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## **Bimonthly Advisory for Bearing Pomegranate Orchards (December 2023 – January 2024)**

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### **I. Bahar: Mrig (i) May-Jun Crop regulation (ii) Late Mrig (July crop regulation)**

#### **Stage of Orchard: Fruit harvesting and allowing trees for rest**

**A. Horticultural Practices:** Soon after harvest, main 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 for better light penetration and air circulation.

#### **B. Nutrient Management:**

1. After harvesting of the previous season fruits, apply 20 - 25 kg Farm Yard Manure (FYM) **OR** 13 - 15 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.
2. Apply 205 g N (446 g Neem-coated urea per plant) 50 g P<sub>2</sub>O<sub>5</sub> (315 g Single Super Phosphate per plant) and 152 g K<sub>2</sub>O (254 g Murate of Potash **OR** 304 g Sulphate of Potash per plant) followed by light irrigation for 2-3 months during rest period.
3. Light irrigation (15-20 litres/plant) in 1 or 2 days per week should be given depending on climate and soil type. Irrigation or water quantity should be just sufficient to uptake the nutrient applied in the soil without excess vegetative growth or new sprouts.
4. Application of bio formulations can be done 20 - 30 days after application of chemical fertilizers. Apply any or combinations of following bio-formulation like *Azospirillum* sp. **OR** *Aspergillus niger* **OR** *Trichoderma viride* @ 1 kg per acre and *Penicillium pinophilum* @ 3 kg per acre (10 g/plant) after incubating separately with 200-500 kg (or 1 ton) of well decomposed farmyard manure for 12 - 15 days under shade maintaining 60 – 70% moisture content in the mixture and alternate day stirring. In about 12-15 days, these beneficial bacteria/fungi grow in good number in the compost.

5. Before application, mix Arbuscular Mycorrhizal Fungi, AMF (*Glomus intraradices* syn. *Rhizophagus irregularis*) @ 1 kg per acre in the bio formulation mixture and use this enriched bio-formulation mixture for 300 plants/acre. Alternatively, the instructions given on the pack of brand purchased for multiplication and dose/acre may be followed.



**Picture1:** Main pruning, fertilizer application and stem pasting just after harvesting of previous season fruits.

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

1. Regular monitoring/observation should be done for stem borer, shot hole borer, termites and leaf eating caterpillars etc. Take need based spray every 15-20 days after consultation.
2. **Note:** For Stem pasting, make the paste mixing Red soil 4 kg + Chlorpyrifos 20% EC 20 ml + Copper oxychloride (COC) 50% WP 25 gram in 10 litres of water and paste on a stem up 2-2.5 ft. from the soil or alternatively 10% freshly prepared Bordeaux paste + Chlorpyrifos 20% EC 20 ml in 10 litres of water can also be used.
3. Above suggested management practice need to be taken based on the insect pest incidence/examination.
4. Adhoc list of chemical available on NRCP website may be referred for list of chemicals.

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

1. 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 gram per litre **OR** Copper hydroxide 53.8% WP @ 2 gram per litre altered with 2-Bromo-2-nitropropane-1,3-diol (Bronopol 95%) @ 0.5 gram per litre.
2. Still if any high incidence of fungal disease is observed; one spray like Mancozeb 75% WP @ 2 gram per litre **OR** any other appropriate fungicide may be taken using fungicides mentioned in Adhoc list of agrochemicals (<https://nrcpomegranate.icar.gov.in/files/Advisory/142.pdf>).

### **E. Nematode Management:**

If the orchard is found to be infested by Root-Knot Nematode, *Meloidogyne* spp.; follow the nematode management practices given under nematode management heading at the end of the advisory during rest period.

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

### Stage of Orchard: Fruit setting and development

#### A. Horticultural Practices:

1. There must be proper staking or plant support system to support fruit laden branches.
2. Excessive bunch bearing / thrips infested and tip bearing fruits may be thinned out for improving fruit size.
3. Too many fruits may be avoided and thinning should be carried out to keep about 50-70 fruits for 2 to 4-year-old plants and about 80-100 fruits per plant for a five and more old plant.

#### B. Nutrient Management:

##### I. Orchards in Flowering stage or Fruit setting stage:

1. Foliar application of micronutrient mixture @ 1.0 -1.5 kg per ha should be taken **OR** Foliar spray of ZnSO<sub>4</sub> @ 3 gram per litre + MnSO<sub>4</sub> @ 6 gram per litre + Boric acid @ 2.5 gram per litre can be taken.
2. Fertigate with N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O::00:52:34 (Mono-Potassium Phosphate) @ 11 kg per ha per application and N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O::00:00:50 (Potassium Sulphate) @ 11 kg per ha per application. Give 7 applications at 7 days' interval through irrigation. Avoid giving excess water to reduce nutrient loss through leaching.
3. Apply Gypsum @ 1.14 kg per tree and MgSO<sub>4</sub> @ 300 gram per tree by thorough mixing with the soil followed by watering.

