

WiltNot

Anti-transpirant

What is WiltNot?

WiltNot is a non-toxic, environmentally friendly foliar spray consisting of carbon chain polymers with an acrylic base. It is a liquid concentrate which must be diluted with water and when sprayed dries to a clear semipermeable membrane (elastic protective coating).

This membrane provides the plant with an effective shield for reducing the effects of weather related stress whilst permitting the free exchange of gases needed for survival. When dried on the leaf surface, the elastic protective coating will stretch with initial plant growth.

The length of drying time will depend on environmental conditions such as temperature, humidity and wind. The protective coating will bio-degrade within 30 to 60 days depending on the following factors:

- the amount of exposure to ultraviolet light (sun rays)
- dilution rate at application
- wind exposure
- amount of exposure to extended moisture conditions
- abrasions due to foreign matter such as dirt / sand carried by the wind
- rate of plant growth which stretches the membrane.

WiltNot is a water-based concentrate and will freeze while in concentrate or liquid form. However, upon thawing, the compound is unchanged. It is white coloured and has a slight acrylate odour in liquid form. It is not harmful to the applicator or user and has a pH of approximately 8.0.

Why is WiltNot needed?

1. To reduce the ravaging effects of weather-related stress or the plant's exposure to hostile environmental growing conditions such as:
 - excessive heat
 - drought conditions (limited moisture supply)
 - frost and freeze
 - drying winds (hot or cold)
 - rapid climatic changes (sudden temperature changes)
2. To reduce shipping/handling damages during transit for nursery stock.
3. To reduce transplant shock and increase survival rates.

When stress is effectively reduced and controlled, the plant can utilise its energies on production or yield. This may be observed by increased fruit weight, larger fruit size, early harvest and enhanced growth.

How does WiltNot work?

1. Reduces or limits transpiration

(amount of water loss through stomata and small amount through the cuticle of leaf)

Transpiration is limited by an application of WiltNot coating which forms a semi-permeable membrane around the leaf and stem surfaces.

The protective coating only partially blocks the stomata and does not “completely shut the plant down” in terms of stopping all transpiration. Recent studies have indicated no difference in net photosynthesis, stomatal conductance, transpiration, intercellular CO₂ concentrations and leaf temperature between plants treated with WiltNot and controls. These studies indicate the action of WiltNot is not by anti-transpirant activity but rather as an agent that modulates the expression of water stress related proteins. These proteins develop when plants are thrown into drought conditions.

The amount of transpiration loss will be influenced by:

Environmental factors which are external to the plant such as:

- humidity index
- air movement
- air temperature
- light intensity
- length of day
- soil conditions.

Morphological factors (internal conditions of the plant):

- condition of the cuticle
- stomata behaviour
- distribution of stomata
- reduction of transpiration surface as in leaf loss.

2. Mechanically protects the plant

(mechanical is defined as effective by physical means rather than chemically)

- Provides a ‘wrap-around’ protective coating covering the complete leaf surface.
- Provides a protective elastic shield against wind abrasions and excessive wind drying (hot or cold)
- Provides an extra coat of protection against shipping and handling bruises.
- Serves as an aid to reduce the damaging effects of frost and freeze exposure.

3. Effects on leaf surface

- Permits free exchange of carbon dioxide and oxygen allowing the plant to “breathe”.
- Does not interfere with photosynthesis.
- Reduces transpiration by up to 50% by partially blocking the stomata.
- Reduces weather related stress conditions from 30 to 35% as measured by infra red stress regulators.
- The carbon chain membrane is permeable which permits the plant to absorb other foliar feeds after application of WiltNot.



On what can it be applied?

All row and specialty crops including grapes, raisin, wine, table, berries, peaches, plums, nectarines, apples, pears, citrus, lawns, golf courses, turf farms, cotton, sugar cane, wheat and ornamental plants.

WiltNot May be sprayed directly on flower petals. It has been specifically developed to spray over cut flowers, floral arrangement, indoor and outdoor plants to greatly reduce wilting and transplant shock.

