



Dual Action Climate Control For Crops

Screen™ Duo is the latest generation of CMM's abiotic stress management technology that combines ***two modes of action*** providing protection of your crops on the outside and from the inside.

SCREEN DUO USER GUIDE



Manufactured by Crop Microclimate Management
PO Box 178, Apex. North Carolina. USA

www.cropstress.com

CMM 
crop microclimate management inc.

What is heat, light & water stress?

Heat & Light Stress

Heat and light stress are economically important problems in agricultural production primarily in hot climate countries – although even in more temperate regions, wide fluctuations in temperature or light intensity, can lead to significant damage to plant tissues.

Heat and light stress cause losses by reducing overall plant productivity and quality. The most commonly observed symptoms are wilted or otherwise unhealthy looking plants and physical injury to limbs, leaves and fruits, generally referred to as ‘sunburn’. These symptoms are caused initially by damage to the photosynthetic apparatus, followed by damage to other tissues. Even if a plant looks healthy, heat and light stress can reduce or completely halt photosynthesis, leading to loss of productivity.

Water Stress

Water stress is complex and is intricately involved with heat and light stress. Shortage of soil water can initiate and exacerbate heat and light stress. When soil moisture is limiting, a plant’s ability to cool itself through transpiration, is impaired. Stomata are closed and leaf temperature increases. The photosynthetic machinery closes down and the plant is no longer able to process the light energy entering its cells. This leads to photoinhibition, a build up of free radicals (oxidants) and ultimately to tissue destruction and cell death i.e. the symptoms of heat and light stress damage.

In the case where heat stress is initiated by high temperature, the plant will attempt to cool itself by means of increased transpiration. Once the soil moisture becomes limiting the same sequence of events as described above will take place.

When to apply Screen Duo

Using Screen Duo for Heat Stress & Sunburn Reduction

Screen Duo may increase plant vigor, total yield and quality in many crops. Under high ambient temperatures, Screen Duo reduces canopy temperature, reducing heat, light and water stress.

The reduction of stress results in increased fruit quality e.g. Total Soluble Solids (TSS/Brix) and fruit size. Other benefits include improved color and reduced russet, fruit drop, sunburn and cracking. Best results are obtained from the ‘**Season Long**’ treatment program.

Using Screen Duo for Late Season Sunburn Management:

Apply to sunburn-prone fruit, leaf, limb and trunk surfaces before conditions leading to sun damage occur. Apply the initial application at the full rate and a second at the half rate, at no more than a 7 to 10 day interval. Subsequent applications may be made at the half rate (but do not reduce volume). Depending upon the length of the heat period, repeat applications may be needed at intervals of 14 to 21 days.

Using Screen Duo for Heat Stress Management (Crop Water Use Management):

For heat stress reduction, spray plants with a full rate of Screen Duo based upon the ‘**Season Long**’ rate schedule found in the crop tables on pages 4 and 5. Make subsequent applications to maintain film coverage and to treat new growth. These applications also help reduce crop water usage by reducing crop temperature and transpiration.

Screen Duo reflects damaging UV and IR radiation and heat, while still allowing photosynthesis and the uptake of nutrients and crop protection products.

Independent trial results indicate that the use of Screen Duo can reduce transpiration and improve soil moisture status by as much as 25%



Before using this product, read the 'Post-Harvest Washing Directions' on page 6.

GENERAL INFORMATION

Screen Duo has two modes of action for the protection of crop plants against abiotic stress. The first is a visible particle film that reflects harmful UV and IR light, reducing the temperature of the plant. The second is a naturally occurring compound, found in all crop plants, that triggers the innate stress response mechanism. When Screen Duo is applied to plants, a visible, bluish-grey film results. For best performance a thorough, uniform, and consistent coverage is essential throughout the stress period.

Rates: For tree crops: unless otherwise specified in crop instructions, use 10 to 20 lbs of Screen Duo per 100 gallons of water, using sufficient spray volume to obtain thorough, near-drip coverage. **For field grown vegetables:** use 6 to 25lbs per acre. Apply an additional spray if coverage is insufficient. Spreading on waxy plant surfaces is usually better when the plant surface is warm.