##### II. Orchards with 100% fruit set and Fruit enlargement stage:

1. Two foliar application of Gibberellic acid (GA) @ 50 ppm at 15 days' interval.
2. Foliar application of micronutrient mixture @ 1.0 -1.5 kg per ha should be taken **OR** Foliar spray of ZnSO<sub>4</sub> @ 3 gram per litre + MnSO<sub>4</sub> @ 6 gram per litre + Boric acid @ 2.5 gram per litre can be taken.
3. Three foliar application of 00:52:34 (Mono-Potassium Phosphate) @ 5 gram per litre should be taken at 15-20 days' interval.
4. Fertigate N:P:K::00:52:34 (Mono-Potassium Phosphate) @ 11 kg per ha per application and N:P:K::00:00:50 (Potassium Sulphate) @ 11 kg per ha per application – Give one application through irrigation.

5. Fertigate urea @ 13.70-23.13 kg per ha per application - Give 8 applications at 7 days' interval through irrigation.

### C. Insect Pest Management:

#### I. Orchards in Flowering stage / Fruit setting stage:

1. Install yellow/ blue sticky traps @ 25-30 traps per acre randomly in a zigzag manner and traps should be tied/hanged 15 cm below from the top canopy of the plant. Depending on the pest population, take the following sprays.
2. **First spray:** Spinetoram 12% SC @ 1.0 ml per litre **OR** Spinosad 45% SC @ 0.5 ml per litre.
3. **Second spray:** 7-10 days after first spray, take 2<sup>nd</sup> spray with Spinosad 45% SC @ 0.5 ml per litre **OR** Neem oil 1% (10000 ppm) @ 3.0 ml per litre **OR** Pongamia oil @ 3 ml per litre **OR** combination of both of oils @ 3 ml per litre + 3 ml per litre with 0.25 ml/L of spreader sticker.
4. **Third spray:** if required, use, Spinetoram 12 % SC @ 1.0 ml per litre **OR** Spinosad 45% SC @ 0.5 ml per litre with 0.25 ml/L of spreader sticker.

#### II. Orchards with 100% fruit set and Fruit enlargement stage:

1. **First Spray:** Cyantraniliprole 10.26% OD @ 0.75 ml per litre **OR** Chlorantraniliprole 18.5% SC @ 0.75 ml per litre **OR** Tolfenpyrad 15 % EC @ 0.75 ml per litre **OR** Flonicamid 50% WG @ 0.75-1.0 ml per litre with 0.25 ml/L of spreader sticker.
2. **Second spray:** 7-10 days after first spray, take 2<sup>nd</sup> spray with Neem oil 1% (10000 ppm) @ 3 ml per litre **OR** Pongamia oil @ 3 ml per litre **OR** combination of both of the above @ 3 + 3 ml per litre with 0.25 ml/L of spreader sticker.
3. Based on the level of pest incidence any of the pesticides mentioned for the first spray may be used alternatively for subsequent sprays.
4. Note: Do not take any spray more than 2-3 times in a season.



**Picture:** Left: Flowering stage Centre: Developing fruit infested by Thrips Right: Fruit damage due to Fruit borer

## D. Disease Management:

1. Take 4 sprays of each of Salicylic acid (SA) @ 0.3 gram per litre (30 grams in 100 litre of water) at 1-month interval starting from pre-flowering. Dissolve the salicylic acid in 50 ml of ethanol/spreader sticker or warm water and then make the spray solution.
2. Take sprays for the disease management at 7-10 days' interval depending on rainfall. whenever possible combine the compatible insecticide and fungicides to reduce number of sprays.
3. Spray of Bordeaux mixture 0.5% **OR** Copper oxychloride 50% WP @ 2.5 - 3.0 gram per litre **OR** Copper hydroxide 53.8% WP @ 2.0 - 2.5 gram per litre **OR** Propineb 70% WP @ 3 gram per litre **OR** Tebuconazole 50% + Trifloxystrobin 25% WG 0.2 gram per litre **OR** Ziram 80% WP @ 2 gram per litre **OR** Pyraclostrobin 5% + Metiram 55% WG @ 3 gram per litre **OR** Copper Oxychloride 45% + Kasugamycin 5% WP @ 2 – 2.5 gram per litre **OR** Copper sulphate 47.15% + Mancozeb 30% WG @ 2.5 gram per litre along with spreader sticker @ 0.3 to 0.5 ml per litre altered with 2-Bromo, 2-Nitro Propane-1, 3-diol (Bronopol 95%) @ 0.5 gram per litre once a month (sometimes 2 sprays/month may be taken and suitable fungicide along with spreader sticker).

