



## **Bimonthly Pomegranate Advisory for Bearing Orchards (Feb-Mar 2022)**

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

#### **STAGE OF THE ORCHARD: Rest Period Followed By Stress Period**

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

- After harvest of previous season fruits, take medium to deep pruning (removal of criss cross, diseased, broken and overcrowded branches).
- While pruning care should be taken to remove bacterial blight affected branches 2-3 inches below the stem canker.
- Pasting of cut ends of thick stems with 10% Bordeaux paste soon after pruning prevents entry of latent infections during pruning.
- Pruned trees/rows should be sprayed with 1% Bordeaux mixture on the same evening after pruning.
- Cleaning should be done by removing the fallen fruits, pruned plant debris etc.

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

- Give basal dose of nutrition soon after harvest of previous season.
- Apply 20-25 kg 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.
- 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.
- **Note:** These recommendations for N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O are applicable if the leaf test report reveals N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O concentrations are within the optimum concentration range. If any nutrient is below the optimum range, it is advised to increase the above recommendation by 25%.

<b>Nutrients</b>	<b>Optimum conc. range in leaves</b>	<b>Nutrients</b>	<b>Optimum conc. range in leaves</b>
Nitrogen (%)	1.32-2.15	Potassium (%)	1.29-1.99
Phosphorus (%)	0.18-0.24	Calcium (%)	0.64-1.20
Magnesium (%)	0.23-0.45		

- 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. @ 1 kg/acre **OR** *Aspergillus niger* AN27/**IRAG07** @ 1 kg/acre **OR** *Trichoderma viride* @ 1 kg/acre and *Penicillium pinophilum* @ 3 kg/acre (10 g/plant) after incubating separately with 200-1000 kg well decomposed farmyard manure for 12 - 15 days under shade maintaining 60 – 70 % moisture content in the mixture and alternate day stirring. In about 15 days, these helpful bacteria/fungi grow in good population in the compost. Before application, mix Arbuscular Mycorrhizal Fungi, AMF (*Glomus intraradices* syn. *Rhizophagus irregularis*) @ 1 kg/acre in the bio formulation mixture and use this enriched bio-formulation mixture for 300 plants.

### C. Insect Pest Management:

- Many problems of insect pests and diseases aggravate if orchards are neglected during rest period. Hence, regular monitoring should be done for stem borer, shot hole borer, termites, mites, leaf eating caterpillars and Sucking pests (Mealy bugs, scale insects) etc. Depending on insect pest observed, take 2-3 sprays at 15 to 20 days interval with any of the insecticides mentioned below:
  - a. If low foliar insect pest infestation observed, spray only Azadirachtin/Neem oil @ 3 ml/L water.
  - b. If foliar pest infestation observed is high, take spray with any of these insecticides Lambda cyhalothrin 5% EC @ 0.5-0.75 ml/L **OR** Indoxacarb 14.5% SC @ 0.75 ml/L **OR** Cyantraniliprole 10.26% OD @ 0.75 ml/L **OR** Thiamethoxam 25% WG @ 0.5 g/L water. Adhoc list of chemicals available on NRCP website may be referred for target insect pests. See detailed advisory on shot/pin hole borer management in pomegranate on the link given below.
  - c. Stem pasting should be done after fruit harvest with Red Soil Paste or 10% Bordeaux Paste. Paste the all the main stems from ground level up to 2-3 feet depending on their height.
  - d. **Preparation for Stem Pasting:** Make the paste by mixing Red soil 4 kg + Chlorpyrifos 20% EC 20 ml **OR** Emamectin benzoate 5% SG 20 g + Copper Oxychloride (COC) 50% WP 25 g in 10 litres of water and paste on a stem up to 2-2.5 ft. from the bottom. Alternatively Bordeaux paste 1% with Chlorpyrifos 20% EC 20 ml **OR** Emamectin benzoate 5 % SG 20 g can be taken.

### D. Disease Management:

- **During rest period** take following sprays at 10 - 15 days' interval depending on climate and individual crop problems: (i) 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. One spray of 2-Bromo-2-nitropropane-1,3-diol (Bronopol 95%) @ 0.5 g/L + 0.25 ml/L spreader sticker may be taken at 1 month interval. Still if incidence of any fungal disease is observed high- 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://nrcpomgranate.icar.gov.in/files/Advisory/91.pdf>).

- Farmers facing the bacterial blight problems in the orchards should follow Stem Solarization/Six step technology which is economical, eco-friendly and effective technology for blight management. Please check the link for more details about this technology. (<https://nrcpomegranate.icar.gov.in/files/Advisory/89.pdf>).

