

ZINNIA ELEGANS

Sanitation is critical for control of Zinnia leaf spot diseases.

- *Z. marylandica* [Zahara and Profusion] are disease tolerant and will only express leaf spots under severe disease pressure.
- *Z. elegans* [Dreamland, Magellan, State Fair, Large Flowered, Shortstuff series] leaf spots are caused by several fungi and bacteria.
- These diseases can move rapidly within the greenhouse so barriers between crops are recommended.
- Isolate production blocks to prevent mechanical spread by personnel or equipment.
- Thoroughly clean all equipment and production areas between production cycles.
- Refer to ‘Sanitation for @Risk Crops’ for additional tips to make sure you have reduced the risk of spreading this disease within your production.
- **Growers are responsible for preventing the spread of Zinnia elegans leaf spot diseases in their operations.**

Zinnia elegans @ Risk Crop
Zinnia elegans is susceptible to a number of seed-borne diseases that, if not managed throughout the production cycle, will cause serious plant losses. Ball has worked diligently to minimize the risk, BUT growers are solely responsible for growing the plants under clean cultural conditions and applying correct fungicides and bactericides to suppress the diseases.

DISEASE CONTROL PROGRAM*

- ◆ Successful control of Zinnia leaf spot diseases is dependent on correct identification of the causal pathogen.
- ◆ Broad spectrum fungicide+bactericide spray programs can be used to minimize infection if applied early in the crop cycle.

Disease	Symptoms	Pathogen/Cause	Management
Alternaria Leaf Spot	Large reddish brown or purple spots, at first round to oblong but becoming irregular in shape have gray or tan centers that may drop out leaving a hole. Severely affected leaves brown, dry, and become brittle.	<i>Alternaria zinniae</i>	Apply a fungicide. Whenever possible, water in a manner that keeps the leaves dry to inhibit this seedborn disease.
Aster Yellows	Leaf-like tissue forms where flower parts should be located. Flower-like parts remain green or light green. Often flowers on only one side of the spoke show symptoms. Sepals may be very large or dwarfed.	<i>Phytoplasma</i>	Destroy infected plants. Control leafhoppers.
Bacterial Leaf Spot	Spots reddish brown to dark brown, angular and with a prominent yellow halo form on leaves.	<i>Xanthomonas campestris pv. zinniae</i>	No sprays are effective. Whenever possible, water in a manner that keeps the leaves dry to inhibit this seedborn disease.
Powdery Mildew	White fungal growth forms on the upper surface of leaves and may form on flower petals.	<i>Golovinomyces cichoracearum</i> (formerly <i>Erysiphe</i>)	Apply a fungicide to protect plants.

PLUG CULTURE

STAGE 1 - Time of radicle emergence (1-2 days)

- ◆ Soil temperature 68-70° F (20-21° C).
- ◆ Keep media on the dry side, do not saturate the media.
- ◆ Cover the seed with coarse vermiculite.
- ◆ Soil pH 5.5-5.8 and soluble salts (EC) less than 0.75 mmhos/cm (2:1 extraction).

STAGE 2 - Stem and cotyledon emergence (3-5 days)

- ◆ Soil temperature 68-70° F (20-21° C).
- ◆ Reduce moisture levels once radicle emergence occurs! Allow the soil to dry out slightly before watering for best germination and rooting.
- ◆ Apply Bonzi to the unfolding seedlings to manage hypocotyl stretch
- ◆ Irrigate early in the day so foliage is dry by nightfall to prevent diseases.

STAGE 3 - Growth and development of true leaves (14 days)

- ◆ Air temperature 60-65° F (16-18° C) night, 70-75° F (21-24° C) day.
- ◆ Allow the soil to dry thoroughly between irrigations but avoid permanent wilting to promote root growth, control shoot growth and prevent foliar disease infections.
- ◆ Increase feed to 50-75 ppm N every 2 - 3 irrigations.
- ◆ ARest, tank mixes and Bonzi are effect PGRs
- ◆ Use DIF whenever possible, especially the first 2 hours after sunrise, to control plant height.

STAGE 4 - Plants ready for transplanting or shipping (7 days)

- ◆ Air temperature 60-65° F (16-18° C) night, 70-75° F (21-24° C) day.
- ◆ Allow soil to dry thoroughly between irrigations.
- ◆ Fertilize with 14-0-14 or calcium/potassium nitrate feed at 50-75 ppm N as needed.

FINISHED CULTURE

TEMPERATURE

- ◆ Night -- 62-65° F (17-18° C)
- ◆ Day -- 65-70° F (18-21° C)

LIGHT

- ◆ Short day treatments promote more rapid flower initiation although flowers will form during long days. The long day flowers will have more disk flower (no petals) while flower initiation under short days will have more petals.
- ◆ Maintain light levels as high as possible while maintaining moderate temperatures.

MEDIA

- ◆ Use a well-drained, disease-free soilless medium with a medium initial nutrient charge and a pH 5.5-6.2.

IRRIGATION

- ◆ Water early in the day to allow leaves to dry rapidly
- ◆ Use drip irrigation systems to minimize wet foliage which leads to disease problems

FERTILIZATION

- ◆ Fertilize every irrigation with 50-75 ppm from 13-2-13.
- ◆ Maintain medium electrical conductivity around 1.0 mmhos/cm (using 1:2 extraction).

CONTROLLING HEIGHT

- ◆ Once plants are rooted to the sides of the containers allow the plants to wilt prior to irrigation to provide some height control.
- ◆ Bonzi is effective in controlling plant stretch when applied early in the crop
- ◆ Zinnia is responsive to day/night temperature differential (DIF), and are shorter with a negative DIF.

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

**Note that interactions of daminozide and copper pesticides have been documented.*