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(ISO 9001:2008 Certified Institute)



## **Bimonthly Pomegranate Advisory for Bearing Orchards** **(June- July 2023)**

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### **I. Bahar: Mrig (May-June Crop regulation)**

#### **CURRENT STAGE OF THE ORCHARD: (Crop regulation, flowering and fruit setting)**

##### **A. Horticultural Practices:**

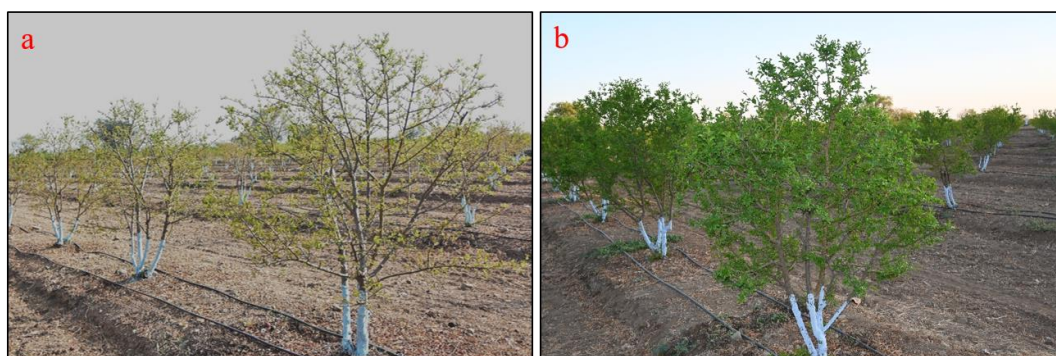
Crop (orchard) is under **stress period**, those farmers who have planned to take early *mrig bahar*, might have done defoliation using Ethephon 39% SL followed by light pruning at the end of the May month. If it's not done yet, it should be done as early as possible to avoid flowering and fruit setting coincides with rain. Fallen leaves and debris in the orchard may be removed/ buried in soil at fertilizer application.

- (i) **Break plant stress:** Defoliation using Ethephon can be done depending upon intensity of stress:
  - **Plant not under proper stress due to intermittent rains or other reasons:**  
Take 2 to 3 sprays of Ethephon 39% SL, first spray @ 0.5 ml/L followed by second spray after 5-8 days with @ 0.5 ml/L; depending on yellowing third spray can be taken after 7 days of 2<sup>nd</sup> spray with Ethephon @ 1 to 1.5 ml/L. Mix 18:46:00 **OR** 12:61:00 **OR** 00:52:34 @ 5 g/L with each Ethephon spray for more efficiency. In blight affected orchards and where rest period basal dose of N (1/3<sup>rd</sup> of total N dose of season) was added after harvest 18:46:00 **and** 12:61:00 should not be mixed with Ethephon spray
  - **Plants under proper stress with yellow leaves:** Take spray of Ethephon 39 % SL @ 1 ml /L + 18:46:00 **OR** 12:61:00 **OR** 00:52:34 @ 5 g/L.
  - **Plants under heavy stress with complete defoliation:** No defoliation sprays required.

- (ii) Remove water shoots and do light pruning by removing of shoots of refill thickness (up to 10-15 cm from top) and thinning out tertiaries if too many/very dense for proper sunlight and aeration. The plants pruned should be sprayed with 1% Bordeaux mixture on same day.

