



# MAS-Power Active Frost™

Mas Power Active Frost is a nutritional, powerful anti-stress liquid package designed to mitigate frost stress factors and reduce accumulation of ice crystals which are so damaging to young plant tissues and blossom.

Active Frost is a combination of Boron, combined with carefully chosen plant amino acids and the addition of 30% of Engage Agro's proprietary MAS anti-stress concentrate.

## How does Active Frost work?

Active Frost when applied to crops during cold stress periods or during frost events has triple activity. Applied 24 hours before a frost event three different modes of activity are seen:

1. Active Frost coats plant tissues to disrupt the formation of ice crystals which induce internal thermic reduction to increase the formation of ice in cells.
2. It provides localised changes in intracellular fluid content which increases the time it takes to form ice in cells and reduces the risk of long-term tissue damage.
3. Active Frost also penetrates tissues to provide and stimulate the production of compounds within cells and intracellular spaces. This dramatically reduces the stress response induced compounds produced during cold stress, again reducing long term damage, and aiding rapid tissue recovery.

**100%  
Organic**

## CROPS

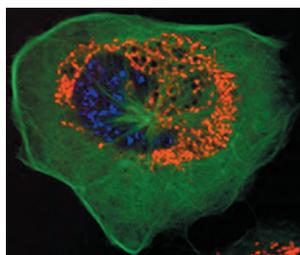
- Brassicas
- Potatoes
- Legumes
- Top Fruit
- Vine crops
- Soft Fruit
- Leafy Salads
- Root crops
- Fruiting Vegetables
- Stone Fruit
- Citrus
- Ornamentals

## A plants response to oxidative stress caused by cold

Environmental changes cause metabolic responses in plants which are focused on maintaining homeostasis inside cells. When the equilibrium between energy generation and consumption to maintain plant defences is broken, the growth and development of plants can be compromised, even resulting in death after a long-term exposure. An important environmental stress is low temperatures which can have a devastating effect on plants, leading to huge economic losses from fruit and vegetable crops.

Low temperatures have two major effects on growing plant tissues:

1. A general stress reaction resulting in the formation of reactive oxygen species (ROS) compounds and free radicals in the plant tissue. ROS compounds (see picture below), for example  $H_2O_2$  or  $O_2$ , cause the oxidation of cell membranes and finally lead to cell death.
2. Ice formation in the tissue. Plant tissues will be damaged by frost if there is ice formation inside the cells whereas ice formation in the intercellular space (cell walls) is less harmful. Ice formation depends on various factors such as ambient air temperature and humidity during the freezing hours as well as on the plant's fitness.



Plants respond to low temperature stress by forming 'antioxidant' substances that can prevent or slow damage to cells caused by free radicals. Antioxidants can eliminate ROS and prevent the cell membranes from disintegration.

The most effective antioxidants in plants are polyphenolic compounds and the metabolites they produce. Under stress conditions and when the antioxidant defences are overcome, the concentration of ROS can increase to harmful levels producing oxidative stress.

Coordinated action to support the antioxidant defences is necessary to protect the plants against the high concentration of ROS.

Cold Stress	Response in the plant
Formation of ROS and free radicles $H_2O_2$ or $O_2$	Antioxidants are formed and not overpowered
Cell membrane damage	Free radicals are neutralised
Cell function ceases	Cell function is maintained
<b>Lysis (Cell Death)</b>	<b>Damage is avoided</b>

The most frost-sensitive plant parts are young plants (vegetable and salad crops), early season new growth (fruit crops) and open flowers (fruit trees). The following charts illustrate the temperature at which damage will occur to fruit blossom and early season growth.

### Early fruit trees growth stage damage temperatures

Growth stage	Temp at which damage occurs
Mouse ear	-4°C
Green bud	-3°C
Pink/white bud	-2°C
50% - Full bloom	-1°C
Set fruitlets	-2°C



### Early spring growth stage damage temperatures

Growth stage	Minor damage temp	Critical damage temp
Shoot growth to 4-6 true leaves	-1°C	-3°C
Shoot growth to rosette stage	-2°C	-4°C
Shoot growth to maturity	-2°C	-4°C



## Application

Active Frost can be applied in two ways:

### Single Application

Apply Active Frost from 24-48 hours before a frost event as a 0.5% solution (5mls per litre) at normal spray rates for the growing crop. Engage Agro recommend multiple applications of Active Frost to cover cold periods.

Apply in a minimum of 200L for vegetable crops and 300-400L for perennial species. For crops requiring higher water rates amend the application to adhere to the 0.5% solution. Once applied the effects of Active Frost will last for 4-6 days and cover multiple chilling events.

### Regular Application

For continual cold periods where tissue acclimatisation has not been possible e.g early spring, Active Frost can be applied weekly at 0.5% solution. This will give continual support to plant tissues, protect against frost and cold damage and replace will with also enhance growth factors for the applied crop. Apply in a minimum of 200L for vegetable crops and 300-400L for perennial species. For crops requiring higher water rates amend the application to adhere to the 0.5% solution.

*For more detailed application rates per crop, please visit [www.engageagroeuropa.com](http://www.engageagroeuropa.com) or speak to an Engage Agro advisor. Always read the label before use.*

## Components of Active Frost

30%	Mas Power Anti-Stress concentrate
12%	Selected plant L-Amino acids
29%	Co-formulants
0.2%	Boron
pH	5.8
Appearance	Clear amber liquid

## Compatibility

Active Frost is compatible with most agrochemicals and nutritional products however when mixing with multiple products or new products for the first time, a simple jar test is recommended.

**For further information please read the label.**

*It is important to note that unhealthy or weak plant tissues or crops are more susceptible to frost and we always recommend a full programme of nutrient support to allow early tissue growth to be strong during the late frost period. Active Frost is a nutritional product and as such we cannot guarantee that it will be 100% effective against extreme frost events.*

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