## III. Bahar: Ambia (Jan-Feb Crop Regulation)

**Stage of Orchard: Last stage of stress induction / Release of stress and Crop regulation**

### A. Horticultural Practices:

- (i) Withhold the water for natural stress induction till 60-70% leaf falls till the end of December.
  - (ii) Defoliation can be done using Ethephon 39 % SL depending upon intensity of stress:
    - **Plants not under proper stress due to rains or other reasons:** Take two sprays of Ethephon 39% SL, first spray @ 0.9 ml per litre followed by second Ethephon spray @ 1 to 1.5 ml per litre after 5-8 days depending on yellowing. Mix 18:46:00 **OR** 12:61:00 **OR** 00:52:34 @ 5 gram per litre with each Ethephon spray.
    - **Plants under proper stress with yellow leaves:** Take only one spray of Ethephon 39 % SL @ 1 ml per litre + 18:46:00 **OR** 12:61:00 **OR** 00:52:34 @ 5 gram per litre.
1. Remove water shoots and do light pruning by removing of shoot tips of refill size thickness (up to 10-15 cm from top) and thinning out tertiaries if too many/very dense for proper sunlight and aeration.

## **B. Nutrient Management**

### **Stage of Orchard: During release of stress**

1. Apply 15 - 20 kg FYM **OR** 10 - 15 kg FYM + 2 kg vermi-compost + 2 kg neem cake per plant.
2. Application of bio formulations can be done 20 - 30 days after application of chemical fertilizers.
3. Apply any or combinations of following bio-formulation including mycorrhiza can be done as mentioned in the nutrient management section of Hasta bahar.
4. Alternatively, the instructions given on the pack of brand purchased for multiplication and dose/acre may be followed.

### **Stage of the Orchard: Leaf and flower bud initiation**

1. If new leaves have opened and flower bud initiation is observed, give foliar application of Naphthyl Acetic Acid (NAA) 4.5% @ 22.5 ml per 100 litre water for good flower induction.
2. Foliar application of micronutrient mixture @ 1.0-1.5 kg per ha should be taken **OR** Foliar spray of ZnSO<sub>4</sub> @ 3 gram per litre + MnSO<sub>4</sub> @ 6 gram per litre + Boric acid @ 2.5 gram per litre can be taken.
3. Fertigate N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O::00:52:34 (Mono-Potassium Phosphate) @ 11 kg per ha per application and N:P:K::00:00:50 Potassium Sulphate @ 11 kg per ha per application - Give 7 applications at 7 days interval through irrigation.
4. Apply Gypsum @ 1.14 kg per tree and MgSO<sub>4</sub> @ 300 gram per tree thorough mixing with the soil followed by watering.

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

- (i) **Leaf initiation stage:** Install blue/yellow stick trap 10-15 days after first irrigation @ 25-30 per acre and trap need to tied 10-15 cm lower to the top canopy and it may get replaced based on the surface coverage of the trap area by pest or at 20-25 days' interval.
- (ii) **Vegetative stage:** Spray Azadirachtin / Neem oil 1% (10000 ppm) @ 3 ml per litre + 0.25 ml per litre spreader sticker **OR** Pongamia oil @ 3 ml per litre + 0.25 ml per litre spreader sticker **OR** combination of both the above @ 3 + 3 ml per litre + 0.25 ml/L spreader sticker. Depending on pest population, 1-2 sprays can be taken at 7-10 days' interval.

- (iii) **Flower bud/flowering initiation stage:** Take 2 sprays at 7-10 days' interval with Cyantraniliprole 10.26% OD @ 0.75 ml per litre + 0.25 ml per litre spreader sticker **OR** Chlorantraniliprole 18.5% EC @ 0.75 ml per litre + 0.25 ml per litre spreader sticker **OR** Flubendiamide 19.92% w/w + Thiacloprid 19.92% w/w @ 0.5 ml per litre + 0.25 ml per litre spreader sticker.

#### D. Disease Management

1. Take one spray of freshly prepared 1% Bordeaux mixture just before defoliation.
2. Take 1 spray of Salicylic acid (SA) @ 0.3 grams per litre when leaves are fully open/pre-flowering.
3. Spray of Bordeaux mixture 0.5% **OR** Copper oxychloride 50% WP @ 2.5-3.0 grams per litre **OR** Copper hydroxide 53.8% @ 2.0 - 2.5 grams per litre along with spreader sticker @ 0.3 ml per litre, altered with 2-Bromo, 2-Nitro Propane-1, 3-diol (Bronopol 95%) @ 0.5 grams per litre + 0.25 ml per litre spreader sticker can be taken at 7-10 days' interval depending on rain.
4. Depending on fungal problems present in the orchard, Copper based formulations may be replaced with appropriate fungicides as given in below table.