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

### STAGE OF THE ORCHARD: Fruit Maturity and Ripening

#### A. Horticultural Practices:

- There must be a proper staking or plant support system to support fruit laden branches.
- If early Hasta bahar has been taken; fruits may have attained full maturity. The fruits may be harvested to avoid dropping and fungal spots. Delay in harvest may also lead to aril quality deterioration or fruit cracking.

#### B. Nutrient Management:

- Three foliar applications of 00:52:34 (Mono-Potassium Phosphate) @ 5-6 g/L at 15-20 days interval should be taken for good fruit development and increasing the fruit size.
- Two foliar application of Manganese sulphate @ 6 g/L at 10-15 days interval.
- 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:K::00:00:50 Potassium Sulphate @ 22.20 kg/ha/application. Give 8 applications at 7 days interval through irrigation.

#### C. Insect Pest Management:

- **Fruit fly damage:** If fruit fly damage is observed, Install 12 McPhail/water bottle traps/ha with Torula yeast/*Bactrocera dorsalis* lure and replace the lure at 15-20 days' interval.
- **Fruit borer (egg stage):** Take the spray with Azadirachtin/Neem oil 1% (10000 ppm) @ 3 ml or Pongamia oil @ 3 ml/L water at 7-10 days' interval.
- **Damaged fruits/bored holes:** Remove all the bored fruit and dispose them by burying in pit and take a spray with any one of the insecticide. Cyantraniliprole 10.26% OD @ 0.75 ml/L **OR** Chlorantraniliprole 18.5% SC @ 0.75 ml/L **OR** Tolfenpyrad 15% EC @ 0.75ml/L **OR** Flonicamid 50% WG @ 0.75-1.0 ml/L water.
- **Southern stink bug: In egg stage** spray Azadirachtin/Neem oil 1% (10000 ppm) @ 3 ml/L + Pongamia oil @ 3 ml/L water. If **nymph and adult stage** then spray Cyantraniliprole 10.26% OD @ 0.75 ml/L **OR** Chlorantraniliprole 18.5% SC @ 0.75 ml/L **OR** Spinetoram 12% SC @ 1.0 ml/L **OR** Lambda cyhalothrin 5% EC @ 0.5-0.75 ml/L water.
- **Mealy bugs/scale insect: Early infestation:** Spray Azadirachtin/Neem oil 1% (10000 ppm) @ 3 ml/L + Pongamia oil @ 3 ml/L water. If the infestation is at the **late stage**, spray Thiamethoxam 12.6 % + Lambda-cyhalothrin 9.5% ZC @ 0.75 ml/L water.
- **Mite infestation:** If mite infestation is observed at an **early stage**, take the spray with Azadirachtin/Neem oil 1% (10000 ppm) @ 3 ml/L water. If the infestation is at a **late stage**, take the spray with Fenazaquin 10% EC @ 1.5 ml/L **OR** Fenpyroximate 5% EC

@ 0.4 ml/L **OR** Spiromecifen 22.9% W/W SC @ 0.4 - 0.5 ml/L **OR** Phosalone 35% EC @ 2 ml/L water.

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

Disease management is given at the end of the advisory in Table 1

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

**STAGE OF THE ORCHARD:** New Leaf Initiation to Early Fruit Set

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

- Watering should be properly regulated as per soil type to avoid excessive vegetative growth.

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

##### **▪ During flowering:**

- i. Foliar application of Naphthyl Acetic Acid (NAA) @ 10 ppm **OR** formulation with NAA 4.5% @ 22.5 ml/100 L water for better flowering and fruit set.
- ii. Foliar application of micronutrient mixture @ 1.0-1.5 kg/ha.
- iii. Fertigate N:P:K::00:52:34 Mono-Potassium Phosphate @ 11 kg/ha/application and N:P:K::00:00:50 Potassium Sulphate @ 11 kg/ha/application - Give 7 applications at 7 days interval through irrigation.
- iv. Apply Gypsum @ 1.14 kg/tree and MgSO<sub>4</sub> @ 300 g/tree followed by thorough mixing with the soil and watering.

##### **▪ After completion of fruit setting:**

- i. Fertigate urea @ 13.70-23.13 kg/ha/application. Give 8 applications at 7 days interval through irrigation.
- ii. Fertigate N:P:K::00:52:34 Mono-Potassium Phosphate @ 11 kg/ha/application and N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O::00:00:50 Potassium Sulphate @ 11 kg/ha/application. Give one application through irrigation.
- iii. Foliar application of micronutrient mixture @ 1-2 kg/ha.
- iv. Two foliar application of Gibberellic acid @ 50 ppm at 15 days interval.

