

Surround[®] WP

Agricultural Crop Protectant

Surround for Insect Management and Protection against Heat and Light Stress

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TKI NovaSource

SURROUND WP is a registered “biopesticide/insecticide” in the USA, Canada, Spain, France, Belgium, and Greece. Additional insect control registrations anticipated for Hungary, Costa Rica, Honduras, Brazil, and Mexico.

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Agricultural Crop Protectant



Now Approved
Organic Status in
European Union.

Product eligible for use in organic farming in accordance with regulation (EC) no. 834/2007 on organic production

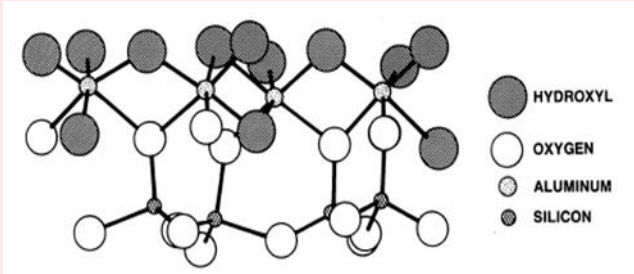
Surround is also listed for use in organic agriculture in:

- **USA and Canada by OMRI (Organic Materials Review Institute)**
- **USA by NOP (National Organic Program administered by the U.S. Department of Agriculture)**
- **Australia by NASAA (National Association for Sustainable Agriculture, Australia)**

What is Surround[®]

Agricultural Crop Protectant

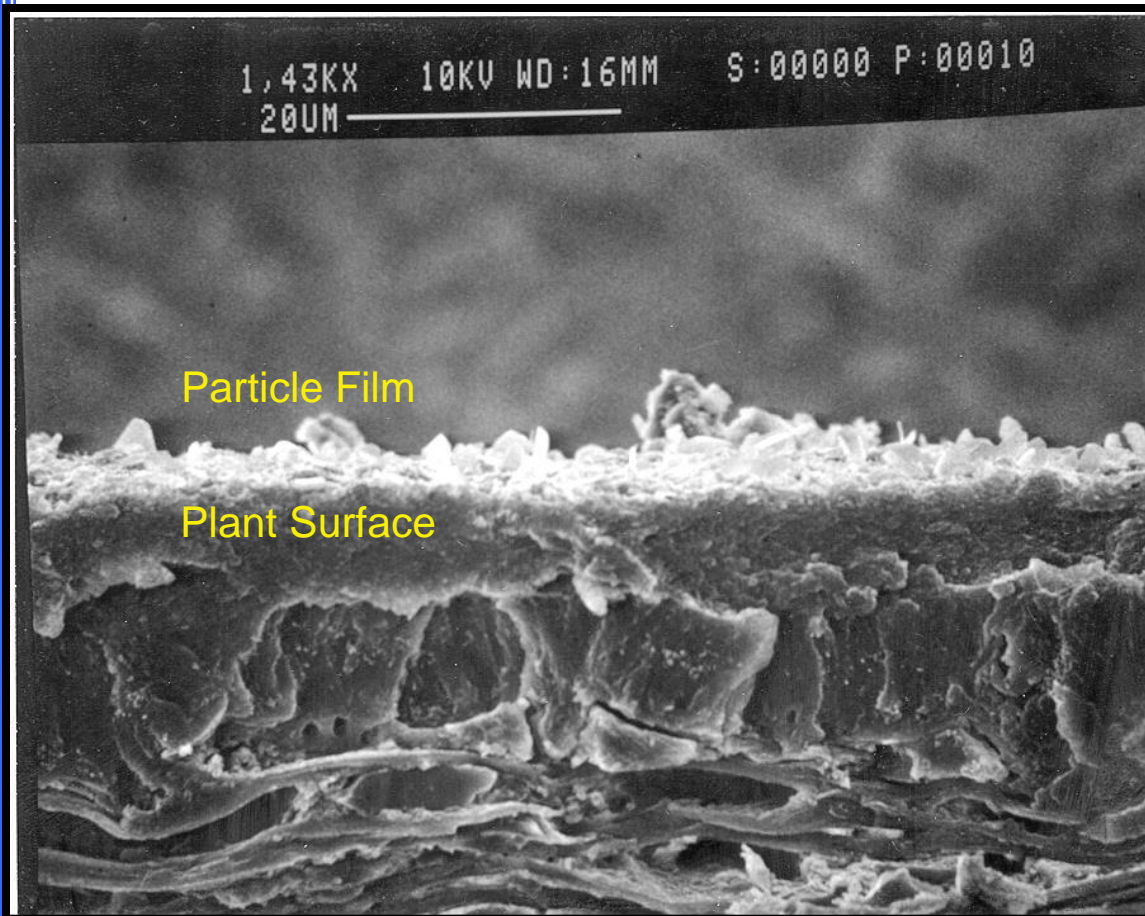
SURROUND WP Crop Protectant active ingredient is 95% Calcined Kaolin

Active substance:	Kaolin (Aluminium silicate)
CAS No:	1332-58-7
Molecular formula:	Hydrous kaolin: $Al_4 Si_4 O_{10} (OH)_8$, Calcined Kaolin: $Al_4 Si_4 O_{14}$
Molecular mass:	A single molecule cannot exist, approx. 258 g/mol of hydrous kaolin
Chemical group:	Clay minerals 
Key Feature:	Highest quality kaolin with minimal impurities is heat treated to form calcined kaolin



What is a “particle film”?

