

COLDSTOP® USE GUIDE

NEW TECHNOLOGY MANAGEMENT THERMAL STRESS ASSOCIATED WITH LOW TEMPERATURES



COLDSTOP, new technologies Nutriprove S.A.®

Low temperature stress

The low temperature damage (eg. cold and freezing) can occur in all plants, but the mechanisms and the type of damage vary considerably. Some crops fruit, vegetable and ornamental tropical undergo physiological damage, when subjected to temperatures below +16 °C, well above freezing temperatures. However, damage from above 0 °C by cooling is more by frost. It occurs in all plants due to icing. Cultivated plants grow in tropical climates, often experience significant frost damage when exposed to

temperatures slightly below zero, while many crops grown in colder climates often survive with little damage if freezing not very severe. Problem of high economic importance in agricultural production mainly in countries of high radiation climates in the summer. In temperate regions, the wide fluctuations in the intensity of radiation and temperature can also lead to significant damage to the plant tissues.

USING COLDSTOP

Fruit Trees

Generally, the sensitivity of crops to freezing increases from first bloom to small fruit stage, and when the crop is more likely to be damaged. The sensitivity is also higher when warm weather has preceded a freezing night if cold temperatures preceded the frost. It is known that plants resistant to freezing when they are exposed to cold temperatures for long periods and this hardening is less if the exposure is to warm temperatures.

The flowers are usually damaged by spring frosts and symptoms are a darkening of the petals. Usually the flowers style is more sensitive than the ovary to frost damage. After fertilization, the seeds are the most sensitive organs. A few days after a frost, the proportion of damaged flowers is obvious. When cutting with a knife, healthy flowers have a light green color, inside the damaged flowers are brownish.

The seeds are essential for normal development of most fruits, but some varieties of pears and apples damaged are able to maintain a parthenocarpic development to produce deformed fruits. Stone fruits are more susceptible to the loss of the seeds as they only have one or two, while apples and pears, having more seeds, are less susceptible. Reducing stress periods result in increased fruit quality (TSS / Bricks) and fruit size, improved fruit color, reduced fall damage and less cold burns.

The best results were obtained from early treatment program (see recommendations for use). Different trials indicate that the use of Coldstop can reduce the incidence of cold damage and improve water status and health of the plant.

Tropical and subtropicals crops

The problems presented by these crops apart from pests and diseases, physiological changes are due to environmental changes such as cold damage (Dadzie and Orchard, 1997, Jones 2000). It seems incongruous that in tropical and subtropical regions of frost injury talk. However, in the producing states, during the windy season, the temperature can drop below 15 °C.

These drastic temperature changes can some cause damage to tropical plants, as with banana lowering its production by up to 40-50 % in Ecuador in 2004 (Sanchez, 2004).

The banana fruits undergo biochemical changes when exposed to cold, such as increased polyphenol oxidase activity and the phenol content decreased, which increased epidermal browning in fruits, protein degradation and chlorophyll is much higher.

With respect to physiological changes induced by cold, damage in the photosynthetic mechanism affecting the photosystem II, which is reflected in a rapid decline in the efficiency of photosystem (Fm / Fv), respiration decreases, production of ethylene is below causing early ripening of the fruit, the leakage of electrolytes is much higher, which indicates indirectly that have a damage at membrane level.

Crops and ornamental horticultural

Cultivated plants grow in tropical climates, often experience significant frost damage when exposed to temperatures slightly below zero, while many crops grown in colder climates often survive with little damage if freezing not very severe. Some exceptions are the lettuce, which have originated in temperate climates, but can be damaged at temperatures close to 0 ° C and some subtropical fruits, which despite having a tropical origin may remain at temperatures from -5 to 8 ° C.

COLDSTOP, INDICATIONS FOR USE

Coldstop is a product of vegetable organic origin, which acts on the metabolism of the plant, reducing the effect of periods of stress on plants. Coldstop, further containing a naturally occurring compound that acts as bioestimulante situations of low-temperature stress.

Coldstop when applied to plants, the visible result is an odorless and colorless translucent film. For best results in protection against low temperatures, it is important to achieve good coverage and uniformity throughout the period of susceptibility, accompanied by a sequence of application, as indicated on the label and data sheet.

DOSE

Fruits tree

Unless otherwise specified in the instructions for use for each crop, using 500 g of Coldstop per hectare in 1000 liters of water, repeating every 14-21 days to leave periods of susceptibility to cold or frost.

Outdoor vegetables

Use 500 g/ha in a water volume independent to apply. And repeat every 10-14 days during periods of low temperatures (prevention mode).

