

Field Production Recommendations for “Clean Seed” Garlic Production

1. Planting Site Requirements/Recommendations

1.1. Isolation

As the majority of garlic viruses of concern in Ontario are spread by non-colonizing aphid species, isolation is one of the keys to maintaining high quality seed. Isolation is also necessary to avoid leak moth infestation. Clean seed garlic fields should be isolated from commercial garlic and related crops and other garlic virus hosts such as wild leak and wild garlic (see Controlling the Spread of Garlic Viruses). References recommend anywhere from 2 km to 20 km isolation from the above.

Isolated, cool-season growing areas with late-season aphid flights are recommended. If this is not possible, other strategies should be used to avoid virus infection (see Controlling the Spread of Garlic Viruses).

1.2. Soil Restrictions

1.2.1. Select land that has not grown garlic, onions, shallots, leeks, chives or volunteer alliums in the previous 5 years.

1.2.2. If fusarium rot is a concern, avoid rotations with cereals.

1.2.3. Test the soil for stem and bulb nematodes (*Ditylenchus dipsaci*) and root knot nematodes (*Meloidogyne* spp) prior to planting. Samples for nematode testing should be taken in September-October the year before planting or in May-June the year of planting. Take 8-10 cores for 500 m² or less, 25-35 for 500 m² to 0.5 ha and 50-60 cores for 0.5 to 2.5 ha. Samples can be sent for testing to the Pest Diagnostic Clinic, Laboratory Services, University of Guelph (www.labservices.uoguelph.ca/units/pdc). If the tests indicate the presence of stem and bulb nematodes or root knot nematodes, the soil should be properly fumigated or not used for seed production.

1.2.4. The field must have no history of white rot.

2. Controlling the Spread of Garlic Viruses

- Plant a border crop around the garlic crop to act as a trap crop and windbreak.
- Weed control around and in the crop is critical.
- Maintain a fallow border of at least 2 meters outside the border crop, but not between the border crop and the garlic crop.

3. Cultural Practices

3.1. Pre-Plant

- Encourage rapid decomposition of plant residue from previous crops by cultivation and/or fallowing to reduce bulb mites.

- If iris yellow spot virus is a concern (currently there is no evidence that this virus exists in Canada) avoid planting next to grain crops as thrips will migrate from cereals as the crop matures or at harvest.

3.2. Planting

- Garlic clones must be planted separately to facilitate roguing.
- Cloves from the same bulb should be planted directly after each other in the field (unit planting) to facilitate virus detection and roguing.
- Varieties should be planted 5 m apart.
- Different field generations should be separated by a minimum of 500 m.
- Plant generation (G)1 material first, followed by G2, G3 and finally G4.
- Remove all debris and dirt from equipment between generations and fields.

3.3. Sanitation

- Use a clean source of irrigation water (preferably not surface water).
- Work should always start in upper generation fields, followed by lower generation fields.
- Clean soil off footwear and clothing between fields.
- Equipment should be thoroughly cleaned and disinfected between fields.

3.4. Crop Culture

- Weeds in the crop, the border crop and the fallow borders should be adequately controlled at all times.
- A pest control and monitoring program should be in place for the entire crop cycle.
- The grower should inspect the crop for off-types and visible disease symptoms and insect pests such as the leek moth weekly, if possible, or at least twice during the crop cycle. The first inspection should be as soon as the plants are large enough in the spring and the second when the plants are mature but before the leaves begin to dry. All off-type plants and plants with visible disease should be rogued out along with the bulb.
- Don't dispose of cull plant material close to the field or irrigation sources.
- If leek moth is a concern, cull material should be either burned or deep composted within 5 days.
- Scapes should not be cut off but removed by hand especially in the early generations.
- Rogue out any prematurely senescing plants and examine for symptoms of botrytis, fusarium, stem and bulb nematode (see below), white rot.
- If stem and bulb nematodes are suspected, a sample of bulbs should be sent to the Pest Diagnostic Clinic, University of Guelph (www.labservices.uoguelph.ca/units/pdc) for isolation and identification.

3.5. Harvest and Storage

- Avoid injuring cloves during handling and storage.
- Discard bulbs showing any signs of infection.

- Remove any plant debris from storages, thoroughly clean and disinfect between crops. Proven disinfectants include sodium hypochlorite, quaternary ammonium, phenolic compounds and 37% formalin solution.
- Clean and disinfect all storage containers between uses.
- Don't dispose of cull plant material close to the field or irrigation sources.
- Remove cull garlic and harvest litter from the field.
- If leek moth is a concern, cull material should be either burned or deep composted within 5 days.
- Examine bulbs prior to re-planting and discard any shrunken or discolored bulbs.
- Any bulbs suspected to be infested with stem and bulb nematodes or white rot should be deeply buried or burned.
- Insects/mites can attack stored garlic, monitor pest populations with sticky trap and leek moth pheromone traps.
- Stem and bulb nematodes and fusarium rot can continue to develop in storage often leading to rot.