### B. Nutrient Management:

- (i) Apply 25-30 kg Farm Yard Manure (FYM) per plant **OR** 15-20 kg FYM + 2 kg vermi-compost + 2 kg neem-cake per plant **OR** 7.5 kg well decomposed poultry manures + 2 kg neem-cake per plant.
- (ii) Apply any or combination of the below mentioned potential bio-formulation of *Azospirillum* sp., **OR** *Aspergillus niger* **OR** *Trichoderma viridae* and *Penicillium pinophilum* after incubating separately with well decomposed FYM in 1:25 ratio for 15 days. Prepare 1-1.5 feet high FYM bed under shed, maintain 60-70% moisture content in the mixture with periodical stirring. In about 15 days, these beneficial bacteria / fungi grow nicely in the compost.
- (iii) Before application, Mix Arbuscular Mycorrhizal Fungi, AMF (*Glomus intraradices* syn. *Rhizophagus irregularis*) with bio-formulation enriched FYM and apply @ 10-20 gram per plant. This enriched bio- FYM can also be mixed with compost or bulk FYM and given to plants.
- (iv) Apply bio formulations 20-30 days after application of chemical fertilizers and give light irrigation immediately after the application of manures and bio-fertilizers.
- (v) Apply Gypsum @ 1.14 kg/tree and  $MgSO_4$  @ 300 g/tree followed by thorough mixing with the soil and watering.
- (vi) After new leaf and flower bud initiation give foliar application of Naphthyl Acetic Acid (NAA) 4.5 % @ 22.5 ml per 100 lit water for good flower induction.
- (vii) Foliar application of micronutrient mixture @ 1.0-1.5 kg/ha **OR** 1.5-2 g/L.
- (viii) Fertigate with  $N:P_2O_5:K_2O::00:52:34$  Mono-Potassium Phosphate @ 11 kg per ha per application and  $N:P_2O_5:K_2O::00:00:50$  Potassium Sulphate @ 11 kg per ha per application. Give 7 applications at 7 days' interval through irrigation.



**Photo 1: a) New Leaf initiation and b) just before flower initiation.**

### **C. Insect Pest Management:**

**(i) Vegetative stage:**

- Install yellow / blue sticky traps @ 24 traps / acre randomly in a zigzag manner and traps should be tied / hanged 15 cm below the top canopy of the plant.
- **First spray:** Spray of 1% Azadirachtin / Neem oil (10000 ppm) @ 3.0 ml/L + 0.25 ml/L spreader sticker **OR** Pongamia oil @ 3 ml/L + 0.25 ml/L spreader sticker **OR** combination of Neem oil + Pongamia oil @ 3 + 3 ml/L with 0.25 ml/L spreader sticker.
- **Second spray:** after 7-10 days of first spray, take the spray with Cyantranilprole 10.26% OD @ 0.75 ml/L + 0.25 ml/L spreader sticker **OR** Thiamethoxam 25% WG @ 0.5 g/L + 0.25 ml/L spreader sticker.

**(ii) Flowering stage:** Spray Spinetoram 12% SC @ 1.0 ml/L + 0.25 ml/L spreader sticker **OR** Spinosad 45% SC @ 0.5 ml/L + 0.25 ml/L spreader sticker.

**(iii) Fruit setting stage:** Spray with Cyantranilprole 10.26% OD @ 0.75 ml/L **OR** Chlorantranilprole 18.5% SC @ 0.75 ml/L **OR** Tolfenpyrad 15% EC @ 0.75 ml/L **OR** Flonicamid 50% WG @ 0.75-1.0 ml/L and add 0.25 ml spreader sticker/L of water.



**Photo 2: Plants at flowering stages**

### **D. Disease Management:**

- Take one spray of freshly prepared 1% Bordeaux mixture just before defoliation.
- Take 4 sprays of Salicylic acid (SA) @ 0.3 g/L at 1-month interval starting from pre-flowering.