MIXING INSTRUCTIONS

For tanks with agitator (conventional sprayers, electrostatic and air)

1. Add Coldstop, in the spray tank with recirculating water, making sure to maintain a vigorous stirring. Spray tanks are preferred with strong agitation.
2. Add pesticide to the mixing tank, and then the adjuvant, it is important to note that an optimal use of the product requires the use of surfactants to achieve a better distribution on the blade. For this purpose, nonionic surfactants are recommended or organo-silicone. Additionally recommended applications to slightly acidic to neutral pH (pH 5.5 to 7.0).
3. Continue stirring until the tank is empty.
4. At the end of the application and flush the system with fresh water sprinklers, periodically check that the filter is clean and clean if necessary. Then, delay the water used, according to local regulation.

The mixing sequence must be as follows:

1.-Use Coldstop, at a dose of 30 gr/25 L of water. For sprayers hard to shake, mix in a container in accordance with the instructions below and pour the suspension into sprayer.

2.-Fill sprayer, with 1/4 to 1/2 of full capacity. Add Coldstop. Close the lid and shake vigorously, add the remaining water.

3.-Mix well, close and shaking container vigorously for 30 seconds.

4.-Added to the tank mix, pesticide and adjuvant (previously reported).

5.-Add remaining water to the tank closed vessel and shake for 30 seconds.

6.-If the computer is still for 1 minute or more, shake the sprayer.

7.-At the end of the application, spray until empty the tank and nozzles.

Can be reused any remaining mixture in two or three weeks at most. Rinse the sprayer and let dry before using again.

It is not recommended to reapply after heavy rains but prefer to apply without high humidity conditions or rain. Applying just the foliage is dry.

Dry foliage

Application to wet foliage, are not recommended for effectiveness and excessive runoff. Under hot and dry conditions, increase the volume of water. To improve deposition.

SPRAYING METHODS

Air blast sprayers, high pressure spray guns, or more turbo tower, in all cases, for best results, use of low diameter nozzles and high pressures to produce a fine droplet spray to form a uniform film on the surface of the treated plant.

A visual inspection of the film deposition (immediately after application) and uniformity of coverage is vital for good performance of the product.

Apply Coldstop through any type of irrigation system, sprinkler, drip etc. , The important thing is to ensure uniformity and dose for modern irrigation.

Dose and comments

Crop	Dosage	Recommendations for Use
Pome, Stone Fruit, Nuts, Almonds, Olives, grapevines Citrus, European Hazel, Olives	500 gr / (volume of water applied) Ex: 500 gr/1000 L of water per ha)	Pome, all varieties, starting applications to adverse weather conditions or low temperatures preventer with fruit in early stages of development, ideally post- first stage of fruits, applications 4-5, in the season.
Berries , Strawberries, Raspberries, Blueberries Vegetables, Nurseries Plants ornamental	Tomatoes, peppers (capsicum), cucurbits (melons, squash, cucumbers etc), Leafy vegetables (lettuce, chard, spinach, etc.), Cruciferous vegetables (broccoli, cabbage, cauliflower, mustard, etc.), Betas (beet), Allium (onion, garlic, chives etc.), potatoes. Apply 500 g product per hectare Coldstop™, Starting immediately after transplantation 2 leaf size on (supporting the reduction of cold and water stress in post-transplant).	Citrus, Olives, European hazel, Berries. First application at the beginning of cold spell, second and subsequent applications. 500 gr / application volume (L) Ex: (350 L / ha) , with intervals of 14-21 days from fruit curd Blueberries.
Crops, Corn, Wheat, Rape, Beet, Etc	Applications should be repeated every 7-14 - days at the same dose 500 g / ha. Since the emergency period to 4-6 true leaves	Crops, solicit recommendations or revise technical department product label or data sheet From fresh fruit curd (3 mm), 4-6 separate applications every 14 days, to overcome periods of susceptibility at low temperatures and cold.
Table-grapes	500 gr / water volume applied per hectare per application.	The product could also be used during periods of bloom with agronomic consulting team.

POSTHARVEST; WASHING

Fruits and vegetables to industrialize or processing and fresh market
No washing required after harvest.

COLDSTOP™

Coldstop is available in bags or jars of 2.5 kg. It is important to discard the bags or empty containers in an approved location according to local authority guidelines.

SUMMARY USER GUIDE

Benefits

- Increased photosynthesis and carbohydrate availability
- Increased quality and crop yield
- Improved Brix / TSS
- Reduction of floral abortion
- Low fruit drop
- Reduced production alternation
- Higher yield of salable product
- Improved skin color of the fruit
- Improved internal quality of the fruit

Nutriprove SA, researches and develops technologies for the management of environmental stress in fruit trees, vegetables and vineyards.

The products developed by Nutriprove SA, are tools that allow farmers to profitably reduce losses in yield and quality of crops that are exposed to environmental conditions of heat, cold, radiation, or suffer water shortage. In combination abiotic stresses are the cause of 50-60% of the yield losses in modern agriculture.

For more information visit: www.nutriprove.com