

BEGONIA × HIEMALIS

Sanitation is critical to limit Bacterial Leaf Spot (BLS, Xanthomonas), while vector control is key for preventing spread of Tospoviruses (INSV and TMV).

- BLS
 - Water-soaked lesions that turn yellow then necrotic, primarily occurs on leaf surfaces and can lead to stem and plant death.
 - Moves rapidly through contact and water.
 - Thoroughly check unrooted cuttings and liners upon arrival and monitor plants during propagation and production rouging any suspect plants.
 - Sanitize all equipment and production areas between crop cycles and handling of suspect plants.
 - Avoid overhead watering.
 - Responsibly and frequently spray bactericides to protect and slow potential infections.
- INSV and TMV
 - Symptoms include mosaic patterns, stem and vein necrosis, stunting, foliage distortion and burns, and poor flower quality; may vary due to species, age, and environment.
 - Vectored by western flower thrips (WFT).
 - Inspect for thrips when receiving material and monitor populations using sticky card traps.
 - Use indicator plants such as petunia but confirm infection through diagnostic test kits or sending symptomatic tissue to a diagnostic lab.
 - Implement a strict WFT management program and break generations to limit potential transmission to future crops.
 - Isolate and dispose of infected material following positive confirmation of Tospoviruses as infected plants are non-curable.
- **Growers are responsible for managing the spread of BLS and Tospoviruses in their operations.**

Begonia × hiemalis @ Risk Crop
*Commonly impacted by two easily spread pathogens, Xanthomonas and Tospoviruses. Ball has worked diligently to minimize the risk, BUT growers are **solely responsible** for growing plants under clean cultural conditions and promptly and responsibly implementing programs to limit the spread of these pathogens.*

LINER CULTURE (Start with unrooted cuttings produced under strict sanitation.)

- Temperature
 - Stage 2: Soil and air 68 to 72F (20 to 22C) night, air 70 to 80F (21 to 27C) day
 - Stage 4: Air 62 to 70F (20 to 22C) night, air 70 to 75F (C) day
- Light
 - Stage 2: 500 to 1000 FtC, slightly increase during stage 3
 - Stage 4: 2000 to 3000 FtC
- Media
 - Maintain pH of 5.5 to 5.8
 - EC less than 1.0 mmhos/cm especially during stages 2 and 3
- Fertilization
 - Foliar feed with 20-10-20 at 50 to 75 ppm if foliage loses color during stage 2
 - Increase to 100 to 200 ppm during stages 3 and 4

GROWING ON TO FINISH (Start with liners produced under strict sanitation.)

- Temperature
 - Night: 62 to 65F (16 to 18C)
 - Day: 68 to 75F (20 to 24C)
- Light
 - 2000 to 3000 FtC
- Media
 - pH 5.5 to 6.2
- Fertilization
 - 200 to 300 ppm alternating between 15-0-15 and 20-10-20
 - EC less than 1.0 mmhos/cm
- Height control
 - Limit phosphorus and ammonium form nitrogen
 - Cycocel, check label for rate
- Flowering
 - Intermediate short-day period of 1 to 2 weeks for budding followed by 14-hour minimum long day for flowering

BACTERICIDES TO CONTROL BLS *Be sure to read and follow all pesticide label and instructions.

- Copper based bactericides are the most effect chemicals to suppress the spread of BLS.
- Copper is a protectant and is not curative once BLS infections begin.
- Apply copper bactericides every 5-7 days when disease pressure is low and every 3-5 days when disease is present.
- Copper is easily washed off the foliage after irrigating. Trials have shown that >50% of the copper residue is gone after 2 days when overhead irrigation is used.
- Tank mix of copper compounds and Mancozeb were shown to be more effective than copper alone.
- Though not as effective, rotations of Mancozeb and Cease have suppressive qualities and may be used in part of a complete bactericide program that included copper applications.

WESTERN FLOWER THRIP CONTROL

- Biologicals should be used in a well-planned IPM strategy but not relied upon when Tospoviruses are present

- Potential chemical options (University of Massachusetts)

Table 1. Pesticides labeled for WFT in greenhouses.

**Be sure to read and follow all pesticide label and instructions.*

MODE OF ACTION GROUP NUMBERS	COMMON NAME	TRADE NAME
18B	azadirachtin (neem)	Aza-Direct, Azatin XL, Neemix 4.5, Ornazin, Molt-X
3 & 27A	pyrethrins and PBO (piperonyl butoxide)	Pyrethrum TR, Pyronyl Crop Spray
1A	methiocarb	Mesurool 75-W
4A	imidacloprid	Marathon II, 1% Granular, 60 WP and many others
Desiccator or membrane disruptors	horticultural oil	Ultra-Pure Oil
15	novaluron	Pedestal
7A	kinoprene fenoxycarb	Enstar AQ Preclude TR
6	abamectin	Avid 0.15EC, Abamectin E pro, Flora-Mek 0.15 EC and others
Unclassified (beneficial fungus)	<i>Beauveria bassiana</i>	Botanigard ES, 22WP
5	spinosad	Conserve SC
1B	acephate	1300 Orthene TR, Orthene TT&O, Orthene TT&O 97
1B	chlorpyrifos	DuraGuard ME
1B & 3	chlorpyrifos and cyfluthrin	Duraplex TR
3	bifenthrin	Talstar Select, Attain TR
3	cyfluthrin	Decathlon 20 WP
Desiccators or membrane disruptors	insecticidal soap	M-Pede

Mention of a pesticide does not constitute an endorsement of any product and any omission from this list is unintentional. The pesticide label is the ultimate authority for pesticide use.

For more information on BLS:

https://www.canr.msu.edu/news/essential_concepts_for_managing_xanthomonas_in_begonia_part_1

Tospoviruses and thrips:

<https://ag.umass.edu/greenhouse-floriculture/fact-sheets/western-flower-thrips-management-tospoviruses#:~:text=The%20use%20of%20yellow%20sticky,as%20possible%20to%20reduce%20populations.>

Find more resources: <https://www.ballseed.com/QuickCulture/ProductionGuides/>

Tech On Demand Podcast: <https://www.growertalks.com/TechOnDemand/>