- Spray of Bordeaux mixture 0.5% **OR** Copper oxychloride 50% WP @ 2.5-3.0 g/L **OR** Copper hydroxide 53.8% @ 2.0-2.5 g/L along with spreader sticker @ 0.3 to 0.5 ml/L, altered with 2-bromo, 2-nitro propane-1, 3-diol (Bronopol 95%) @ 0.5 g/L can be taken at 10 days' interval.
- If orchard has bacterial blight history; take spray of Streptocycline (Streptomycin sulphate 90% + tetracycline hydrochloride 10%) @ 0.5 g/L once a month and at 7-10 days' interval from Bronopol. Avoid too many sprays, take an additional spray of Streptocycline + Copper based fungicide after rain.
- Depending on fungal problems present in the orchard, Copper based formulations may be replaced with appropriate fungicides as given in Table 1: **Some promising fungicides for pomegranate fungal scab, spots and rots** at the end of the advisory.
- **Wilt and Nematode Management:** Please follow the instructions given at the end of the advisory for wilt and nematode management in the pomegranate orchard.

## II. Bahar: Hasta (Sep-Oct Crop regulation)

**CURRENT STAGE OF THE ORCHARD:** Rest period/last harvest if crop regulation delayed due to unseasonal rains.

**A. Horticultural Practices:** Soon after harvest, heavy pruning should be done by removing branches up to pencil thickness (up to 60 cm from top), removal of broken, criss-cross or infected branches, removal of straight and fast growing water shoots from the centre of the canopy to open the canopy for better light penetration. If harvesting and pruning done in May, then bahar pruning not required.

**Note:** pruning should be done during sunny days and plants pruned should be sprayed on same day with 1% Bordeaux mixture.

### **B. Nutrient and Water Management:**

- Apply 15-20 kg FYM **OR** 10-15 kg FYM + 2 kg Vermi-compost + 2 kg Neem cake per plant.
- Apply 225-280 g N (490-610 g urea); 63 g P<sub>2</sub>O<sub>5</sub> (395 g SSP); 200 g K<sub>2</sub>O (335 g MOP); 488 g Ca (2.80 kg gypsum) and 80 g Mg (800 g MgSO<sub>4</sub>) per plant followed by light Irrigation.
- Apply any one or combination of potential bio-formulation along with Arbuscular Mycorrhizal Fungi, AMF (*Glomas* sp.) as mentioned in the Mrig bahar nutrient management.

- Ensure optimum soil moisture in the soil for utilization of applied nutrients. Irrigate the sandy soil 15-20 litres at 3 to 4 days' intervals and in sandy loam soils 10-15 litres of water at weekly intervals. Do not irrigate after the rain for 2-5 days depending on rainfall received and soil type.

### C. Insect Pest Management:

- **In crops where the last harvest is delayed** till June avoid any insecticide spray.
- **In the rest period** regular monitoring / observation should be done for stem borer, shot hole borer, termites, mites, leaf-eating caterpillars, and sucking pests (Mealybugs, scale insects, etc.).
  - (i) If low foliar insect pest infestation is observed, spray only Azadirachtin / Neem oil (1000 ppm) @ 3 ml/L + 0.25 ml/L spreader sticker.
  - (ii) If infestation is moderate to high, depending on the insect pest observed, take 2-3 sprays at 15 to 20 days' intervals with any of the insecticides mentioned below:
    - (a) Foliar Pests:** In rest period, if any foliar pest infestation observed is high, take spray with any of these insecticides Lambda cyhalothrin 5% EC @ 0.5 - 0.75 ml/L + 0.25 ml/L spreader sticker **OR** Indoxacarb 14.5% SC @ 0.75 ml/L + 0.25 ml/L spreader sticker **OR** Cyantraniliprole 10.26% OD @ 0.75 ml/L + 0.25 ml/L spreader sticker **OR** Thiamethoxam 25% WG @ 0.5 g/L + 0.25 ml/L spreader sticker.
    - (b) If shot hole borer infestation is observed in the orchard:** Refer to the NRCP advisory <https://nrcpomgranate.icar.gov.in/files/Advisory/107.pdf>.
    - (c) If stem borer infestation is observed in the orchard:** Refer to the NRCP advisory or follow the below steps.
      1. Observe for the presence of stem borer adult beetles under the canopy of the young plants/shoot. if found, collect and kill by immersing in insecticides mixed water (any contact insecticide @ 1 ml/L water).
      2. If you found the incidence of the beetle, take spray on the stem with neem oil 1% (10000 ppm) @ 3 ml/L + 0.30 ml of spreader sticker/L water.
      3. **Injecting of damaged hole:** Clean the damaged hole up and down by using the bending/ tying wire followed by injecting the damaged holes with Emamectin benzoate 5% SG @ 2 g/L. Apply Emamectin benzoate solution with the help of a squeeze bottle till the bored tunnel is filled; close the hole with the wet mud / soil. After treatment, remove the chewed woody material fallen below the damaged plant and observe the plant after 24

