

Be Aware of Important Differences in Mineral-based Crop Protection Products

Calcined Kaolin in Surround® Delivers One of the Purest and Most Effective Options

SURROUND Agricultural Crop Protectant, a kaolin-based particle film product, is acknowledged around the world as a successful tool for reducing harm from solar radiation and reducing heat stress. In the USA and some other countries, SURROUND is also registered for the suppression/control of many insect pests on a wide variety of crops.

SURROUND is the only calcined kaolin product available for agricultural production with more than 18 years of commercial use and extensive research on a multitude of crops.

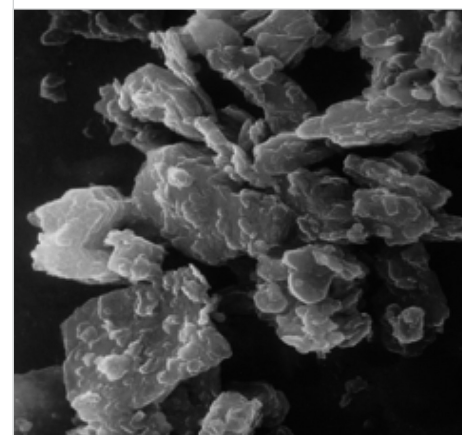
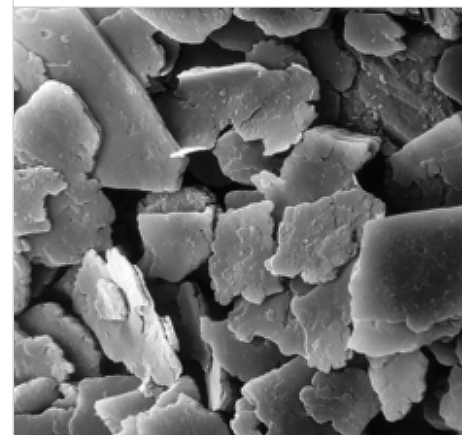
As new products enter the market, NovaSource is committed to continuing stewardship activity regarding the use of mineral-based particle films, providing insights into the characteristics of SURROUND.

A Superior Choice

When considering solar protection options, consider that:

- SURROUND is formulated calcined kaolin, which is a brighter white than other kaolin products.
- SURROUND applies in a consistent layer, which combined with its brightness, makes it a stronger reflector of solar radiation and is therefore, pound-for-pound, more effective at protecting crops.
- SURROUND increases photosynthesis by keeping stomata open longer and, therefore, increasing CO₂ uptake in plants.
- SURROUND mixes easily. It has a reliably fine particle size; the median size is about one micron, unlike other crude mineral protectants.
- SURROUND is made of high-grade kaolin, mined in Georgia and highly purified so as not to contain measurable levels of crystalline silica.¹
- Crystalline silica is a pulmonary carcinogen that is, unfortunately, common in crude kaolin products that are not purified with the same care as SURROUND.^{2&3}
- While SURROUND contains no measurable crystalline silica, imitation products can contain crystalline silica particles fine enough that they can be inhaled deeply into the lungs.
- Beyond its serious health effects, crystalline silica is a hard mineral that can cause premature pump and nozzle wear.
- SURROUND is OMRI-approved and registered for use on a broad spectrum of crops as a sunscreen and for insect suppression. The U.S. EPA pesticide registration process involved a risk assessment of SURROUND. Other kaolin mineral products without U.S. EPA registrations have not been evaluated by U.S. EPA for their effects on human health.

Read the label and SDS of any mineral-based particle film to ensure the product does not contain cancer-causing crystalline silica.



Top: Hydrous kaolin

Bottom: Calcined kaolin

Electron micrographs of hydrous kaolin and calcined kaolin clearly demonstrate the multi-dimensional surfaces of calcined kaolin. This causes it to reflect and disperse light more efficiently.



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KAOLIN STEWARDSHIP UPDATE



Surround®
Agricultural Crop Protectant

Calcination Improves Effectiveness

In the manufacturing process, the kaolin in SURROUND passes through ovens at temperatures greater than 1,800° F (1,100° C) to modify its surface structure in order to optimize its reflectivity of solar (infrared, ultraviolet, and visible) radiation.

It has long been known that excessive heat can shut down photosynthesis. SURROUND can reduce and disperse the amount of radiation reaching plant surfaces, which can result in minimized sunburn damage, increased fruit size, greater yield, increased soluble solids and more vigorous plant growth.

Comparing SURROUND Calcined Kaolin and Hydrous Kaolin

SURROUND Calcined Kaolin	Hydrous Kaolin
No measurable levels of crystalline silica.	Often contains respirable crystalline silica, understood by global health organizations as a pulmonary carcinogen if inhaled.
Manufactured using a patented water wash process that removes harmful crystalline silica from kaolin.	Inexpensive kaolin is generally manufactured by dry milling virtually everything mined from the earth — resulting in levels of crystalline silica very likely to exceed NIOSH safety standards.
Manufacturing involves additional purification steps and SURROUND is formulated to optimize efficiency for agricultural uses.	Manufacturing does not include the patented water wash process used in producing SURROUND and may not be formulated for agricultural uses.

For California

Products containing crystalline silica may require Prop 65 warnings in California because workers are exposed to a cancer-causing hazard.

U.S. EPA Registration Provides Additional Benefits

SURROUND also provides insect control and/or suppression of insects in many major crops. It deters insect damage by creating an environment that:

1. is repellent and unfamiliar. Pests go elsewhere.
2. prevents egg laying — shutting down future generations.
3. inhibits and substantially reduces feeding — reducing vectoring of important diseases.
4. causes paralysis or altered behavior.
5. makes the host plant unrecognizable both visually and upon contact.
6. makes it hard for insects to grasp treated surfaces. Pests fall off.

FOOTNOTES:

- 1 SURROUND contains no measurable amounts of crystalline silica, per analyses conducted to the internationally recognized sampling and method of analysis published by the National Institute of Occupational Safety and Health (NIOSH Manual of Analytical Methods, #7500 — Silica Crystalline).
- 2 "Crystalline silica has been classified as a human lung carcinogen." Source: OSHA Fact Sheet — Crystalline Silica Exposure Health Hazard Information, 2002. Available on OSHA.gov.
- 3 "Crystalline silica in the form of quartz or cristobalite dust causes cancer of the lung." Source: International Agency for Research on Cancer (IARC), IARC Monographs — 100C, "Silica Dust, Crystalline, in the Form of Quartz or Cristobalite."

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.

WARRANTY AND LIMITATION OF DAMAGES

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Aerial application of SURROUND



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