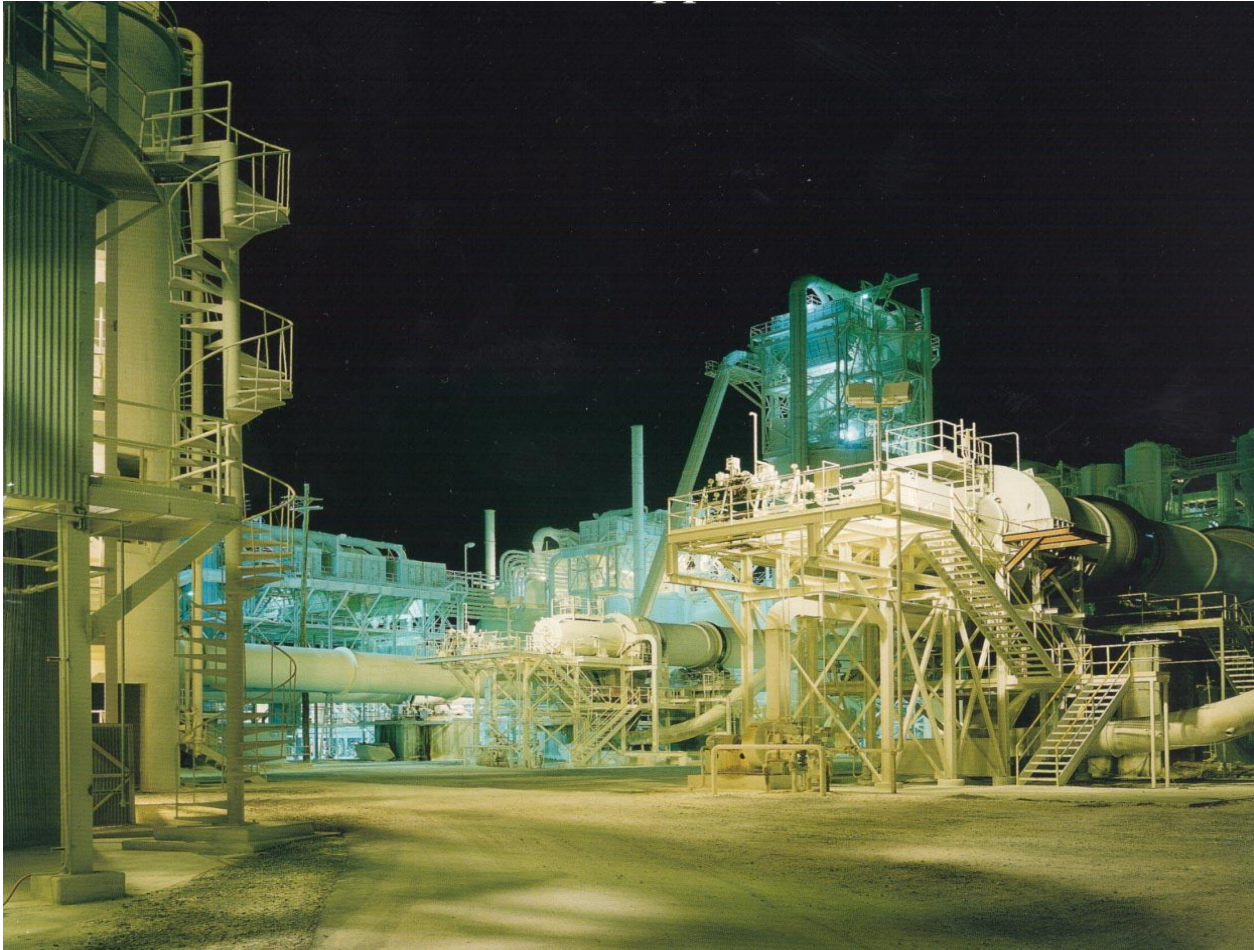
- A microscopic layer of mineral particles.
- Allows water and carbon dioxide to pass through the film.
- SURROUND does not block stomata.
- SURROUND selectively reflects UV and IR but allows much of photosynthetically active radiation (PAR) to be transmitted.
- Whole canopy measurements demonstrated SURROUND applied to apple trees actually increased photosynthesis.