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

- **Vegetative stage/Flower bud/flowering initiation stage:** Spray Azadirachtin/Neem oil 1% (10000 ppm) @ 3 ml/L + Pongamia oil @ 3 ml/L **OR** Spinetoram 12% SC @ 1.0 ml/L **OR** Spinosad 45% SC @ 0.5 ml/L + 0.25 ml/L spreader sticker.
- **Fruit setting/development stage:** Cyantraniliprole 10.26% OD @ 0.75 ml/L **OR** Chlorantraniliprole 18.5% SC @ 0.75 ml/L **OR** Tolfenpyrad 15% EC @ 0.75-1.0 ml/L **OR** Flonicamid 50% WG @ 0.75-1.0 ml/L + 0.25 ml/L of spreader sticker.

- **Mite:** If mite infestation is observed at an **early stage**, take the spray with Azadirachtin/Neem oil 1% (10000 ppm) @ 3 ml/L water. If the infestation is at **late stage**, take the spray with Fenazaquin 10% EC @ 1.5 ml/L **OR** Spiromesifen 04-0.5ml/L **OR** Fenpyroximate 5% EC @ 0.4 ml/L **OR** Phosalone 35% EC @ 2 ml/L water.

#### D. Disease Management:

Disease management is given Table 1

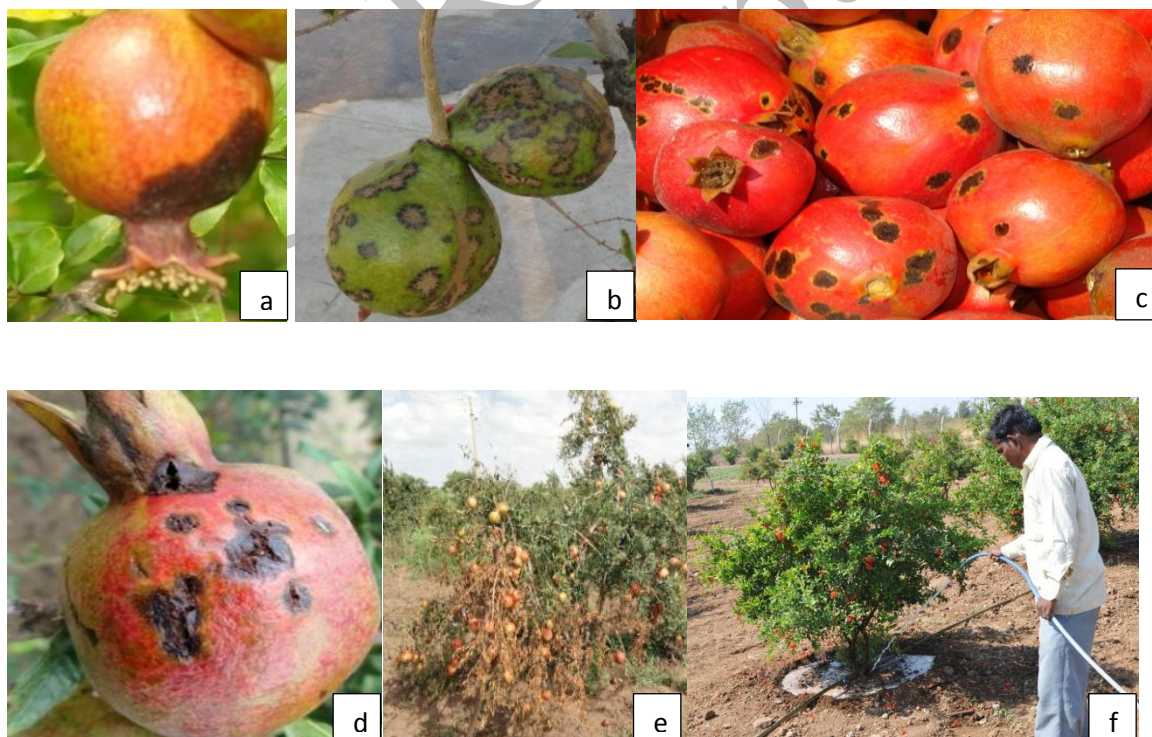
<b>Table 1: Some promising fungicides for pomegranate fungal scab, spots and rots</b>	
1. Mandipropamid 23.4 % SC @ 1 ml/L.	9. Tricyclazole 18 % + Mancozeb 62 % WP @ 2.5 g/L.
2. Metiram 55 % + Pyraclostrobin 5 % EC @ 3 g /L.	10. Chlorothalonil 75 % WP @ 2 g/L.
3. Propiconazole 25 % EC @ 1 ml/L + Azoxystrobin 23 % SC @ 1 ml/L.	11. Fluopyram 17.7 % + Tebuconazole 17.7 % w/w SC @ 1 ml/l
4. Azaoxystrobin 20 % + Difenconazole 12.5 % SC @ 2 ml/L.	12. Tebuconazole 50% + Trifloxystrobin 25 % w/w WG (75WG) @ 0.5g/L
5. Chlorothalonil 50 % + Metalaxyl M 3.75 % @ 2 ml/L.	13. Difenconazole 25% EC @0.5-1.0 ml/l
6. Bordeaux mixture @ 0.5%.	14. Carbendazim 50% WP @ 1.0g/l
7. Copper Oxychloride 45 % + Kasugamycin 5 % @ 2.5 g/L.	15. Mancozeb 75% WP @2g/l
8. Zineb 68 % + Hexaconazole 4 % WP @ 2.5 g/L.	16. Thiophanate Methyl 70% WP @1g/l
<p><b>Note:</b> 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 a spreader sticker with sprays except Bordeaux mixture. No fungicide should be used more than 2 times in a season except copper fungicides.</p>	
<b>Management of Diseases for all seasons</b>	
<p>1. Spray During crop season for Bacterial blight (7-10 days interval) Bordeaux mixture (0.5% except 1% just after pruning) altered with Streptocycline (Streptomycin Sulphate 90% + Teracycline Hydrochloride 10%) @ 0.5 g/L <b>OR</b> 2-bromo, 2-nitro propane-1, 3-diol (Bronopol 95%) @ 0.5 g/L + Copper oxychloride <b>OR</b> Copper hydroxide @ 2-2.5 g/L + Spreader sticker @ 0.5 ml/L.</p> <p>2. Depending on fungal problems present in the orchard Copper based formulations may be replaced with appropriate fungicides.</p>	
<b>Emergency Sprays for bacterial blight</b>	