hours of treatment. If fresh chewed wood material is observed, repeat the treatment **OR** follow the below steps.

- **Drenching:** Emamectin Benzoate 5% SG @ 2 g/ L + Propiconazole 25% EC @ 2 ml/ L water.
- **Stem spray:** Spray on stems with Thiamethoxam 25% WG @ 1-2 g/ L water.
- **Stem pasting:** Take the stem pasting with the red soil-based paste: (For 10 liters' preparation mix: Red soil 4 kg + Emamectin Benzoate 5% SG 20 g + COC 25 g).

**(c) Mealy bugs / scale insect:**

- **In Early infestation:** Spray 1% Azadirachtin / Neem oil (10000 ppm) @ 3 ml/L + Pongamia oil @ 3 ml/L + 0.5 ml fish oil resin soap/L water.
- If the infestation is at the **late stage**, spray Thiamethoxam 12.6% + Lambda-cyhalothrin 9.5% ZC @ 0.75 ml/L **OR** Buprofezin 25% SC @ 1-1.5 ml/L water + 0.5 ml fish oil resin soap/ L water.

**(d) Mite infestation:**

- If mite infestation is observed at an early stage, take the spray with 1% Azadirachtin / Neem oil (10000 ppm) @ 3 ml/L + 0.25 ml/L spreader sticker.
- If the infestation is at a late stage, take the spray with Fenazaquin 10% EC @ 1.5 ml/L + 0.25 ml/L spreader sticker **OR** Fenpyroximate 5% EC @ 0.4 ml/L + 0.25 ml/L spreader sticker **OR** Phosalone 35% EC @ 2 ml/L **OR** Spiromesifen 240% SC @ 0.4-0.5 ml/L water + 0.25 ml/L spreader sticker.

**D. Disease and Nematode Management:**

- (i) In plots where last harvest is expected within 15-20 days:** No sprays are recommended.
- (ii) In plots where crop is in rest period:** Take following sprays during rest period at 10-15 days' interval depending on climate and individual crop problems: 1% Bordeaux mixture **OR** Copper oxychloride 50% WP @ 2.5 – 3 g/L + 0.25 ml/L spreader sticker **OR** Copper hydroxide 53.8% WP @ 2 g/L + 0.25 ml/L spreader sticker altered with 2-Bromo-2-nitropropane-1,3-diol (Bronopol 95%) @ 0.5 g/L. + 0.25 ml/L spreader sticker. Still if any fungal disease observed, one spray like Mancozeb 75% WP @ 2 g/L + 0.25 ml/L spreader sticker **OR** any other appropriate fungicide may be taken using fungicides mentioned in Adhoc list of agrochemicals (<https://nrcpomegranate.icar.gov.in/files/Advisory/91.pdf>).

- (iii) **Wilt and Nematode Management:** Wilt and Nematode affected plots should take treatments soon after harvest. Details given at the end of the advisory.

### III. BAHAR: AMBIA (JAN-FEB CROP REGULATION)

**CURRENT STAGE OF THE ORCHARD:** Fruit enlargement, development and maturity stage/ colour development

#### A. Horticultural Practices:

- Spray of amino acid @ 2 - 2.5 ml/L to partially offset high temperature stress.
- Tying of drooping branches (due to crop load) with jute strings on GI wire connected bamboo crotches or structures or supporting branches with GI/MS based structures connected with GI wires.