SURROUND does not block stomata, therefore
does not interfere with photosynthesis

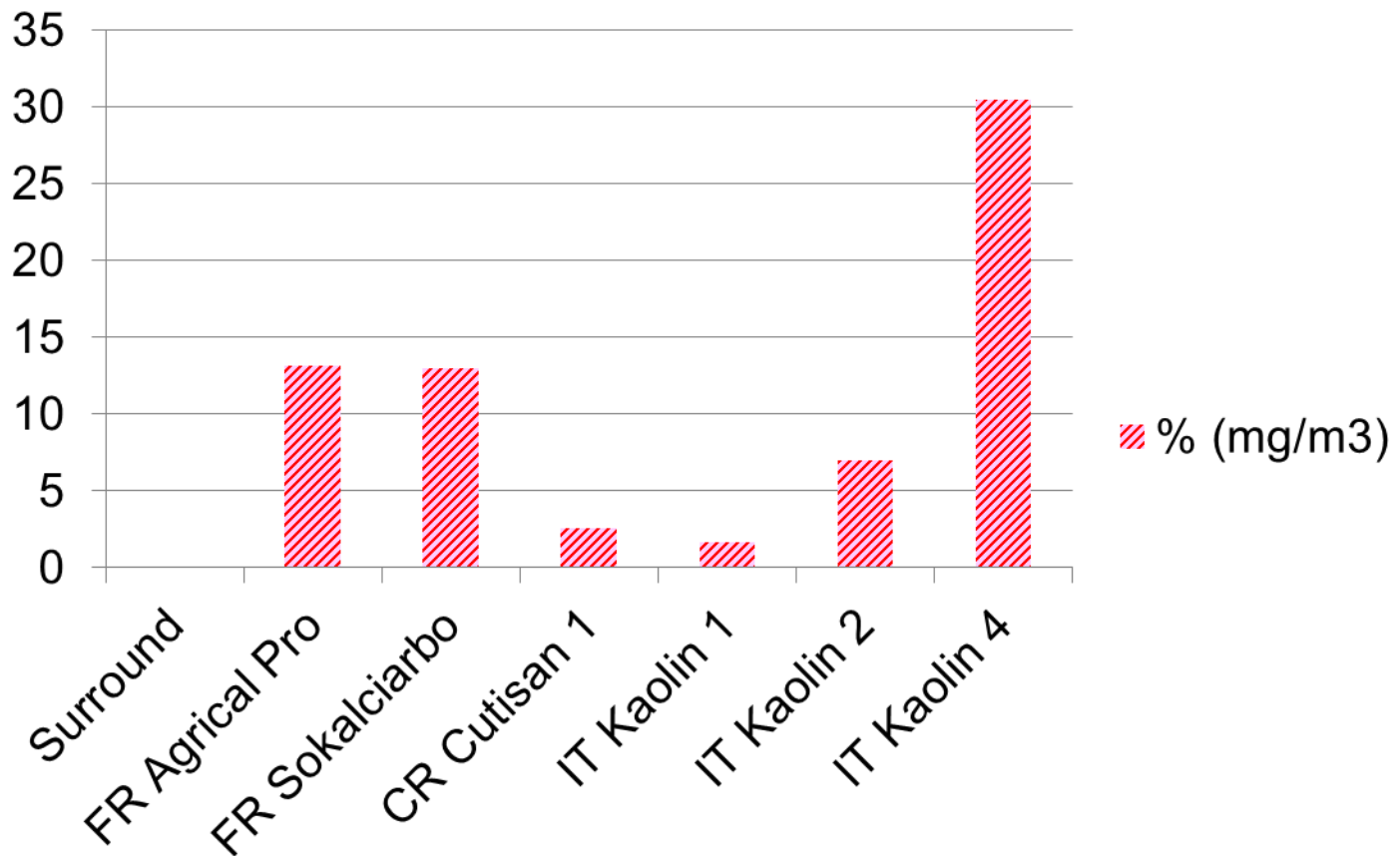


SURROUND kaolin is extensively processed to improve overall safety and functionality



Surround[®] kaolin is extensively processed to improve overall safety and functionality

