**Surround® Crop Protectant**

**Less Extreme Conditions and/or a More Heat-Tolerant Plant**

(Stomata closure is not reached by either the Surround-treated or the untreated plant)

- Under these conditions the Surround-treated plant remains cooler all day and uses less water than the hotter, untreated plant. The environmental demand for water in the Surround-treated plant is reduced due to the lower canopy temperature.

**More Extreme Conditions and/or a Less Heat-Tolerant Plant**

- Under these conditions both plants get hot enough that their stomata close down because they cannot meet the environmental demand for water. But because the Surround-treated plant remains cooler, it reaches the shutdown temperature later in the day than the untreated plant. In this example the Surround-treated plant will use more water during midday but will be more productive and will suffer less damage.

**Washing Considerations**

Kaolin, the active ingredient in Surround Crop Protectant, is approved for use as a food additive at levels up to 2.5 percent, according to the United States Food and Drug Administration (FDA). It is also exempted from the requirement of a tolerance by the United States Environmental Protection Agency (EPA), under CFR 40, 180.1001(c).

Fruits and vegetables that are to be marketed fresh but have a white film of Surround remaining at harvest can be washed to remove the film. Though Surround is designed to have moderate adhesion to fruit surfaces, the film is normally removed with common washing techniques found in packing houses. Perform a wash test under your packing house conditions before applying Surround to fresh market fruit.

Field-packed fruit that will not be washed may be sprayed early in the season for heat stress. The sprays should be discontinued when the fruit are still small. The remaining film coating will essentially loosen and fall off due to the expansion of the fruit and from rain and wind attrition. This attrition will be more pronounced in rainy climates. Remember, when Surround sprays are discontinued and the crop begins to “grow out” of its protective coating, sunburn protection will be lost. Consult the Surround Wash Guide for more information.

**For more information visit www.novasource.com or call 1.800.525.2803.**

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**PROTECTION You Can See. PERFORMANCE You Can TRUST.**

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**Surround Test Plot in a California Vineyard.**
Surround Crop Protectant represents a breakthrough opportunity to improve plant health and maximize crop yields. Surround covers plant surfaces with a protective film – a layer of highly engineered calcium-based particles – providing protection from some of nature’s most damaging elements and allowing the plant to achieve its full potential yield.

In Development with the United States Department of Agriculture (USDA), Surround is an advanced plant health technology that can significantly reduce losses from sunburn and stress and can lead to greater rates of photosynthesis and potentially enhanced yields. And Surround protects crops from harmful insects.

Benefits of Surround

PLANT HEALTH

Light and heat are necessary for plant growth. Too much or too little light can reduce crop yield and quality. When plants experience conditions outside their optimum temperature and light conditions, they expand energy to adapt. However, plants’ adaptive mechanisms often are slow to adjust to environmental change. If conditions go too far beyond the optimum, critical plant processes can slow, and imbalances can occur that result in damage.

Surround Can Help Reduce Sunburn and Heat Stress in Two Ways:

1. Surround creates a light, greatly reducing the transmission of harmful ultraviolet and infrared light into the leaf.
2. Surround reduces leaf/canopy temperature.

Benefits of Using Surround

• Achieve higher rates of photosynthesis in plants under heat stress.
• Keep plants cool: A cooler plant may use less water.
• Reduce water stress, which can result in higher rates of photosynthesis and greater yields.

The net benefit is that more carbohydrates are available to be stored in the fruit and to build healthy roots and other structures, and less energy is used to maintain and repair damage. This is measured as increased fruit size, more water, higher oil content, increased fruit size, and more vigorous plant growth. For perennial crops, one result may be a more vigorous, healthier plant, which is not visible until the year after Surround treatment.

Insect Suppression

Surround is an EPA-registered insecticide specially formulated with calcium-based to suppress insect activity. To be effective, Surround must be used in a preventative program and should be sprayed before the insect appears. Surround can reduce pest pressure and minimize the need to use pesticides, eliminating the need for a conventional insecticide spray. When pest pressure reaches an economic threshold then a knock-down insecticide should be used.

Insect Suppression Benefits

• Protection from insect pests is provided when used preventative.
• Integration into an IPM program can aid in reducing the number of pest infestations.

Insect Suppression

• Surround should be applied prior to high temperature/humidity conditions in order to be effective as a plant health and anthracnose preventative product.

As an insect repellent, Surround’s suppression activity is most effective when applied before insects enter the field; since one way Surround protects your field is by cancelling your crop from infestation.

• Several applications are typically necessary for complete coverage and suppression is dependent on - the coverage obtained in each application;
• the length of time protection is required; and;
• the reduction in coverage over time from irrigation, rain, wind and expanding new plant growth.

Application Tips

• Apply Surround near drip. Avoid foliage run-off.
• Surround can be tank-mixed with most pesticides.
• Surround can be applied aerially using standard equipment.
• Apply Surround to near-drip. Avoid foliage run-off.
• Surround’s suppressant activity is most damaging elements and allowing the plant to achieve its full potential yield.

The apple treated with Surround (right) is cooler – and therefore less prone to sunburn damage than the untreated apple (left), which shows a pronounced damage. This is measured as increased fruit size, more water, higher oil content, increased fruit size, and more vigorous plant growth. For perennial crops, one result may be a more vigorous, healthier plant, which is not visible until the year after Surround treatment.

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How Does Surround Affect Water-Use Efficiency in Plants?

Three general environmental factors affect the “demand” for water: light, temperature and relative humidity. If a plant can meet the environmental demand for water, the plant will use less water, but it will also be less productive and potentially suffer damage. When conditions are extreme, the plant’s natural defense mechanism closes stomata to conserve water, and photosynthesis processes are shut down or reduced accordingly. This protective plant response can contribute to significant stress, including cell damage as sunlight continues to deliver energy that the plant’s cells cannot productively absorb. During extreme conditions, entire plants will be less water than the untreated plant. And during the time of plant shutdown, significant plant stress and damage can occur in addition to the plant being non-productive.

How Do I Calculate the Effect of Surround on My Crop?

A theoretical example may help explain the phenomenon of how efficiently water is used. Calculating the exact benefit is difficult because conditions vary from hour to hour and day to day.

Can Surround Treated-Crop Use Water More Efficiently?

Yes, Surround enables the plant to tolerate much more severe ambient temperatures, therefore prolonging the period in which photosynthesis can take place. When photosynthesis is occurring, the plant continues to use its water. In addition, the treated plant continues to grow and manufacture carbohydrates promoting enhancing its potential for both production and yield.

How to Use Surround

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