#### B. Nutrient Management:

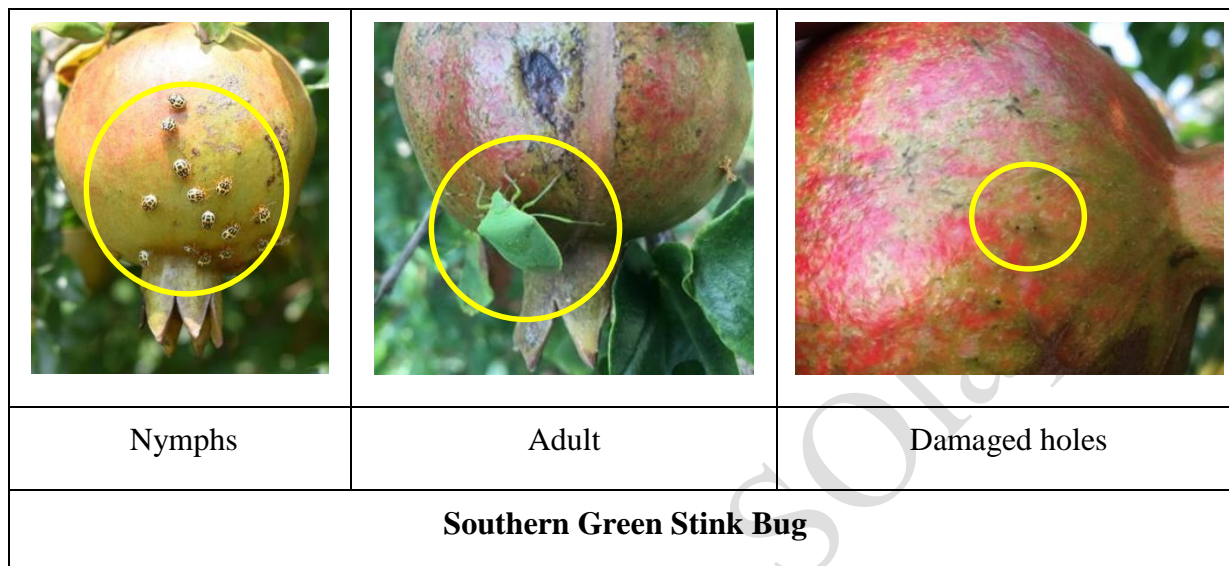
- Apply Gypsum @ 640 g /plant and MgSO<sub>4</sub> @ 400 g/plant followed by thorough mixing with the soil and watering.
- Fertigate with Urea @ 41.44-69.56 kg/ha/application; N:P:K::00:52:34 Mono-Potassium Phosphate @ 22.20 kg/ha/application and N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O::00:00:50 Potassium Sulphate @ 22.20 kg/ha/application. Give 8 applications at 7 days' interval through irrigation.
- Three foliar application of 00:52:34 @ 5-6 g/L and two foliar application of manganese sulphate @ 6 g/L at 10 days interval.

#### C. Insect Pest Management:

##### 1. Fruit Borer:

- **Egg stage:** If low infestation is observed, single spray may be taken and if higher infestation is observed take two sprays (1<sup>st</sup> single and 2<sup>nd</sup> combination) with 1% Azadirachtin / Neem oil (10000 ppm) @ 3 ml/L + 0.25 ml/L spreader sticker **OR** Pongamia oil @ 3 ml/L + 0.25 ml/L spreader sticker **OR** combination of both the above @ 3 + 3 ml/L + 0.25 ml/L spreader sticker at 7-10 days' interval.
- **Fruits with damaged holes:** Remove all the damaged fruits with holes and dispose of them by burying them in the pit and take a spray with any one of the insecticide Cyantraniliprole 10.26% OD @ 0.75 ml/L + 0.25 ml/L spreader sticker **OR** Chlorantraniliprole 18.5% SC @ 0.75 ml/L + 0.25 ml/L spreader sticker.