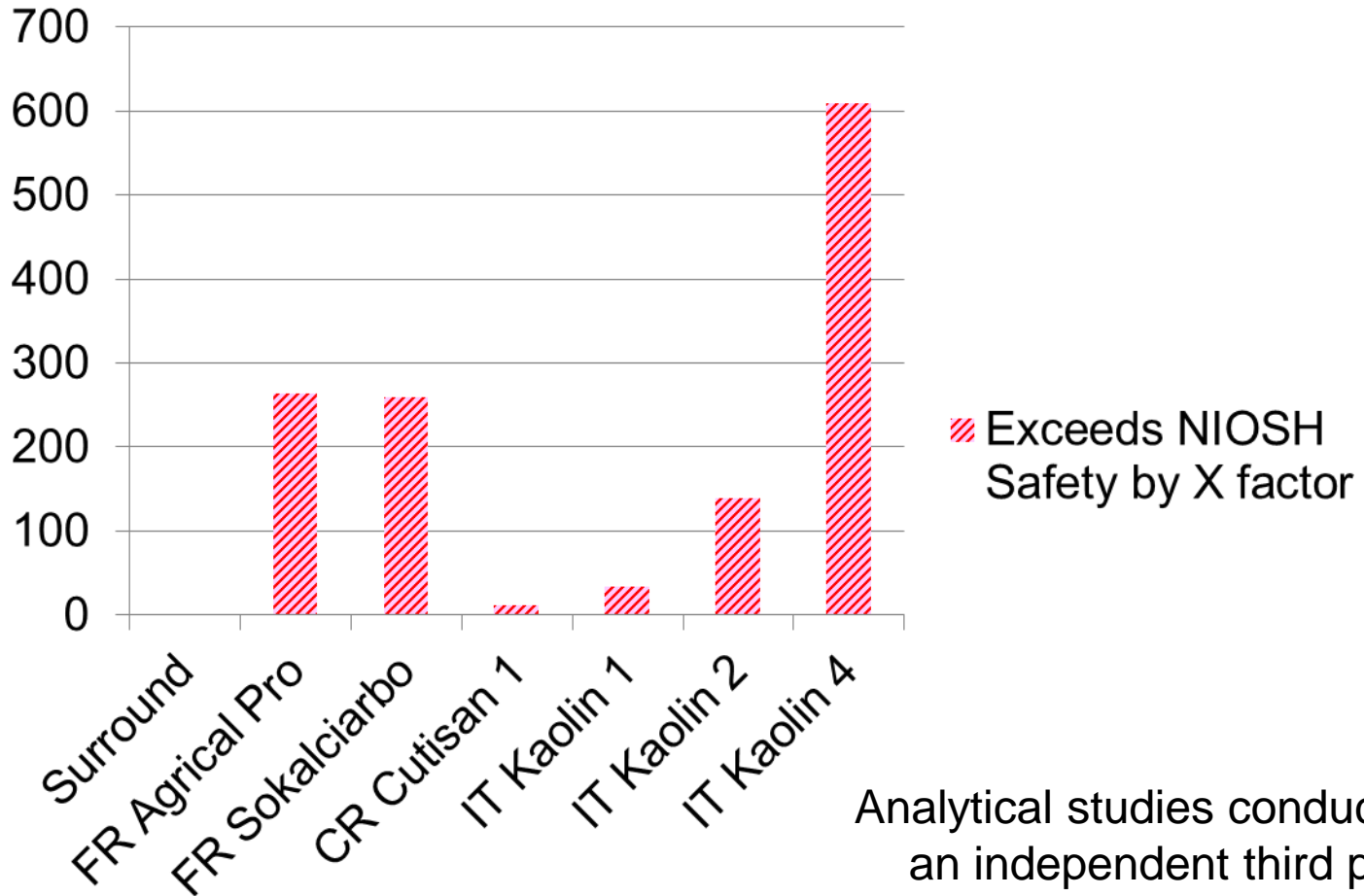
Crystalline silica % (mg/m³) a pulmonary carcinogen if inhaled



Analytical studies were conducted by an independent third party laboratory.

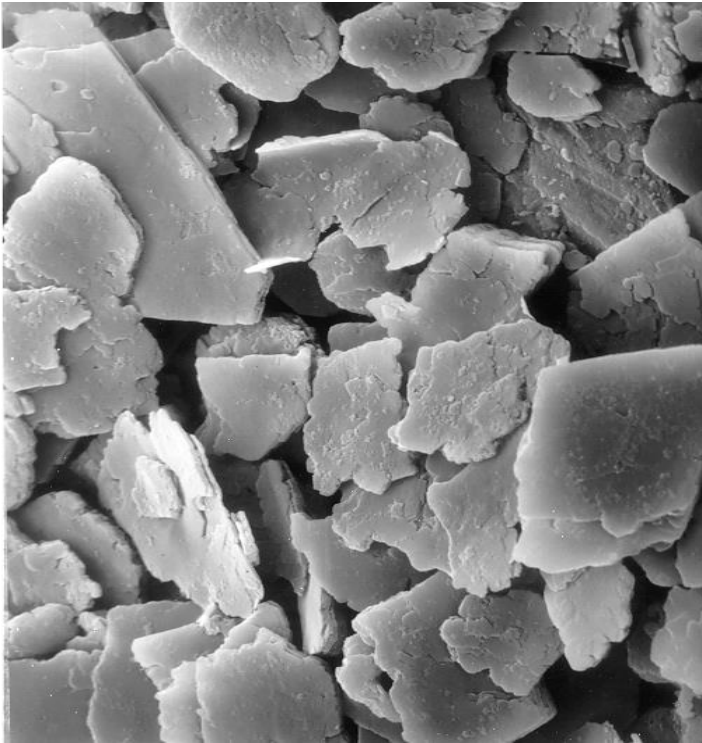
SURROUND kaolin is extensively processed to improve overall safety and functionality

