

GUIDELINES FOR MANAGING BACTERIAL FRUIT BLOTCH DISEASE

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The results of ongoing research suggest several procedures to reduce the risks from bacterial fruit blotch disease (BFB) caused by *Acidovorax avenae* subsp. *citrulli*. Although many of these procedures are already used, financial considerations may make others very difficult to adopt. The following suggestions are offered as our best information for various components of the industry in January, 2001. These are intended to be guidelines only and are not intended to set forth industry standards for seed producers, transplant growers or commercial watermelon growers.

SEED PRODUCERS

1. Use foundation/stock seed produced in dry climates and that have tested negative for BFB by seedling grow-out or other equivalent methods. It is generally accepted that a minimum of 10% of the total volume of seed up to a maximum of 10,000 (seedlings by grow-out) be tested for *A. avenae* subsp. *citrulli*. Practices for stock seed production should be at least as stringent as those for commercial seed in relation to sanitation measures, harvesting and disease control tactics.
2. Produce seed in dry, cool climates and in regions of countries known to be free of BFB. Fields with known BFB outbreaks should be taken out of seed production for at least three years. Crop rotation should be practiced with seed production.
3. Physically separate the cucurbit seed crop from other cucurbits of unknown origin or unknown seedling grow-out test results.
4. Inspect fields thoroughly for typical fruit and foliar BFB symptoms as well as atypical restricted fruit lesions (Hopkins et al., 1994). Inspectors should be trained to recognize variations in BFB symptomatology. Do not harvest seed from fields with suspicious BFB-like symptoms until *A. avenae* subsp. *citrulli* has been ruled out as the causal agent. Institute procedures for rapid identification of suspicious BFB-like symptoms. This may involve preliminary testing with commercially available serological test kits followed by pathogen isolation and confirmation with more accurate laboratory assays.
5. Utilize seed only from fields that are free of BFB symptoms by inspection.
6. Do not utilize seed from symptomless fields near to fields with BFB infections.

7. Use fermentation to reduce chances of seed transmission in diploid and tetraploids. Where available consider using seed disinfectants, or acid washes after fermentation to reduce bacterial contamination. Current technology and potential reductions in germination prohibit the use of fermentation and disinfectants for triploid (seedless) watermelon seed. Seed treatment practices alone do not guarantee that seed will be free of *A. avenae* subsp. *citrulli*.
8. Assay all seedlots for the presence of *A. avenae* subsp. *citrulli* by the seedling grow-out assay of minimum of 10,000 seedlings per lot or an equivalent method.

TRANSPLANT GROWERS

1. Plant seed from lots that have tested negative for *Acidovorax avenae* subsp. *citrulli* by grow-out of at least 10,000 seedlings or an equivalent method. **DO NOT plant experimental or non-tested seed in the same houses with commercial seedlots.**
2. Minimize traffic and equipment sharing between transplant houses. Special attention should be paid to separating experimental/non-tested seedlings from commercial seedlings. Do not handle seedlings unnecessarily.
3. Make a floor plan of the transplant houses and keep good records of the origin of seed, seedlot numbers and location of each variety planted. Also keep accurate records of the treatments applied to seedlings.
4. If possible, use “dedicated” greenhouses for particular varieties or seedlots. If multiple varieties and/or seedlots are to be planted in the same transplant house, use physical barriers (at least 2 feet high) between plantings to minimize splash contamination.
5. Carefully inspect seedlings and destroy/discard any flats, and seedlots containing seedlings with BFB symptoms. Be sure of diagnosis before destroying an entire greenhouse of plants. In the transplant house certain fluorescent *Pseudomonads* and another *Acidovorax* spp. can cause BFB-like symptoms on seedlings. Commercial serological test kits are available and should be used initially but subsequent confirmation should be sought from research or commercial testing laboratories. The *Acidovorax* spp. may react positively with serological assays necessitating confirmation with other techniques (PCR, fatty acid analysis).
6. If possible, use ebb and flow irrigation to reduce bacterial spread. If there is no alternative to overhead irrigation, water at mid-day to ensure that plant surfaces dry rapidly and reduce delivery pressure to eliminate excessive splashing and aerosol generation.
7. With ebb and flow irrigation, discard any seedlings near plants with symptoms. With

overhead watering, discard all seedlings from transplant houses with infected seedlings.

