ADVISORY FOR POMEGRANATE WILT MANAGEMENT

Ceratocystis fimbriata, Meloidogyne incognita, shot hole borer –*Xyleborus spp.* major cause and species of *Fusarium, Rhizoctonia, Sclerotium, Macrophomina, Phytophthora* are occasionally associated

Symptoms (Fig. 24)

- Plants with yellowing/drooping/drying of leaves in some of the branches or entire plant.
- Observe the roots and split open the roots and lower portion of the stems, if you observe:
    - brown/gray/black discolouration of wood it is a fungus *Ceratocytis fimbriata*
    - only xylem is brown it is *Fusarium* sp.
    - pin holes are observed it is shot hole borer
    - knots are observed on fine roots in early stage and other roots in advance stageit is nematode infestation.
    - If stem just above soil level shows color rot it can be *Rhizoctonia and/or Phytophthora.* In this case sudden toppling down of green plant can also be seen.
    - If root are slimy to touch or white-black fungal growth is observed feeder roots are missing then it cold be root rot by *Sclerotium or Macrophomina*

Predisposing factors: The wilt diseases are generally aggravated due to biotic stresses particularly drought as well as excessive rain, boron deficiency in soil result in increased severity to *C. fimbriata*. Wounds natural or due to insect/nematode or human activity like pruning and inter cultural operations predispose the plants to severe infections, as the pathogen is more devastating in overindulged orchards rather than in orchards with little human activity. Stress due to flowering and fruit bearing trees also results in sudden death of the entire plant. All commercial cultivars are susceptible to wilt and it can attack plants of all ages.

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Wilted plants due to *Ceratocystis fimbriata*


Brown dicolouration of vascular tissue and wood due to *C. fimbriata*

Fusarium wilt

Root rot

Collar rot

Shot hole borer with larva and pupa

Root knot nematode

Fig. 24: Pomegranate wilt symptoms due to different agents

Management

The planting material (sapling as well as soil in which it is planted) should be free from all wilt causing agents-the fungi, insects and nematodes; use solarized/sterilized soil for planting saplings. It is advisable to take cuttings/air layers from disease free orchards and make your own saplings using sterilized soil.

1. The **soil used for potting mixtures or soil of beds for planting new orchards should be sterilized** using chemical sterilants @2.5-5% formalin or 6 weeks of soil solarization using 50-100µ thick linear low density polyethylene (LLDPE) sheet during hot summer months. If formalin is used ensure that the soil is free from any formalin fumes before transplanting in the bags. Soil solarization is beneficial as it kills harmful pests and pathogens and also increases population of beneficial microrganisms which are present in the soil and are thermo tolerant, whereas, formalin treatment kills both harmful and beneficial organisms.
2. The above formalin treatment can be also be used for sterlizing soil after removing dead plant.
3. On observing first symptoms of wilt first ascertain the cause/s. If it due to **fungal pathogens** in the orchard immediately drench soil with propiconazole 25EC (2ml/l) + chlorpyriphos 20EC (2.ml/l) or carbendazim 50WP (2.0g/l) + chlorpyriphos 20EC (2.ml/l) use 5-10 l solution/plant depending on growth so that 12 inches depth below shaded area becomes wet.

Also drench at least 3-4 healthy plants on all the four sides around the infected plant/s, repeat the drenching 3-4 times at 20-25 days interval. Drenching with Ridomil, metalaxyl or dithane M-45 (2g/l) will be beneficial if *Phytophthora* is causing any loss.

4. For controlling **shot hole borer** (*Xyleborus* spp.) which is associated with wilt disease, 10 litres preparation containing red soil (4kg) + Chlorpyriphos 20EC (20ml) + Copper oxychloride (25 g) needs to be applied on plant base up to 2 ft. from second year onwards. To control stem borer, inject in the holes on the trunk with DDVP 2-3 ml and plug the holes with mud.
5. Wilt due to **root knot nematodes** can be managed with soil application of phorate 10G @10- 20g/plant or carbofuran 3G @ 20-40g/plant or other suitable nematicide in the plant basin, in a ring near root zone and cover it with soil. Drenching with azadirachtin (1%) @ 2ml/l is also recommended. Application of neem cake 1-3kg/plant depending on age is advisable twice a year. Plant *Tagetes erecta* (African marigold varieties best followed by French marigold) between plant to plant space in a row, or in a ring, on the border of plant basin. For effective results these should be grown for more than 4-5 month. Crops like onion, tomato, chili, potato, capsicum, gram, legumes, cucurbits, Gerbera, Gladiolus *etc.* aggravate nematode infestation and hence should be avoided as intercrop. Green anuring with sesbania is beneficial.

Biological Control: Biological formulations if used should be reliable, fresh and used during rest period when no other fungicides/bactericides are used. The soil application of *Bacillus subtilis, Paecilomyces lilacinus, Pseudomonas fluorescens, Trichoderma harzianum, Aspergillus niger* 10-15g/plant along with well-decomposed farm yard manure around the trunk of pomegranate trees helps to prevent wilt infections. Neem cake @ 2-3 kg/ plant effectively checks incidence of wilt complex.

Biofertilizer – Kalisena SA having *Aspergillus niger* @1 kg/acre+ Mychorrhizal preparation Josh @ 5kg/acre or Josh ultra 1Kg/acre- gives effective control of wilt if use from beginning or before disease starts. These two biofertilizers should be applied twice a year along with sufficient organics for effective wilt management. These controls several soil pathogens and also improves nutrient uptake and gives disease resistance and improves yields.

General precautions

1. Once disease is detected in the orchard, dig about 3-4 feet long trench between the wilted and healthy plant/s. The partially wilt affected plant/s should be treated with a suitable soil application depending on pathogen involved.
2. Dead plants should be removed and burnt, they should not be kept dumped in the orchard for firewood. While removing the wilted plants from the orchard for burning, protect the entire root zone with cover- fertilizer bag *etc*., so that pathogens in soil on root do not spread in orchard.
3. The soil in the pit from which dead plant has been removed, should be sterilized with 2.5-5% formalin using about 10 l solution. It should be covered with polyethylene sheet for 1 week. After 1 week remove polyethylene sheet and rake the soil daily up to 10-15 days, so as to allow escape of gas. Plant new sapling once there is no smell of formalin in soil.
4. Pruning tools should be disinfected and cut ends painted with fungicidal oil based paints. Pruning should be avoided during spring to summer and done in winter months. Partially affected plants within the buffer zone should be treated with a suitable treatment; neighboring asymptomatic apparently healthy plants should also be treated with appropriate systemic fungicide/insecticide. Plants with more than 30% canopy loss should not be treated, they should be uprooted and burnt, soil treated with formalin and new plant grown.

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