When is it needed?**1. When plants experience drought stress with probable causes as:**

- lack of available water in the soil due to limited or insufficient rain or irrigation
- sandy soil where water is lost due to quick run off and rapid evaporation
- compacted soil which creates penetration problems for roots or water
- inadequate root volume to supply needed moisture for plant support as may occur in recently planted transplants
- when transpiration (moisture loss through the stomata) and water uptake (provided by the roots) are out of balance, the plant may experience stress
- plants growing in water logged soil conditions may experience a lack of water uptake because of a diminished rate of available oxygen in the soil.

2. When plants experience cold stress

Cold soil conditions reduce water uptake capabilities in the plant. This may occur in early spring when air temperatures exceed soil temperatures. In these conditions, the leaves transpire rapidly while root uptake is restricted causing the plant to experience moisture deficiency.

3. During periods of frost and freeze

- by protecting the plant with a wrap-around polymer coating
- by maintaining equal moisture equilibrium in the plant cells or keeping the cells filled with moisture
- by reducing ice markings on winter fruit such as citrus
- by providing an expanded or extended growing season. This can occur by reducing frost damage for early spring planting's and extending late autumn harvesting.

4. When plants experience wind desiccation (hot or cold drying)

- under windy conditions, excessive amounts of moisture are removed from the plant cells which creates stress conditions
- by preventing leaf abrasions from particles of foreign matter blown by the wind (sand blast effect)
- by reducing the incidents of twig and abrasion damage caused by rubbing action of plant parts in windy conditions.

5. When plants experience heat stress

During exposure to high temperature, the root system may not be able to absorb water rapidly enough to equal the amount lost by transpiration through the leaves even if adequate amounts of moisture are available in the soil.

The evidence of heat stress may be observed as:

- wilted or flaccid / limp leaves
- dropping of fruit (this will generally occur several weeks after the plant has experienced stress)
- dropping of blooms or flowers (i.e. squares in cotton)
- in prolonged exposure there may be a dropping of leaves.



When is it needed? (cont)

6. To reduce dust and dirt build up on leaf surface.

- The elastic semi-permeable coating provides the leaf surface with a smooth glossy finish which resists the build up or accumulation of dirt and dust.
- The clean leaf surface may assist photosynthesis.
- Prior to application (especially for indoor plants or those used for decorative purposes,) the leaf surface should be free of dust, dirt, water spots, chemical residue, etc, before spraying. WiltNot will adhere all foreign matter to the leaf surface.

7. As a plant shine

An application of WiltNot provides a natural sheen to the leaf surface making it a superior plant shine. The protective coating will not block the stomata but will effectively limit transpiration up to 50%. The top and bottom of the leaf surface should be sprayed for complete protection. For a high gloss shine, two coats need to be applied with sufficient drying time between applications.

8. When shipping plants and flowers.

- WiltNot provides excellent protection to extend water retention during shipping of potted plants and flowers.
- The protective coating will enable the plant to remain turgid during shipping.
- The protective coating will reduce the effects of acclimatisation shock and limit damages caused by sudden climatic changes.
- The protective coating will reduce the possibility for bruise damages occurring from handling and shipping.

9. For moisture retention on bare root.

- WiltNot has proven to be a cost effective alternative for wax when holding, shipping or planting.
- The protective coating encourages leafing after planting when sprayed with a 20:1 dilution rate.
- Recommended application time of 24 to 48 hours before planting.

10. For moisture retention on rose canes (when processing for resale)

- Gives superior shoot potential in hot climates.
- Will encourage shoot growth.



When is it needed? (cont)

11. Before stress occurs

For transplants:

- May be sprayed or dipped.
- For most effective results, spray in greenhouse if adequate coverage is possible. A 24 to 48 hour time period between spraying and transplanting is recommended.
- It is best to water the plant well and wait for the cell walls to become turgid before spraying.
- The 24 to 48 hour time period between spraying and transplanting will provide the plant enough time to adjust to the new protective coating and regulate its internal watering cycle.