2. **Fruit sucking bugs:** Spray Thiamethoxam 12.6% + Lambda-cyhalothrin 9.5% ZC @ 0.75 ml/L **OR** Spinetoram 12% SC @ 1.0 ml/L **OR** Spray Spinosad 45% SC @ 0.5 ml/l **OR** Chlorantraniliprole 18.5% EC @ 0.75 ml/L + 0.25 ml/L spreader sticker.



#### D. Disease Management:

- Take remaining 1-2 sprays of Salicylic acid (SA) @ 0.3 g/L and Micronutrient mixture @ 2 g/L each at month's interval (Note: Take total 4 sprays of each of salicylic acid and micronutrient mixture at 1-month interval starting at pre-flowering).
- Bordeaux mixture 0.5% **OR** Copper oxychloride 50% WP @ 2.5 - 3.0 g/L + 0.25 ml/L spreader sticker **OR** Copper hydroxide 53.8% @ 2.0 - 2.5 g/ L + 0.25 ml/L spreader sticker, altered with 2-bromo, 2-nitro propane-1, 3-diol (Bronopol 95%) @ 0.5 g/L + 0.25 ml/L spreader sticker at 10 days' interval.
- If orchard has bacterial blight history, take spray of Streptocycline (Streptomycin sulphate 90% + Tetracycline hydrochloride 10%) @ 0.5 g/L + 0.25 ml/L spreader sticker once a month and at 7-10 days' interval from Bronopol. Avoid too many sprays.
- Depending on fungal problems present in the orchard, Copper based formulations may be replaced with appropriate fungicides.

**Some promising fungicides for Pomegranate Fungal Scab, Spots and Rots are listed below:**

**Table 1: Some promising fungicides for pomegranate fungal scab, spots and rots**



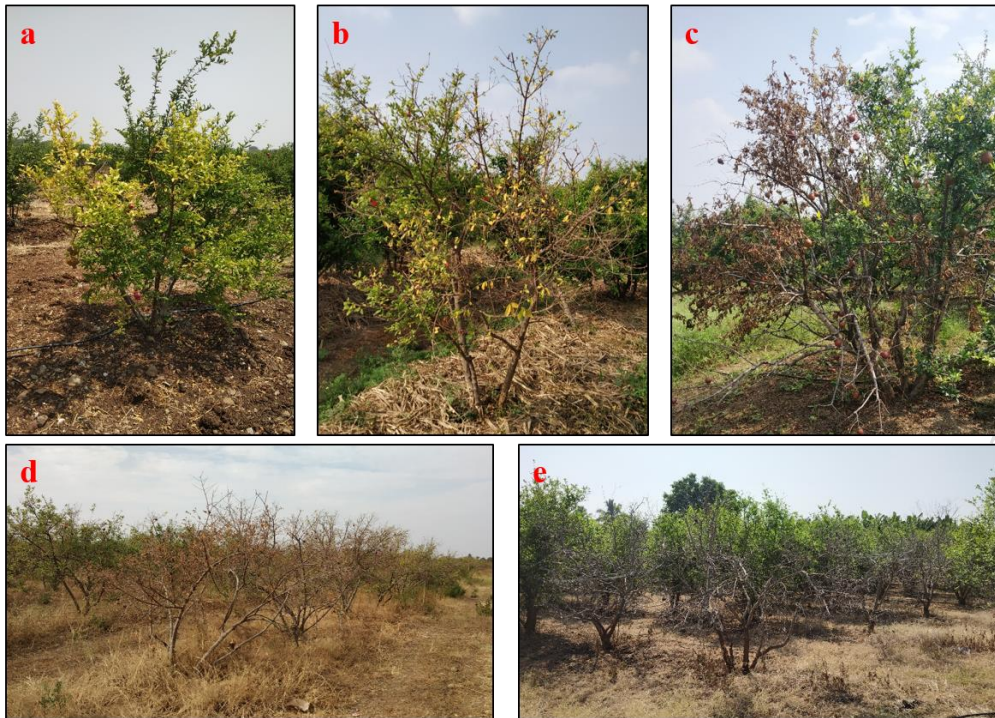
1. Mandipropamid 23.4% SC @ 1 ml/L.	7. Copper Oxychloride 45% + Kasuamycin 5% @ 2.5 g/L.
2. Metiram 55% + Pyraclostrobin 5% EC @ 3 g/L.	8. Zineb 68% + Hexaconazole 4% WP @ 2.5 g/L.
3. Propiconazole 25% EC @ 1 ml/L + Azoxystrobin 23% SC @ 1 ml/L.	9. Tricyclazole 18% + Mancozeb 62% WP @ 2.5 g/L.
4. Azaoxystrobin 20% + Difenoconazole 12.5% SC @ 1 - 2 ml/L.	10. Chlorothalonil 75% WP @ 2 g/L.
5. Chlorothalonil 50% + Metalazxyl M 3.75% @ 2 ml/L.	11. Propiconazole 25% EC @ 1 ml/L
6. Bordeaux mixture @ 0.5%.	12. Fluopyram 17.7% + Tebuconazole 17.7% w/w SC @ 1 ml/L.
	13. Tebuconazole 50% + Trifloxystrobin 25% w/w WG (75WG) @ 0.5 g/L