8. Alternatively, if BFB occurs in the transplant house, discard infected seedlings and those nearby. Spray remaining seedlings with copper-containing fungicides to reduce spread (only if registered for greenhouse application). If possible, reduce the relative humidity in the transplant house and promote good air circulation. This is a less desirable alternative than discarding all seedlings, but may be more practical than replanting and missing the targeted market window. The transplant producer should inform all clients (growers) of BFB outbreaks in transplant houses so that adequate disease management measures can be taken in the field.
9. Use the utmost in sanitation techniques when producing transplants. Minimize any physical contact with seedlings. Maintain sanitation stations (70% ethanol in spray bottles and clean paper towels) at all entrances and exits of each facility. Surface sterilize hands when entering and leaving transplant houses.
10. Decontaminate transplant houses with BFB-infected seedlings using commercially available disinfectants e.g. Greenshield, Physan 20, or 0.5% sodium hypochlorite (1 part bleach to 9 parts water). Wait at least two to three weeks before replanting seedlings in the transplant house.
11. Gravel or plastic/cloth floor coverings are better than dirt floors. Dirt from the floor can be splashed onto seedling foliage or the roots may contact the dirty floor, leading to disease. Plastic/cloth coverings can be cleaned or replaced if necessary. Transplants should be raised off the greenhouse floor onto wooden pallets or cinder blocks to lessen the chance of contamination.
12. Transplant flats should be new or cleaned before each transplant generation. Trays should be cleaned to remove soil and plant residue and then treated. Several chemicals e.g., Greenshield, Physan 20, household bleach are available for disinfecting transplant trays. A ten minute soak in the treatment material followed by rinsing, provides adequate disinfestation. Be certain to follow label instructions including wearing gloves and eye protection.
13. Utilize pest control strategies and good cultural practices to maintain seedling fertility, and minimize insect damage or other plant stresses during transplant production.

COMMERCIAL GROWERS

1. Use seed from seedlots that have tested negative for *A. avenae* subsp. *citrulli* by grow-out of at least 10,000 seedlings per lot, or use transplants from houses in which there were no BFB symptoms on any cucurbits. **Inspect all transplants thoroughly prior to acceptance.** Do not use left-over seed from which the seedlings developed BFB.

2. Be sure other cucurbit transplants planted nearby are not infected with *A. avenae* subsp. *citrulli*. Keep records of the varieties, their locations in the field, seedlot numbers and sources of seedlings used in the plantings.
3. Debris, including watermelon culls from a field that had BFB should be plowed under and next year's crop should be planted as far from the contaminated site as possible.
4. Practice crop rotation of watermelons with non-cucurbit crops on at least a 3 year rotation schedule.
5. If possible eliminate wild cucurbits, such as citron, wild bur gherkin and volunteer watermelons, pumpkins, and melons near production fields and transplant houses.
6. If symptoms appear in seedlings apply copper pesticide weekly at the full recommended rate. If symptoms are not present, biweekly applications at the full rate or weekly applications at half the recommended rate of copper-containing fungicides should be used as a protective treatment. Applications should begin at first flower, or earlier and continue until all fruit are mature. It is recommended to tank mix ethylene bis dithiocaramate (EBDC) fungicides with copper compounds to increase bactericidal activity while providing broad spectrum fungal disease suppression. As with all pesticides, follow label instructions closely and if necessary, consult with a certified pesticide applicator or county extension agent prior to pesticide application.
7. If symptoms occur, avoid working in fields when plants are wet. Decontaminate irrigation and mechanical equipment with 0.5% sodium hypochlorite solution or an equally effective disinfectant before moving it from an infested field to a non-infested field.
8. **Do not panic !!!** The severity of losses due to BFB in the field are dependent upon the weather. BFB is a manageable disease in the field.