Frost and freeze:

- During rapid Spring growth, spray as close to frost exposure as possible. As an example, if plants are sprayed on Monday and the frost occurs four days later, the new growth between spraying and frost will not be protected.
- WiltNot is a frost and freeze aid and not the ultimate answer for all frost/freeze problems.
- On sensitive outdoor ornamentals, apply two coats with drying time between applications for enhanced protection.
- The question is often asked, "Can WiltNot be applied during pollination to protect open blooms and flowers. WiltNot may be applied during pollination. Many tests have been done to determine if the WiltNot coating would interfere with the pollination process. Included were vegetable plants, apple, plum, peach, nectarine, almond and apricot trees. Tests included spraying at bud break, open bloom and petal fall. Results indicated no negative effects in reduction to fruit set while receiving excellent frost protection.
- WiltNot is effective as soon as it dries: This makes it an effective product for reducing cold damages on same day of application and occurrence of cold conditions.

Drought:

- Apply before the plant is stressed from drought causing conditions.
- WiltNot will "not make moisture". It is an effective aid to assist the plant to reduce transpiration. This reduction in transpiration will help the plant to use the available moisture more efficiently.
- Rapidly growing plants.
- Reapply approximately every 21 days or at 20 to 30% new growth. These applications are for protection of new growth.

Sunburn:

Apply to young fruit and nuts before they experience sunburning conditions. Field observations appear to support the theory that most sunburn conditions occur early but show up at a later date when the fruit or nut is well developed.



When will it not be effective?

During periods of extended rain or irrigation where the plant is not experiencing any stress conditions.

During periods of ideal growing conditions as warm days and cool nights.

In one-spray situations where new growth is not covered.

Where the plant is already in a stressed condition.

Where high humidity or rain prevents adequate drying time.

When all parts of the leaf surface are not covered.

When the dilution rates far exceeds that of label recommendations.

When should it not be applied?

Edible foods:

- When applying on plants producing edible foods, the last spray should be applied 45 to 60 days before harvest.
 - This applied to those edible fruits or vegetables which are not washed by agitation or brushing action in packing house operations.
 - For those edible foods which are grown for canneries as tomatoes where all parts of the vegetable/fruit are used in the canning process.
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Expected results

Using WiltNot in multi-spray programs

(sprayed properly, on a regular basis, throughout the season)

1. For drought stress:

- Extends watering cycle from 30 to 40%.
- Assures a higher survival rate for transplants by providing the plant with a protective coating while the root hairs develop for plant support.
- Decreases environmental stress and plant loss for crops grown in sandy soil or shallow soil as in hard pan situations.
- May aid plants when flooded or over-watered by slowing transpiration rate.
- Test results indicate a positive effect on fruit weight when compared to water stressed against non-stressed trees.

2. For cold stress:

- A slowed transpiration rate protects against moisture loss when cold soil conditions limit the ability of the plant to collect and absorb moisture for water uptake.
- Mechanically (physical coat) protects the plant by assisting it to retain a more constant temperature and water level in the cells. This will generally result in:
 - A higher pack out for citrus by reduction in ice markings.
 - A greater survival rate on seedlings and transplants.
- Assists grafted plants by protecting from excessive moisture loss and graft shock.
- Permits early planting or transplanting by reducing damages of cold stress.
- Extends growing window by providing protection from early Spring and late Autumn frosts.
- Decreases needle drop in Fir trees when excessive winds cause defoliation or temperatures are too cold for moisture uptake.



Expected results (cont)

3. For heat stress:

- Slows transpiration to more evenly correspond to the ability of the roots to collect and absorb moisture.
- May increase retention of sugars in fruits as grapes, apples and citrus.
- May increase solids (sugar) in row crops as tomatoes (from 5 to 6.5 index.)
- Increase in leaf canopy for stone fruit, apples and grapes.
- The increase in canopy coverage may assist in reducing sunburn and aid in fruit colouring.
- Reduces bloom and square drop in cotton.