Exceeds NIOSH Safety by X factor

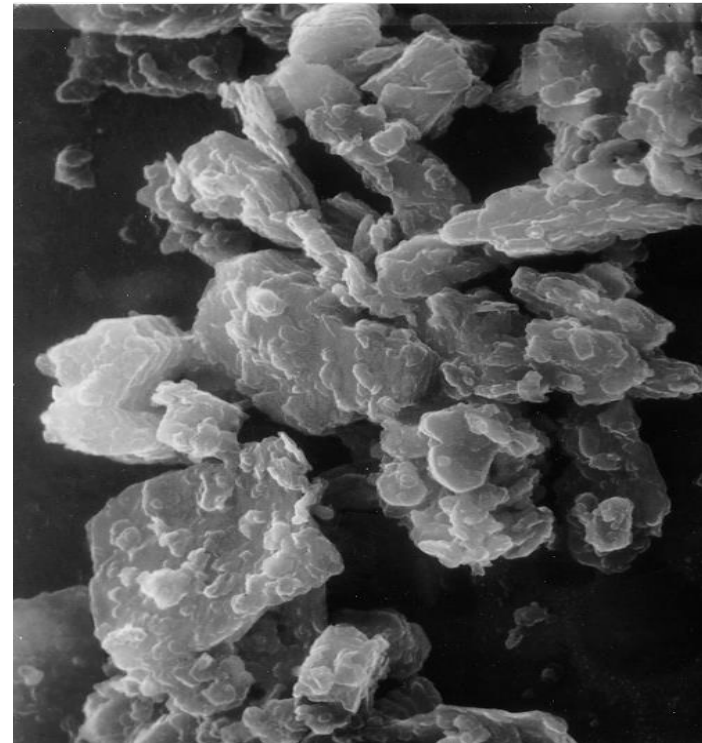


Analytical studies conducted by an independent third party laboratory.

Electron micrographs of uncalcined (hydrous) and the calcined kaolin.



Hydrous kaolin



Calcined kaolin active ingredient in SURROUND

HEAT TREATMENT 

- **Insects controlled equal to conventional insecticides**

- | | |
|--|---------------------------------|
| – Pear psylla | Pear |
| – Glassy-winged Sharpshooter | Brazil citrus, CA vines |
| – Leafhoppers (Homopterans - cicadellids) | Pome fruit, vines |
| – Lacanobia fruitworm | Pome fruit |
| – Fruit flies (<u>Ceratitis</u> , <u>Bactrocera</u>) | Citrus, Pome fruit, olive, etc. |
| – Armyworm | Pineapple |
| – Leafminer | Melon |
| – Olive moth | Olive |

- **Insects Suppressed**

- | | |
|-------------------|-----------------------|
| – Thrips | Citrus, vines, tomato |
| – Aphids | Pome fruit, tomato |
| – Plum Curculio | Pome fruit |
| – Japanese Beetle | Pome fruit |
| – Codling moth | Pome fruit, walnut |



SURROUND deters insect damage by

- 1. Camouflaging the host**
- 2. Repellency (impeding settling)**
- 3. Deterring oviposition**
- 4. Inhibiting feeding (repellent or 'barrier')**
- 5. Inducing paralysis or altered behavior**
- 6. May cause acute mortality**
- 7. Impeding grasping (insects fall off)**
- 8. Restricting movement or infestation progression in treated plants**

} Major Mechanisms





<http://nichenotes.wordpress.com/>

In European orchards, psyllids, particularly, the European pear sucker (*Cacopsylla pyri* L), are the most economically important pest of pears.

- *C. pyri* completes 4-6 generations per year.
- The winter form of *C. pyri* is an adult which undergoes a reproductive diapause.
- Over-wintering females lay eggs from January (SE France) to April (Belgium).

After egg hatching, the nymphs go through five stages (L1 to L5) to form adults (summer form).

C. pyri damages pears in several different ways:

- it drinks a large quantity of sap;
- it produces honeydew that serves as a growth medium for black sooty mold fungi that reduces market value of fruit;
- Pear psylla is the vector for Pear Decline, caused by 'Candidatus *Phytoplasma pyri*'. This disease causes a loss of tree vigor and sometimes tree death.



How does SURROUND work?

SURROUND makes a white protective particle film on the surface of treated vegetation.

- The insect does not recognize the host plant which reduces feeding and egg laying;
- Insects which do land on the protected vegetation find it inhospitable for feeding and/or oviposition.
- Young larvae struggle to feed and move.

SURROUND treated pear orchard



Pear psylla on treated leaf



SURROUND WP Crop Protectant is currently registered against pear psylla in Belgium, France, Greece and Spain.

Country	SURROUND kg/ha min-max	Spray volume min-max	Applications min-max	Application minimum interval
Belgium	20-30	500-1000	1-7	7 days
France	25-50	1000	1-7	7 days
Greece	12.5-50	500-1000	Not stated	Not stated
Spain	25-50	500-1000	Not stated	Not stated

In all countries application window from BBCH 01 to BBCH 69 . Which is dormant to the end of flowering.