Application timing: Screen Duo can be used anytime from planting through to Post Harvest. If visible residues at harvest are a concern, refer to the instructions under '**Post-harvest Packing and Washing Directions**' on page 6.

Plant Response Precautions: Screen Duo keeps plant surfaces cooler and an advance or delay in maturity may result. Pome and stone fruit may have maturity delays of 3 to 7 days, especially in cool regions or cool seasons.

Mix Instructions:

For Agitating Sprayer Tanks (conventional, electrostatic and aerial sprayers)

1. Slowly add Screen Duo into the water in a recirculating sprayer tank, making sure to keep agitation brisk. Sprayer tanks with strong agitation are preferred. A pre-mix tank may speed up loading operations if the sprayer does not have mechanical agitation. Add Screen Duo directly into the mix basket if pump recirculation empties into the mix basket. If there is no mix basket, add Screen Duo very slowly to the recirculating water. Avoid dumping Screen Duo directly into the pump intake area as this could plug the filter or intake. Mix thoroughly.
2. Add tank mix pesticides and adjuvants after the Screen Duo.
3. Continue agitation until the tank is empty.
4. At the end of the application flush system and nozzles with fresh water. Periodically check in-line strainer and clean if necessary. Properly dispose of rinse water.

For Non-agitating Sprayer Tanks, Such as Handheld and Backpack Sprayers

The following mixing sequence must be followed:

1. Use Screen Duo at a rate of 1oz to 4oz of Screen Duo per gallon of water. For sprayers that are difficult to shake, pre-mix in a bucket per the directions below and pour suspension into sprayer.
2. Fill the sprayer to 1/4 - 1/2 full. Add Screen Duo. Close top and shake vigorously. Add remaining water and shake to mix, as well as to break up any remaining small clumps of Screen Duo, if found. It is not recommended to fill with a hose or shake the container while Screen Duo is floating on top of the water.
3. Mix thoroughly by shaking the closed container vigorously for 30 seconds.
4. Add tank mix pesticides and adjuvants after the Screen Duo.
5. Add the remainder of batch water and shake the closed container for an additional 30 sec.
6. If sprayer is motionless for 1 minute or more, shake sprayer to agitate product.
7. At the end of the application, spray until empty and flush system and nozzles. If not empty, blow air pressure out of the line and nozzle (usually by upending) and store in a cool place. Apply any leftover mix within two to three weeks to avoid spoilage. Rinse the sprayer and allow to dry before the next batch.

Heavy rainfall, new growth, and wind erosion will affect film quality. Reapply to re-establish coverage after heavy rain as soon as the foliage is dry. Avoid excessively thick coatings.

Foliage Dryness: Applications to wet foliage can cause inadequate film formation as well as excessive run off.

Under Hot, Dry Conditions: Under very hot and dry conditions, increase volume of water and droplet size to improve deposition.

Spray Methods: Air blast, high-pressure handgun, or boom sprayers provide the best results. For best results, use narrow diameter nozzles and high pressures to produce a light mist-like spray with fine droplets that will form a uniform film on the treated plant surface. At given concentrations, the flow rate of suspended Screen Duo is similar to water. Strainers, preferably no finer than 40 mesh, in the spray system and behind each nozzle per normal practice helps to reduce nozzle clogging.

A visual inspection of film deposition and completeness of coverage is crucial for fine-tuning spray coverage.

Overhead Irrigation and Overhead Cooling: Do not apply Screen Duo through any type of irrigation system. Overhead irrigation or cooling is not preferred over Screen Duo treated surfaces due to the possible deposition of calcium carbonate from hard water that may form residues that are hard to remove in the pack house.

Screen Duo does not require EPA approval and therefore is not included in CDMS or AGRIAN
There are no 'Re-Entry' or 'Pre-Harvest Interval' restrictions for Screen Duo