7. It enhances a greater volume in blooms for flowering plants as well as larger and extended life of blooms:

- Increase lushness in growth for ornamentals.
- It enhances a greater survival rate for foliage on moisture loving plants as ferns.

8. For wind damage:

- Reduces desiccation of leaves and lessens stress damage from dryness.
- Reduces the incidents of leaf abrasions.

9. Reducing scarring on fruit which results in higher pack-outs:

- Assists ornamentals from abrasions caused by blowing debris or sand blast effect.

10. Other values or benefits:

- Reduction of dust and dirt build up on leaf surface because foreign matter tends to slide off the protective coating.
- The clean surface appears to assist in photosynthesis.
- Serves as an aid to reduce sunburn damage on sensitive plants.
- For ornamentals and decorative plants, the natural gloss provides a more cosmetically appealing value. When a high gloss appearance is desired for indoor plants or ornamentals, apply two coats with adequate drying time between applications.
- Will prolong blooms (especially effective for mums, poinsettias and other colour plants.)

11. For shipping:

- Reduces plant loss which directly reflects on saving in replacement expenses.
- Makes plants more cosmetically appealing.
- Reduces shipping and handling bruises.
- Eliminates the need for plant shines and oils that may block stomata, attract dust and encourage sunburn.
- Helps the plant acclimatise to different growing climates.
- Protects the plant from rapid climatic changes.

12. For bare root:

- Replaces the need for wax. WiltNot will not block stomata or melt when exposed to heat.
- Reduces desiccation in bare root.
- Encourages new growth when planted.
- Reduces dry out when exposed for lengthy time periods before planting.



Spraying & application

1. WiltNot may be applied with conventional spray equipment

- Vineyard, orchard, ground or mist sprayers.
- Back packs or trigger sprayers are applicable.
- Helicopters may be used for some crops.
- Fixed wing aircraft is not recommended because it is difficult to dispense the product under the leaf surface for effectiveness. However, if the purpose of application is to spray only the top surface of leaves as in reducing sunburn, then fixed wing application would be appropriate.

2. Tank pressure

- The pressure selection should be such as to dispense the product over the complete leaf surface in a uniform pattern.
- For tree application, sufficient pressure must be applied to dispense the product to all leaves including those at the highest levels.
- In some row crops with thick canopies as in grapes, sufficient pressure must be applied to penetrate the canopy for coverage of the back side of the leaf on the opposite side of the row being sprayed.
- When insufficient pressure is used, the product may "drop" over the leaf and some sections will not be covered. This level of application will not provide the coverage needed to receive the desired results. Therefore, tank pressure is extremely important and should be sufficient to force the product over all parts of the leaf to assure full coverage.

3. Nozzle selection

- Nozzle selection should be such as to dispense the product over the complete leaf surface (wet down.)
- Small droplet size will provide the best coverage.
- The nozzle selected should be free of dirt or other foreign matter to assure uniform distribution at application.

4. Nozzle direction

- For small plants or those growing with leaves near ground level as melons, it may be necessary to use drops from the tank to near ground surface for the product to reach or be applied to the under side of the leaf surface.
- For some row crops as cotton, it will be necessary to adjust the nozzles downward as well as upward for complete coverage of the total leaf surface.

5. Ground speed

- For tree application ground speed should not exceed 3-4 kph
- For all spraying applications, the ground speed should be adjusted for the amount of foliage being sprayed.

6. Other considerations may include

- type of sprayer
- density of foliage
- amount of canopy to be covered
- tank pressure being applied
- nozzle adjustment
- water volume.



Spraying & application (cont)

7. Dilute spraying

- High volume spraying to the run off state is considered as dilute spraying application.
- Spraying to excessive run off is over spraying and may not be cost effective in terms of the amount of WiltNot being used in the application.