3. Take 1-2 sprays at 4 day interval soon after blight infection seen on fruits in green lemon stage:
4. Streptocycline (Streptomycin Sulphate 90% + Tetracycline Hydrochloride 10%) @ 0.5 g/L + Bronopol (95-98%) @ 0.5 g/L + Copper hydroxide @ 2 g/L + Spreader sticker @ 0.5 ml/L.
5. Streptocycline (Streptomycin Sulphate 90% + Tetracycline Hydrochloride 10%) @ 0.5 g/L + Bronopol (95-98 %) @ 0.5 g/L + Carbendazim @ 1 g/L + Spreader sticker @ 0.5 ml/L.

**PLEASE NOTE:As per order of Ministry of Agriculture & Farmers Welfare, dated Dec. 22, 2021 Ban on manufacture of Streptomycin + Tetracycline in Agriculture from Feb. 1, 2022 and Ban on Use from Jan 1, 2024**

#### Precautions

- Take only need based sprays at recommended doses
- Reduce number of sprays.
- Take additional spray after the rains
- Use non-ionic spreader sticker except with Bordeaux mixture.
- Before every spray remove and burn all bacterial blight/rot affected fruits
- Prepare Bordeaux mixture fresh and use on the same day
- Take sprays in the evening.



**Figure 2: Major Diseases in Pomegranate. a) *Colletotricum* fungal infection on fruits. b) *Sphaceloma* fungal Scab. c) *Cercospora* Fungal fruit spots. d) Bacterial Blight e) Fungal Wilt. f) Correct way of Drenching.**

## 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 the first symptoms are observed, check the roots of the affected branch. Remove and split open the roots; if deep yellow/brown/grey colour 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.

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 the 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 plants and surrounding 4 - 5 plants where infected soil might have spread.

- For complete details about the method of drenching, please see Wilt advisory on NRC P website.

### E. Nematode Management:

If the orchard is known to have heavy nematode infestation (Can be confirmed by presence of galls on the white root of the plant below the dripper. Please follow the root knot nematode management practices given in the advisory.

1. The bio-control formulations (*Aspergillus niger* + *Rhizophagus irregularis*) 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.
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.
  - 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 a 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 detailed information on management of diseases on Pomegranate in above crop seasons/*bahars*, farmers are advised to use the following links:

- Adhoc list of chemicals: (<https://nrcpomegranate.icar.gov.in/files/Advisory/91.pdf>)
- IDIPM Schedule: - (<http://nrcpomegranate.icar.gov.in/files/Advisory/12.pdf> )
- Stem Solarization/Six step to manage bacterial blight in pomegranate: (<https://nrcpomegranate.icar.gov.in/files/Advisory/89.pdf>)
- Wilt disease management: (<https://nrcpomegranate.icar.gov.in/files/Advisory/86.pdf>)
- Shot/Pin hole borer management in pomegranate (<https://nrcpomegranate.icar.gov.in/files/Advisory/107.pdf>)
- Bordeaux mixture and Bordeaux paste preparation: <https://youtu.be/JXwWBDiUdyA>