**Note:** Best results are obtained with 2-3 sprays starting at flowering and fruit setting stage at 10 - 14 days' interval with any of the above. This will avoid several sprays at later stages. Always use spreader sticker with sprays except Bordeaux mixture. No fungicide should be used more than 2 times in a season except copper fungicides.

#### IV. WILT AND NEMATODE MANAGEMENT

##### Wilt Management: Fungal Wilt Management:

On observing first symptoms of wilt, first ascertain the cause/s that it is due to fungal pathogens *Ceratocystis*, *Fusarium*, etc. Wilt due to *Ceratocystis* fungi is most destructive. Identify the cause at first/initial symptoms of leaf yellowing. As soon as first symptoms observed, check roots of the affected branch. Remove and split open the roots; if deep yellow/brown/grey color and alcoholic/fruity smell is observed, the symptoms should be attributed to *Ceratocystis* fungi.



**Photo: Symptoms of Wilt caused by *Ceratocystis fimbriata* fungus.** a) Initial yellowing of leaves. b & c) drying of one branch as disease progress d & e) wilting of plants in line or in patches as disease spreads to adjoining plants.

Sometimes, other root rot fungi like *Rhizoctonia*, *Sclerotium* or *Phytophthora*, are also found to be associated with wilt. In the orchard with wilt disease, treat soil with only one of the following most promising protocols:

#### Method I:

- 1<sup>st</sup> drenching Propiconazole 25% EC @ 2 ml/L + Chlorpyrifos 20% EC @ 2 ml/L  
**OR** Thiamethoxam 25% WG @ 1-1.5 g/L (use 5 to 10 L solution per plant).
- After 30 days of first application, 2<sup>nd</sup> drenching with *Aspergillus niger* AN 27 (New Packs have AN 27 with IRAG 07) fungus @ 5 g/plant with 2 Kg FYM per plant.
- 3<sup>rd</sup> application after 30 days of 2<sup>nd</sup> application with VAM fungus (Vesicular Arbuscular Mycorrhizae - *Rhizophagus irregularis* @ 25 g/plant with 2 Kg FYM per plant).

**OR**

#### Method II:

- Propiconazole 25% EC @ 2 ml/L + Chlorpyrifos 20% EC @ 2 ml/L (3 drenching at 20 days' interval).