8. Concentrate spraying

- Generally, low volume spraying without any drip is considered as concentrate application.
- Spraying to a bead pattern without complete coverage over the total leaf surface is under spraying.
- For the purpose of WiltNot, semi-dilute is recommended over concentrate spraying.
- To receive maximum effectiveness, WiltNot must be applied with complete coverage to the upper and lower leaf surface.
- It is recommended that the lowest spray literage that will provide this desired coverage be used.
- For the best results, spraying to a semi-drip or until there is a slight movement of the product on the leaf surface is the desired coverage and will be most cost effective.

9. Mixing recommendations

- One litre of WiltNot concentrate mixed with 50 litres of clean water is the recommended application rate.
- When spraying for frost/freeze and cold protection, mix one litre of WiltNot concentrate to 30-40 litres of water. The thicker the film, the better protection is achieved.
- The amount of foliage to be covered will always determine the amount of product and water to be applied.
- The under side of the leaf is more important than the top surface for reducing stress. In most plants, the greatest percentage of stoma are located on the underside of the leaf.

10. Effective spraying

- The type of equipment used must have the capability to dispense the product thoroughly to assure complete coverage of lower and upper leaf surfaces.
- It is essential that enough tank pressure be applied to dispense and spread the product over all the leaves.
- The tank, pump, hoses and nozzles should be clean and in good working condition.
- Faulty equipment or insufficient pressure will limit the dispensing of the product and fail to meet the desired expectations for full plant protection.
- Faulty equipment and technician error have been responsible in every case investigate where the desired results were not obtained.

6. Three essentials for good application are:

- Ratio of concentrate to water mixture.
- Tank pressure and nozzle selection.
- Ground speed at application.



General application guidelines

The amount of foliage to be covered is very important when considering water to concentrate mixture.

- As a example, a forty centimetre cotton plant will not require as much water volume per acre as an almond or citrus tree. Yet, the desired results remain the same.
- Recommended application rate is one litre of WiltNot concentrate to 50 litres of clean water. When additional water is needed for effective coverage, appropriate amounts of concentrate must be added.

Tank mixing

WiltNot is not registered for tank mixing with other chemicals.

When tank mixed, WiltNot will generally enhance the effectiveness of most other products by holding them on the leaf surface. This includes the enhancement of foliar fertilisers and other chemicals.

Never use WiltNot in tanks that have previously been used for herbicide application until the equipment (tank, pump, hoses, filters and nozzles) have been neutralised with products manufactured exclusively for this purpose. If the equipment has not been neutralised, the polymer will activate the herbicide residue and cause leaf burn.

Residue from some chemicals, especially calcium and magnesium, may cause polymers to separate from water. These elements are often found in foliar fertilisers. Evidence of this occurrence will appear as "cottage cheese" or small bits of whitish material floating in the surface foam and collecting in filters. If the sprayer has been used for application of these types of material, clean the tank and equipment by neutralising with products manufactured exclusively for this purpose.

Application rates

The under side of the leaf is more important than the top surface for reducing stress. In most plants, the greatest percentage of stoma are located on the underside of the leaf.

Application	Dosage rate	Comment
Transplanting of seedlings, cuttings and small shrubs	50mL per 1L of water	To reduce transplant shock, spray or dip plants before transplanting.
Shrub and plant protection (incl. indoor plants)	50mL per 1L of water	For total protection and reduced watering requirements.
Turf protection and transplanting	10L per 100L of water	Apply at a rate of 100L of mix to 500 m ² of turf. To extend the life of palleted turf, allow 1 hour drying time before cutting.
Transporting pot plants and trees	50mL per 1L of water	Trim to size, spray 24 hours before moving. Spray pot plants 1 hour before moving.
Cropping and large scale projects	50mL per 1L of water	Apply to run-off. Top and bottom of leaf.
UV, frost and wind protection	5L per 100L of water	Apply 24 hours before these extreme weather conditions occur. Repeat in 4 weeks or as required.

