

KALE

Sanitation is critical for control of Black Rot of Crucifers (Kale).

- Black Rot of Crucifers can move rapidly within the greenhouse so strict sanitation is critical to prevent spread within the greenhouse.
- Isolate production blocks to prevent mechanical spread by personnel or equipment.
- Thoroughly clean all equipment and production areas between production cycles.
- Produce finished plants in areas where other Crucifers (cabbage and cauliflower) are NOT being grown since these field crops can contaminate the Kale production
- 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 Black Rot of Crucifers in their operations.**

Kale @ Risk Crop
*Black Rot of Crucifers (Kale) is a seed-borne disease that, if not managed throughout the production cycle, will cause serious plant losses. Ball has done everything possible to minimize the risk, BUT growers are **solely responsible** for growing the plants under clean cultural conditions and applying correct bactericides to suppress the disease.*

BACTERICIDES TO CONTROL Black Rot of Crucifers*

- ◆ Copper based bactericides are the most effective chemicals to suppress the spread of Black Rot of Crucifers
- ◆ Copper is a protectant and is not curative once Black Rot of Crucifers 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 manzate were shown to be more effective than copper alone.

PLUG CULTURE

STAGE 1 - Time of radicle emergence (3-4days)

- ◆ Soil temperature 65-70°F (18-21° C).
- ◆ Keep media evenly moist but not saturated.
- ◆ Cover the seed lightly with coarse vermiculite.
- ◆ Kale is very sensitive to high salts, particularly high ammonium, during germination.

STAGE 2 - Stem and cotyledon emergence (4-7 days)

- ◆ Soil temperature 62-65° F (17-18° C).
- ◆ Reduce moisture levels once radicle emergence occurs! Allow the soil to dry out slightly before watering for best germination and rooting.
- ◆ Increase light levels to 1000-2500 foot-candles.
- ◆ Irrigate early in the day so foliage is dry by nightfall to prevent diseases.

STAGE 3 - Growth and development of true leaves (10-14 days)

- ◆ Soil temperature 62-65° F (17-18° C). Cooler temperatures will minimize stretching.
- ◆ Use DIF whenever possible, especially the first 2 hours after sunrise, to control plant height.
- ◆ Allow the soil to dry thoroughly between irrigations but avoid permanent wilting to promote root growth and control shoot growth.
- ◆ Bonzi (1-5+ ppm) applied early in stage 3 will control hypocotyl stretch and encourage rosette formation.

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

- ◆ Soil temperature 60-62° F (16-17° C).
- ◆ Allow soil to dry thoroughly between irrigations.
- ◆ Maintain soil pH 5.5-5.8 and EC less than 0.75 mmhos/cm.
- ◆ Fertilize with a balanced fertilizer at 50-75 ppm N as needed.

GROWING ON TO FINISH

Start with transplants produced under strict sanitation.

TEMPERATURE

- ◆ Night -- 50-60° F (10-15° C)
- ◆ Day -- 55-60° F (18-21° C)

LIGHT

- ◆ Maintain light levels around 4000-5000 foot-candles while maintaining moderate temperatures.

MEDIA

- ◆ Use a well-drained, disease-free soilless medium with a medium initial nutrient charge and a pH 5.5-6.3.

FERTILIZATION

- ◆ Once plants are established feed at 200+ ppm nitrogen from a balanced fertilizer source (20-10-20) to encourage leaf expansion.
- ◆ 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 plants to wilt prior to irrigation to provide some height control.
- ◆ Kale are responsive to day/night temperature differential (DIF), and are shorter with a negative DIF.
- ◆ Bonzi (1-5 ppm) must be applied after transplant to encourage compact habit and encourage color expression.

For more information on this disease: http://vegetablemdonline.ppath.cornell.edu/factsheets/Crucifers_BR.htm

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