAUSES OF SUNBURN in fruit concludes that sunburn is caused not by a single wavelength of light, but rather by a combination of ultraviolet, visible and infrared radiation (heat) reaching the plant surface.

Independent researchers compared the amount of light radiation passing through a slide treated with Surround against a similar glass slide coated with other sunburn protectant products. Experts know that sunburn in crops is caused by a combination of UV, visible and infrared radiation reaching the plant surface, suggesting that superior protection against all these forms of light radiation provides superior protection against sunburn.

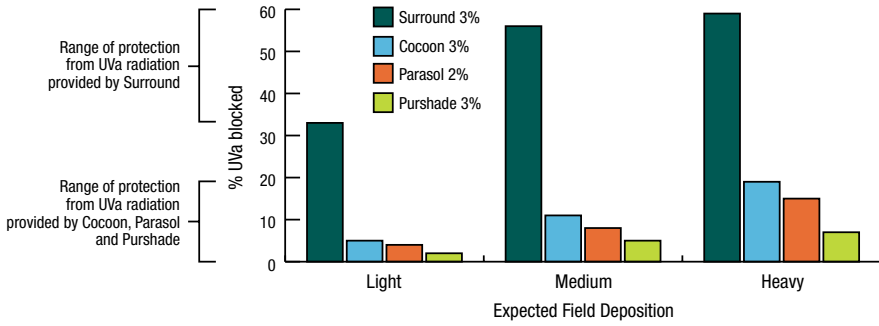
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A beam of light is refracted through a glass slide sprayed with Surround.

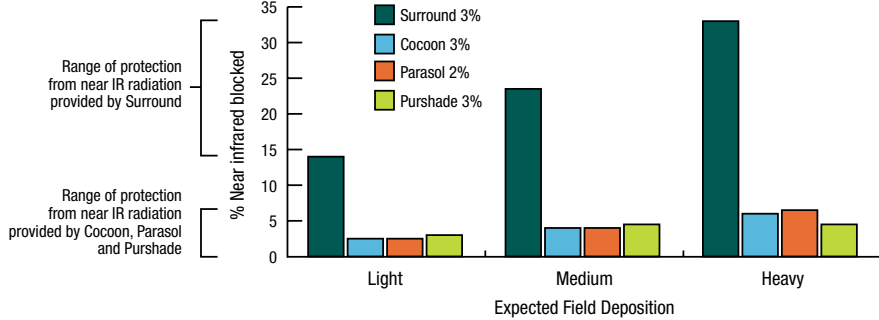
A Comparison of Protection From UVa Radiation

A light deposition of Surround is far more effective reflecting UVa radiation than even heavy applications of Cocoon, Parasol or Purshade



A Comparison of Protection From Near Infrared Radiation (Heat)

A light deposition of Surround is far more effective reflecting and blocking near infrared radiation (heat) than even heavy applications of Cocoon, Parasol or Purshade



The Cause of Sunburn in Plants

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The laboratory study found that Surround reflects all three wavelengths of incoming light radiation significantly better than competitive sunburn protection products, even under comparatively light depositions. At the same time, studies have shown that Surround does not inhibit the ability of water and carbon dioxide to pass through the film.

Researchers sprayed slides with multiple product applications of Surround and three other sunburn protection products and measured the level of protection from various light spectra, including UVb, UVa, and near infrared (NIR) radiation. Multiple product applications were made to evaluate the effect of increasing deposition, and the measurements were replicated three times.

In those replicated trials, researchers found that Surround reflects more than twice the level of UVb radiation, three times the level of UVa radiation and five times the level of near infrared radiation from plant surfaces, when compared to equivalent applications of Cocoon®, Parasol® and PurShade™.

“This research shows that even light depositions of Surround provide far more protection against UVb, UVa and near infrared radiation than even heavy depositions of the competition,” said Peter Barrows, Surround product manager and international business director for NovaSource. “This is most likely because the calcined* kaolin in Surround provides much better reflectivity to these wavelengths of light than does hydrous kaolin or calcium carbonate found in the competitive products compared in this study.”

* Note: the use of calcined kaolin in agricultural crop applications is protected by Surround WP U.S. patent USP #6027740 and USP #6069112. Always read and follow label directions.

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Almond Drought Management

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injury to leaves and fruit. It also increases leaf carbon assimilation and reduces canopy temperature,” Glenn said. “I think there is the potential that Surround applications in severe water-stressed orchards might help.”

Whole tree gas exchange studies showed treated trees were under less stress at high temperatures and as a result, continued to photosynthesize longer than untreated trees under drought-like conditions. Surround essentially reflects light off the outer leaf surfaces and diffuses it throughout the middle of the canopy to reduce temperatures on the outer leaf surface. The result is an increase in stomatal conductance of carbon and water, which relates directly to increased photosynthesis and productivity.

“Particle film technology puts one more tool in the tool kit, along with the other things (growers) are doing, to work with the economic and environmental realities of today,” Glenn said.

UC Cooperative Extension farm advisor Brent Holtz, who has also studied Surround for nearly a decade, shared his findings on Surround related to yield and bud failure on a new almond planting between 2002 and 2008 (see March 2009 issue of [NovaSource Reporter](#).) Multi-year trials on Carmel and nonpareil almonds showed significant reduction in the incidence of bud failure on affected Carmel trees in the study, likely as a result of reduced heat stress with Surround applications.

“We saw definite trends between 2005 and 2008 for less water stress in Surround-treated trees,” Holtz said.

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