OR

### Method III:

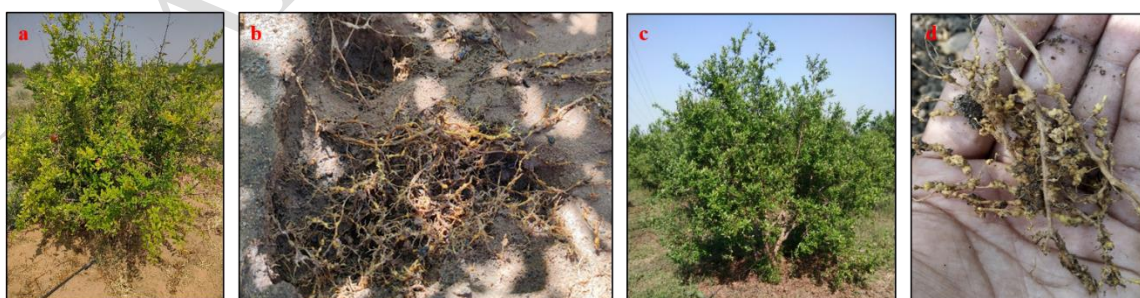
- 1<sup>st</sup> and 3<sup>rd</sup> drenching Fosetyl Al 80% WP @ 6 g/plant (10 L solution); [2<sup>nd</sup> and 4<sup>th</sup> drenching with Tebuconazole 25.9% w/w EC @ 3 ml/plant (10 L solution)]. Drenching interval 20 days.

### NOTE:

- Drenching is effective only at first stage of symptom. If 1 entire branch is affected better to remove affected plants and drench surrounding plants.
- Drench surrounding 4-5 plants around affected where infected soil might have spread.
- The wilted plants removed should be sterilised with chemicals/solarized
- Prefer drenching soon after harvest, in rest period or initial stage of crop regulation.
- For shot hole borer, Chlorpyrifos 20% EC @ 2 ml/L may be taken along with above in first drenching.
- Drenching with Metalaxyl 8% + Mancozeb 64% @ 2-2.5 g/L will be beneficial if *Phytophthora* is causing any loss.
- For complete details about method of drenching, please see Wilt advisory on NRCP website. Use only one of the above methods.

### Nematode Management:

- If the orchard is known to have heavy nematode infestation (evident from the presence of galls on the root of the plant below the dripper).



**Symptoms of nematode infested plants:** a) Pomegranate plant showing the symptoms of nutrient deficiency. b) Small galls visible in early nematode infestation. c) Fully grown plants without flowers d) Large sized galls on the roots of heavily infested pomegranate plants.

- The bio control formulations used in Method I, in fungal wilt management also reduces the infestation of root knot nematode. Alternatively, other promising bio formulations

like *Paecilomyces* spp. **OR** *Pseudomonas* spp. or *Trichoderma* spp. may be added right from planting every 6 months in order to have sustainable nematode management. Application of these bio-agents should be done twice a year (once on start of rest period, second at crop regulation) in the soil helps in improving nutrient uptake, plant growth and biochemical resistance to diseases, and also checks pomegranate wilt.

- If infestation is high, any of the following nematicide should be applied during rest period or just before commencement of bahar in order to reduce the root knot population below the damage threshold without any residue in the fruits.
- Farmers can either use the granular nematicide Fluensulfone 2 % GR. In order to use the granular nematicide, make a small pit (5 - 10 cm) under the dripper and apply the granular chemical @ 10 gram per dripper (Maximum dose should not exceed 40 gram/plant); cover it with the soil and start watering.
- Drenching can also be done with another nematicide like fluopyrum 34.48 % SC @ 2 ml/plant. Plants should be sufficiently watered day before drenching. Mix 2 ml of the nematicide in 2 litre of water per plant and pour 500 ml per dripper (4 drippers/plant) or 1000 ml per dripper (2 drippers/plant).

For detailed advisory please see <https://nrcpomegranate.icar.gov.in/Advisory>

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