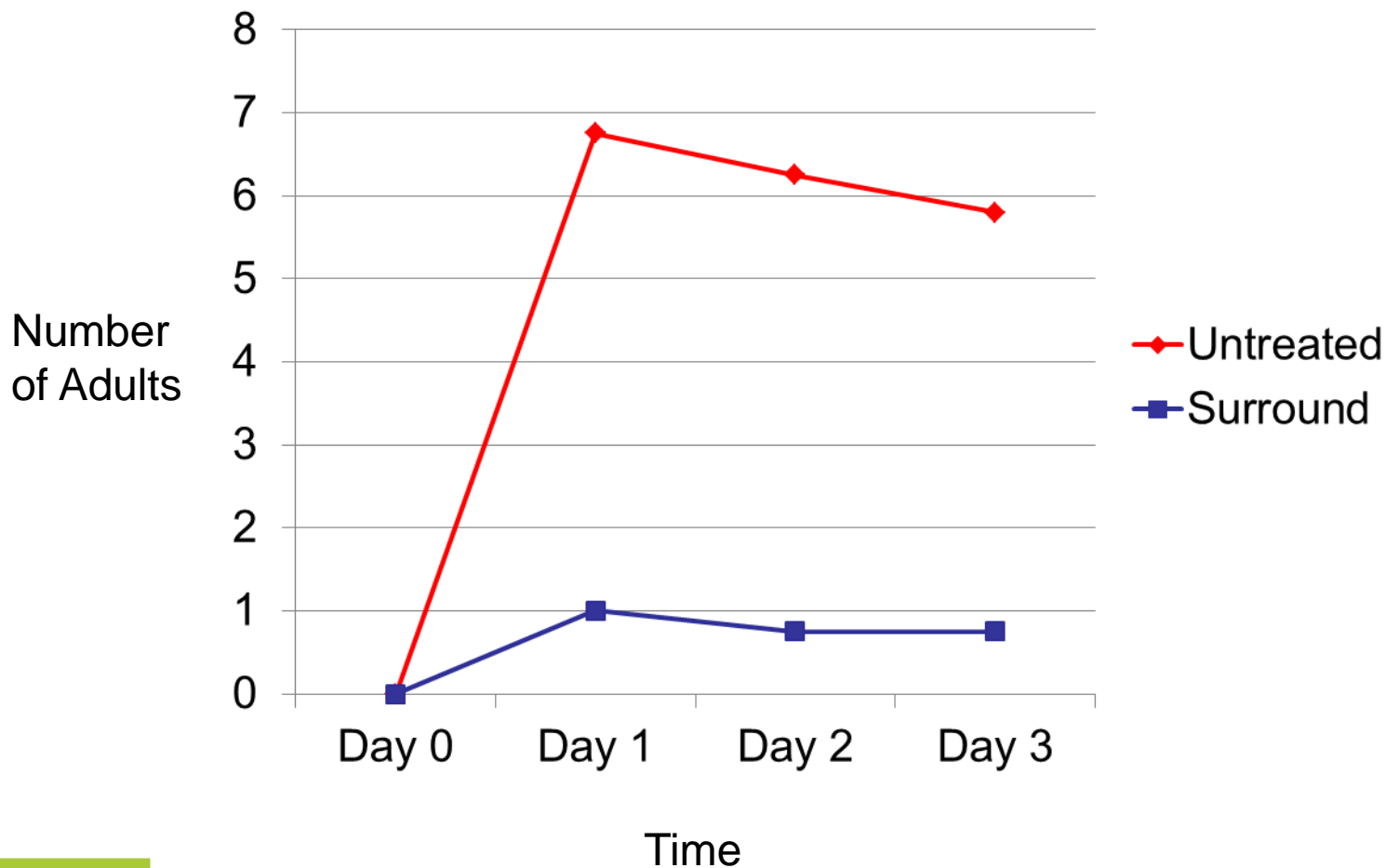
SURROUND WP Crop Protectant is registered against the first generation of pear psylla, which results from the eggs of overwintering females.

Spray volume is fairly high but prior to drip to allow formation of a homogeneous white particle film.