Use Rates and Comments

TREE CROPS	Rate	Comments
Pome and Stone Fruits, Nut crops, Olives, Grape Vines, Small Fruits including Berries	<p><u>Season Long</u> 1. Apply 10 lbs/100 gals water every 10-14 days beginning at petal fall (cap fall). If rainfall or high temperatures occur, re-apply Screen Duo to refresh film.</p> <p><u>Late Season Sunburn & Heat Management</u> 1. Initial application 20 lbs/100gals 2*. Subsequent applications at 10 to 14 day intervals at 10 lbs/100gals</p>	<p>Make applications 14 days apart beginning at petal fall (cap fall) and prior to the first heat event. Apply in a water volume according to Tree Row Volume. Refer to Application Guidelines.</p> <p>On hard to wet foliage and fruit such as mangoes, plums and grape vines add a non-ionic surfactant/spreader at the recommended spreader label rate to the initial spray, or when reapplying after the film has worn off.</p> <p>Stone Fruit (excl. cherry) – apply only early season up to 1/2 to 1 inch fruit diameter or after harvest. For cherry, apply early season up to 1/4 inch fruit diameter, or after harvest.</p> <p>*At low rates of Screen Duo and at high water volumes it may be necessary to add additional surfactant/spreader at the recommended label rate.</p> <p>For all crops: refer to 'Post Harvest Washing Directions' on page 6.</p>
Tropical and Subtropical crops such as Avocado, Banana, Mango, Guava, Papaya, Paw Paw		
Nursery & Ornamental Plants		
Citrus		<p>*Citrus – due to the excellent ability of Screen Duo to stick to citrus leaves and foliage the application rate of subsequent applications is 5 lbs/100 gallons of water at 14 to 21 day intervals.</p> <p>Do not apply Screen Duo to the underside of unfolded leaves during growth flushes.</p>



Use Rates and Comments

FIELD CROPS	Rate	Comments
<p>Vegetable crops including :</p> <p>Tomatoes, Peppers, Potatoes, Onions, Cucurbits such as Cucumber Squash, Pumpkin, Rock melon, Watermelon.</p> <p>Vegetable Seedlings</p>	<p><u>Season Long</u></p> <ol style="list-style-type: none"> 1. Apply 6 lbs/acre beginning just prior to flowering. 2. Re-apply at 14 day intervals. <p><u>Late Season Sunburn & Heat Management</u></p> <ol style="list-style-type: none"> 1. Initial application 25 lbs/acre 2. Subsequent applications 12.5 lbs/acre 	<p><i>For all crops: refer to 'Post Harvest Washing Directions' on page 6.</i></p> <p>Apply the first two applications 14 days apart and prior to the first heat event. Application interval should be reduced if crop growth is rapid, and there are large amounts of uncovered foliage. Increase the volume of water used throughout the season based upon plant size. Reapply at 7 to 14 day intervals as required to maintain an even coverage on the fruit and foliage. Continue treatment as required and maintain cover up to 7 days prior to harvest.</p> <p>For transplant shock reduction, apply at 12.5 lbs/acre to plants in trays. Begin subsequent applications after post-transplant watering and continue as described above.</p> <p>Cucurbits – apply to smooth-skinned cucurbits only. Refer to Post-harvest Packing and Washing instructions in the user guide.</p> <p>Ensure that fruit is well covered for greatest sunburn reduction.</p> <p>DO NOT TREAT TRANSPLANTS BY DIPPING</p>
Pineapple	<p><u>Season Long</u></p> <ol style="list-style-type: none"> 1. Apply 6 lbs/acre beginning just prior to flowering. 2. Re-apply at 7 to 14 day intervals. 	<p>Apply in a water volume of approximately 100 to 125 gals/acre using a calibrated boom fitted with fan nozzles. Applications near harvest are needed if the ripening fruit changes position as its weight increases. Reapply at 7-14 day intervals as required due to growth dilution or rainfall/irrigation.</p> <p>Heavy rainfall, new growth and wind erosion will affect film quality. Reapply to re-establish coverage after heavy rain as soon as the foliage is dry. If the entire cover is lost due to rain, re-commence applications at the initial high rate, followed by subsequent applications at the lower rate.</p> <p>For fresh market pineapple, use high pressure forced water sprays to remove any remaining residue.</p>
Cotton, Peanuts	<p><u>Season Long</u></p> <ol style="list-style-type: none"> 1. Apply 6 lbs/acre beginning just prior to flowering. 2. Re-apply at 7 to 14 day intervals. 	<p>For the management of heat stress.</p> <p>Re-apply as required at 7 to 14 day intervals depending on growth dilution and rainfall.</p>



Crops that will be processed

Thorough washing is not generally required for crops to be processed, as light traces of Screen Duo do not affect the quality of processed products. Crops for which the skin or treated surface is removed during processing, generally do not need to be washed. Check with the processor before using Screen Duo to ensure that treated produce is acceptable for processing.