**Table 1: Some promising fungicides for pomegranate fungal scab, spots and rots at the end of the advisory.**

Table 1: Some promising fungicides for pomegranate fungal scab, spots and rots	
1. Mandipropamid 23.4% SC @ 1 ml/L.	8. Zineb 68% + Hexaconazole 4% WP @ 2.5 g/L.
2. Metiram 55% + Pyraclostrobin 5% EC @ 3 g/L.	9. Tricyclazole 18% + Mancozeb 62% WP @ 2.5 g/L.
3. Propiconazole 25% EC @ 1 ml/L + Azoxystrobin 23% SC @ 1 ml/L.	10. Chlorothalonil 75% WP @ 2 g/L.
4. Azoxystrobin 20% + Difenoconazole 12.5% SC @ 2 ml/L.	11. Fluopyram 17.7% + Tebuconazole 17.7% w/w SC @ 1 ml/L.
5. Chlorothalonil 50% + Metalaxyl M 3.75% @ 2 ml/L.	12. Tebuconazole 50% + Trifloxystrobin 25% w/w WG (75WG) @ 0.5 g/L.
6. Bordeaux mixture @ 0.5%.	13. Copper Sulphate 47.15% + Mancozeb 30% WDG @ 2.5 g/L
7. Copper Oxychloride 45% + Kasugamycin 5% WP @ 2.5 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.

**Wilt and Nematode Management:** Please follow the instructions given below for effective management of wilt and root-knot nematode in the pomegranate orchard.

### General information on wilt management:

#### A. 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.
- Sometimes, other root rot fungi like *Rhizoctonia*, *Sclerotium* or *Phytophthora*, are also found to be associated with wilt.



Pic: Advance symptom of plant infested by wilt causing *Ceratocystis fimbriata* fungi on branches, brown/black discolouration on root and splitting of stem

1. **Wilt due to *Ceratocystis*, *Rhizoctonia*, *Sclerotium* spp.** Treat soil with **only one** of the following most promising methods:

#### 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/plant).

- After 30 days of first application 2<sup>nd</sup> soil application with *Aspergillus niger* AN 27 (New Packs have AN 27 with IRAG 07) fungus @ 5 g/plant with 2 Kg FYM/plant.
- 3<sup>rd</sup> application after 30 days of 2<sup>nd</sup> application - VAM fungus (Vesicular arbuscular mycorrhizae - *Rhizophagus irregularis* @ 25 g/plant with 2 Kg FYM/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.

#### 2. *Phytophthora* wilt:

In this type of wilt, crown rot at soil level is observed leading to sudden wilt of plant. Drenching with Metalaxyl 8% + Mancozeb 64% @ 2 - 2.5 g/L can be helpful in controlling *Phytophthora* wilt.

#### NOTE:

- 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.
- Drench affected plant and surrounding 4 - 5 plants where infected soil might have spread.
- For complete details about method of drenching, please see Wilt advisory on NRCP website.

#### **B. Nematode Management:**

If the orchard is known to have heavy nematode infestation (evident from the presence of galls on the white root of the plant below the dripper. Please follow the root knot nematode management practices given at the end of the advisory.

1. 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.



Figure: Nutrient deficiency symptoms on nematode infested plant, Heavy root-knot nematode infestation on the new roots of the plant just below the dripper.

2. 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.
3. 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.
4. 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).

#### **Important Links for details:**

For the information on management of diseases on Pomegranate in above bahars, farmers are advice to use following links.

1. **Preparation of Bordeaux mixture and Paste:** <https://nrcpomegranate.icar.gov.in/files/Advisory/135.pdf> & <https://www.youtube.com/watch?v=9NmWJCI6Qms&t=571s>
2. **Adhoc list of chemicals:** <https://nrcpomegranate.icar.gov.in/files/Advisory/134.pdf>
3. **IDIPM schedule:** <https://nrcpomegranate.icar.gov.in/files/Advisory/142.pdf>
4. **Shot / Pin hole borer management:** <https://nrcpomegranate.icar.gov.in/files/Advisory/121.pdf>.
5. **Wilt Management:** <https://nrcpomegranate.icar.gov.in/files/Advisory/86.pdf>
6. **Nutrient management:** <https://nrcpomegranate.icar.gov.in/files/Advisory/41.pdf>
7. **Six steps Bacterial blight management:** <https://www.youtube.com/watch?v=ZTvIfeM5RSg&t=377s> & <https://nrcpomegranate.icar.gov.in/files/Advisory/89.pdf>.

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