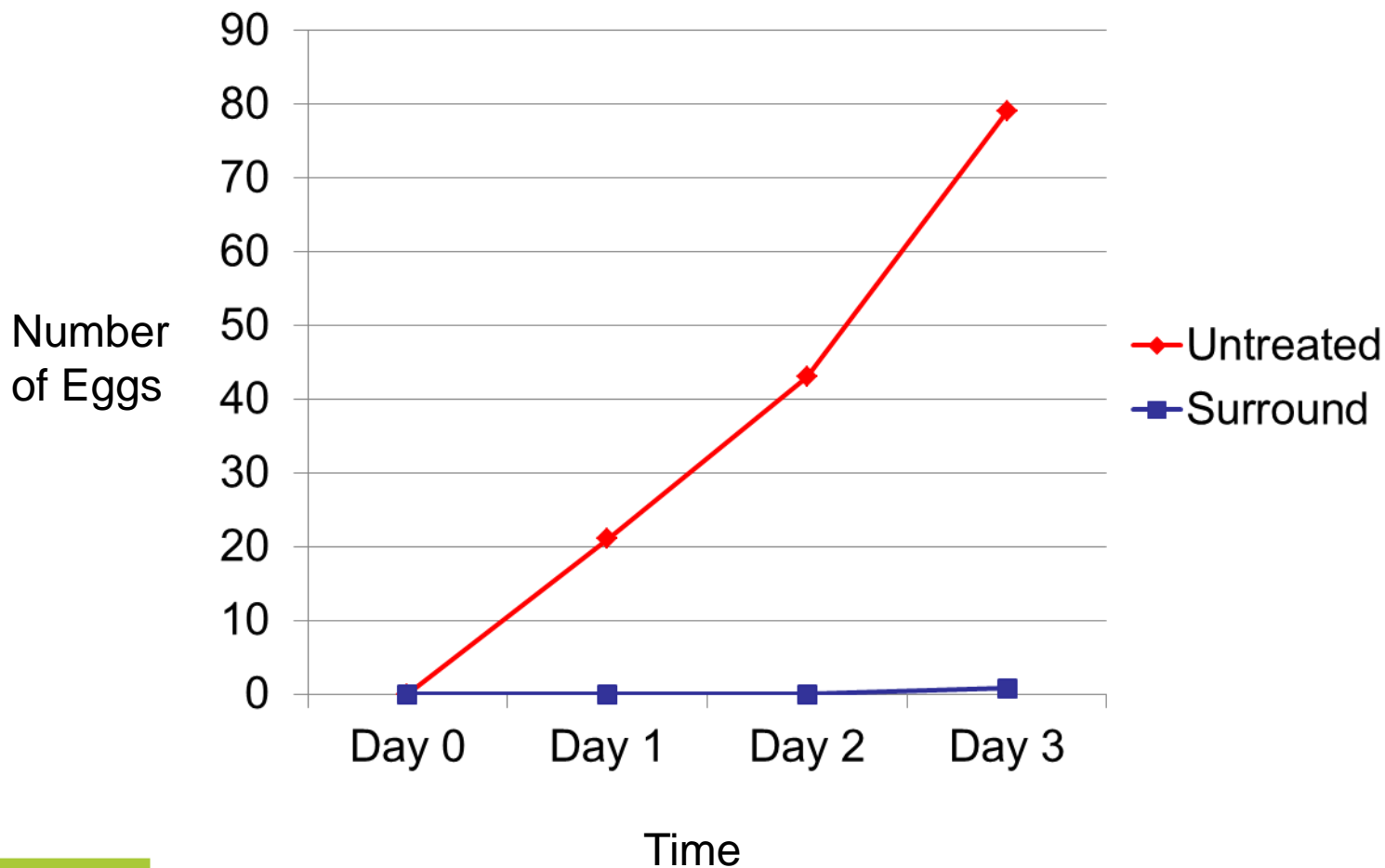
Repellency: Pear Psylla avoid settling on SURROUND treated plants

Adult Pear Psylla Choice Test



Oviposition Deterrent: Pear Psylla avoid laying eggs on SURROUND treated plants

Pear Psylla Oviposition Choice Test



EU Registration Efficacy Trials

% Control of pear psylla nymphs at pear flowering stage

Country Year EPPO Zone	SURROUND kg/ha # appl.	Standard kg ai/ha	SURROUND	Standard
France 2001 Mediterranean	30 kg 5	Decis 0.0175	100	87
France 2003 Mediterranean	30 kg 4	Decis + oil 0.0175 + 15.4	92	81
France 2003 Mediterranean	30 kg 3	UTC	89	--
France 2004 Mediterranean	30 kg 3	Decis 0.175	93	19*

* Pear psylla resistant to Decis (deltamethrin)



EU SURROUND Trials: Average control of Pear Psylla.

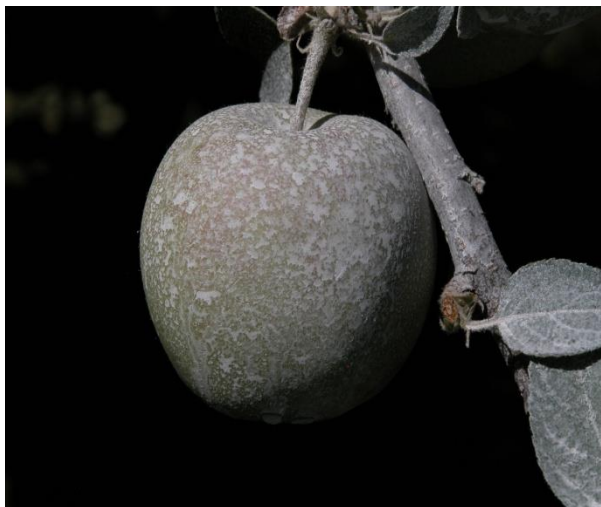
	<u>SURROUND</u>	<u>Standard</u>
Average pear psylla control/SURROUND Reference (9 trials)	92.7	51.2
Average pear psylla control/SURROUND both EPPO zones (12 trials)	93.4	74
Average pear psylla control/SURROUND EPPO Mediterranean (7 trials)	91.7	62
Average pear psylla control/SURROUND EPPO Maritime (5 trials)	95.8	86

SURROUND is used pre-bloom on approximately 40% of pear acres in Washington State.