Crops for fresh market

Post-harvest washing is required unless only early-season applications are made and no traces of Screen Duo are present at harvest. Most traces of Screen Duo can be washed off with packing line brushing and forced water sprays.

First time users it is suggested that a small-scale field application and post harvest film removal trial be conducted before commercial use on fresh market crops to determine if any remaining traces of Screen Duo can be fully removed.

Traces of Screen Duo may still be visible after washing, particularly in difficult to brush areas of the produce e.g. calyx, stem end, creases etc. and modifications to the packing line can be made to improve film removal: e.g. higher pressure nozzles and different nozzle types; warm water; a longer soaking period in the dump tank; use of different brush types, including longer-haired or sculpted brushes; adjustment of brush rotation speed; using overhead brushes; using a blanket over the top of the fruit on the brush bed to increase downward pressure and improve penetration of the bristles into hard to reach areas; increasing the number of brushes in the brush bed. Reducing the speed of the packing line to increase the residence time of the fruit on the brushes and under the high pressure water sprays. Produce that shows traces of white film after a single pass through the washing process can be washed again. Post-harvest waxing further improves fruit appearance.

The use of a fresh produce washing detergent that is labelled for use in the packing line and/or wash tank may assist in film removal. The detergent must be approved for this purpose by the relevant authorities and potential buyers.

For fresh market crops that will not be waxed or if the washing system is inadequate to remove all traces of Screen Duo: Unless washing facilities are adequate, cease applications sufficiently in advance of harvest to allow residue to weather off completely.

For field packed crops and fresh market crops that will not be washed and remaining Screen Duo film would reduce crop value: *Do not use this product.*

Special washing considerations for stone fruit: Special washing is required for fresh market stone fruit, especially for fuzzy peaches. Most traces of Screen Duo will wash off with brushing and forced water sprays. Use of an approved fruit cleaning detergent may improve results. Prior to brushing, a pre-soak in approved fruit cleaning detergent is needed for fuzzy peaches. ***A pre-harvest washing trial is recommended as a means to determine if a detergent is necessary.*** If fresh market peaches cannot be washed as noted above, discontinue Screen Duo sprays when the fruit are approximately 1 inch in diameter. Residues of Screen Duo do not affect processed fruit quality.

Screen Duo™ Packaging:

Screen Duo is available in 50LB multilayered paper bags.

Dispose of empty bags at an approved land fill site or according to local authority guidelines.

Screen Duo™ is a registered trademark of Crop Microclimate Management Inc.

Crop Microclimate Management researches and develops technologies for the management of environmental stresses in crop plants. CMM's products are tools that allow farmers to cost-effectively reduce losses in yield and harvest quality that result from plants being exposed to excessive heat, cold, light, or suffer from a shortage of water in combination with excessive heat and light.

Abiotic stresses cause 50-60% of all crop losses in modern agriculture.

For further information on Crop Microclimate Management visit:

www.cropstress.com

For further information on Certis USA visit:

www.certisusa.com





Dual Activity - More Protection

- Reduced heat, light and water stress
- Increased photosynthesis
- Increased carbohydrate
- Increased quality & yield
- Improved Brix/TSS
- Reduced flower abortion
- Crops shed less fruit
- Reduced bi-annual bearing



Screen Duo Reduces Sunburn

- Increased marketable yield
- Improved skin color
- Less russet
- Improved internal fruit quality
- Higher pack outs
- Lower grading costs

Screen Duo Keeps Crops Cooler - Cooler Crops Use Less Water

- More efficient water use (*less used for cooling and more for photosynthesis*)
- Up to 30 - 40% reduction in potential water use
- Improved sustainability of deficit irrigation
- Reduced impact of soil moisture deficits

Distributed by:

Certis USA, L.L.C.
9145 Guilford Rd, Suite 175,
Columbia, MD 21046

Customer Service: 800-250-5024 or
www.customerservice@certisusa.com



www.certisusa.com