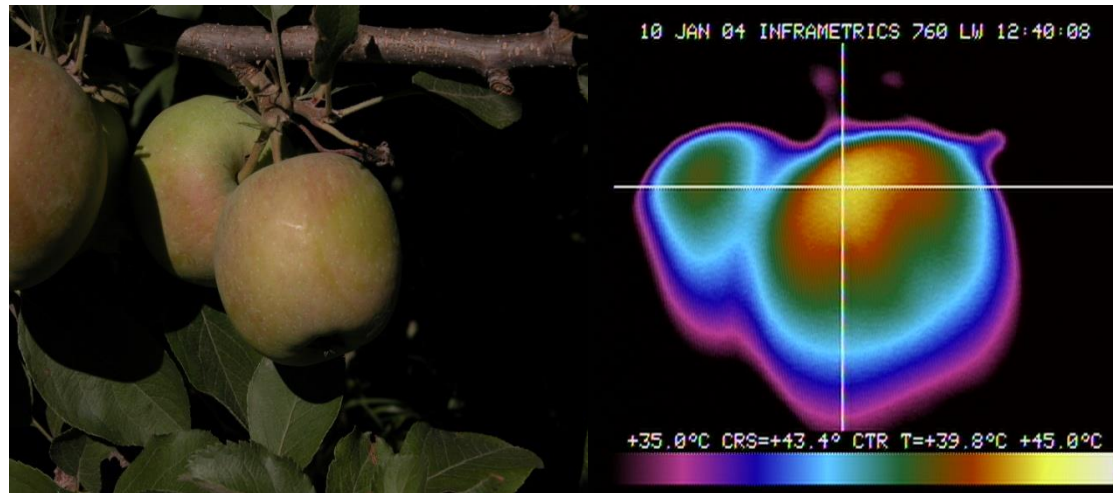


Sunburn suppression

- *Surround greatly reduces the amount of Uva, Uvb, and Infrared radiation that cause sunburn.*

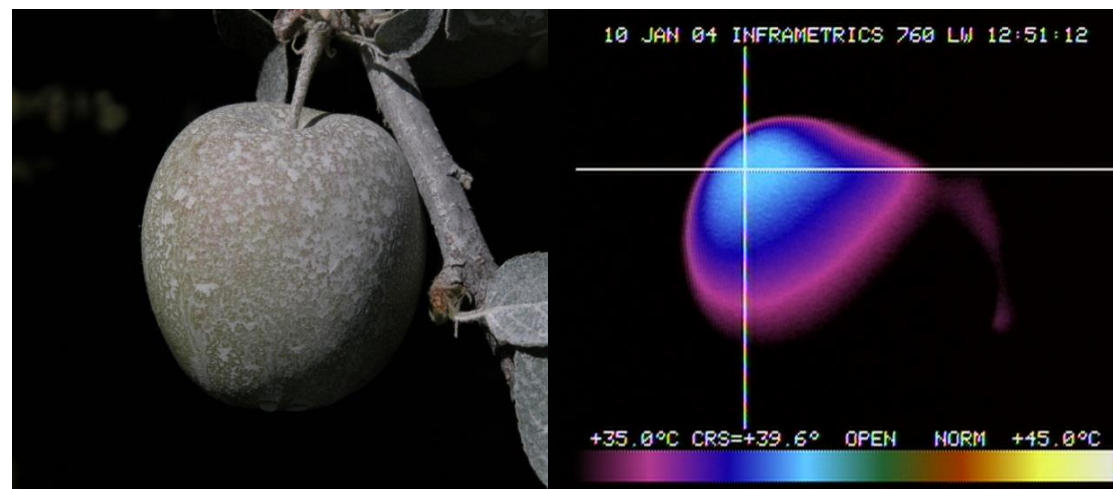


Untreated Control



The Surround treatment was 4° C cooler than the control at the hot spot. (39°C versus 43°C).

Surround 2 applications



SURROUND impact on plant health.



S. L. Lapointe, U.S.Horticultural Research Lab, Ft. Pierce, FL

The effect of lessening heat stress and increased photosynthesis on drought stressed olives in Italy.



SURROUND
Treated

Untreated



Surround[®] General Recommendations

- Always apply good, uniform coating of Surround particle film before insect infestation occurs.
- Utilize adequate application rate: initial 5% followed by 2.5% w/v. (50 kg/ha followed by 20 kg/ha in 1000 l/ha or appropriate spray volume) on a 14 - 28 day schedule.
- Maintain particle film coating during infestation period. This may be season long such as needed for olive moth or only prior to key infestation stages, such as, overwintering adult pear psylla or prior to egg laying stage of some fruit flies.
- Utilize good scouting program to monitor insect population.
- Can anticipate added plant health benefits of Surround treatment: less heat stress, sunburn, better quality, higher yields, general plant vigor improvement.







Thanks
Merci
Grazi
Obrigado
Danke

For more information visit:

www.novasource.com