



भा.कृ.अनु.प.- राष्ट्रीय अनार अनुसंधान केन्द्र, सोलापुर  
**ICAR - National Research Centre on Pomegranate**  
(Indian Council of Agricultural Research)  
NH-65, Solapur-Pune Highway, Kegaon, Solapur-413 255 (M.S.)  
T-(0217) 2354330, 2350074, 2350263, F-(0217) 2353533  
E mail- nrcpomegranate@gmail.com, www.nrcpomegranate.icar.gov.in  
(ISO 9001:2008 Certified Institute)



## **BIMONTHLY ADVISORY FOR BEARING POMEGRANATE ORCHARDS (APRIL- MAY 2024)**

**Jyotsana Sharma, Somnath Pokhare, Manjunatha N., Mallikarjun, Chandrkant Awachare,  
Mahadev Gogaon and R. A. Marathe**

### **I. Crop Season: Rainy Season / *Mrig Bahar* (May-Jun Crop regulation)**

**CURRENT STAGE OF THE ORCHARD: LATE STAGE OF REST PERIOD OR STRESS PERIOD OR CROP REGULATION AT MAY END)**

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

- **Crop under rest period and bahar regulation May last week:** Depending on the soil texture and water holding capacity, stop irrigation for stress induction for natural defoliation (loamy soil: 5-6 weeks **OR** light sandy soil: 3-4 weeks).
- Defoliation should be done using Ethephon 39% SL. Quantity of Ethephon should be adjusted based on yellowing of leaves:
  - (i) **If natural defoliation occurs:** As natural defoliation was there, Ethephon spray was not used for defoliation; In such cases one can take Ethephon 39% SL @ 20 ml per 100 liters of water (0.2 ml/L) after leaf opening for good flowering.
  - (ii) **If leaves are deep yellow:** - Take one spray of Ethephon 39% SL @ 1 ml/L.
  - (iii) **If leaves are green / slight yellow:** - Take 1-2 sprays of Ethephon 39% SL @ 0.5 ml/L and after 1 week, depending on yellowing take 2<sup>nd</sup> spray @ 1-1.5 ml/L.
- **NOTE:** Total quantity of Ethephon should not be more than 2.5 ml/L. Please add DAP (18:46:00) **OR** (MAP) 12:61:00 **OR** (MPP) 00:52:34 @ 5 g/L with each Ethephon spray for better defoliation.
- Defoliation should be followed by light pruning (removing 10 -15 cm new growth from top or refill thickness and partially removing thorns) before bahar initiation / first irrigation (at the end of the May month).
- Fallen leaves and debris in the orchard may be removed/ buried in soil at fertilizer application.

## B. Nutrient Management:

- Apply following manures and bio-fertilizer after light pruning, at the time of first irrigation **OR** release of stress.
- Apply 25-30 kg Farm Yard Manure (FYM) **OR** 15-20 kg FYM + 2 kg Vermicompost + 2 kg Neem-cake per plant **OR** 7.5 kg well decomposed Poultry manures + 2 kg Neem-cake per plant.
- Apply the bio-formulation of *Azospirillum* sp., *Aspergillus niger* AN 27, *Trichoderma viride* each @ 1 kg per acre and *Penicillium pinophilum* @ 3 kg per acre after incubating each bio-formulation separately in 1-1.5 feet high bed with well decomposed FYM for 15 days maintaining 60-70% moisture content in the mixture and alternate day stirring under shade. In about 15 days, these beneficial bacteria / fungi grow in very large number in the compost.
- Before application, mix Arbuscular Mycorrhizal Fungi, AMF (*Glomus intraradices* syn. *Rhizophagus irregularis*) in the bio-formulation mixture and use this @ 10-20 g per plant. Give light irrigation immediately after manure application.

**Note: Apply bio formulations 20-30 days after application of chemical fertilizers.**

## C. Insect Pest Management:

- Regular monitoring / observation should be done for stem borer, shot hole borer, termites, which are major pests during dry stress periods.
- **Stem pasting:** Stem pasting should be done with any of the below mentioned pastes:
  - (i) **Bordeaux paste 10%:** Mix 1 kg of Copper Sulphate + 1 kg hydrated Lime in 10 litres of water

**OR**

  - (ii) **Red Soil Paste:** Mix the Red soil 4 kg + Copper oxychloride 50% WP @ 25 gram in 10 liters of water.

### Note:

- (a) In both Bordeaux and Red soil paste also add Chloropyriphos 20% EC @ 20 ml **OR** Emamectin benzoate 5% SG @ 20 g per 10litre
- (b) Paste the stems up to 2-2.5 ft. from the bottom.
- (c) See this video for preparation of Bordeaux paste and Bordeaux mixture (**Link:** <https://youtu.be/JXwWBDiUdyA>).

## D. Disease Management:

- Sprays of freshly prepared 1% Bordeaux mixture (<https://youtu.be/JXwWBDiUdyA>) should be taken at 15 days' interval alternatively, Copper oxychloride 50% WP @ 2.5 g/L **OR** Copper hydroxide 53.8% @ 2.0-2.5 g/L along with spreader sticker @ 0.3 to 0.5 ml/L. This will take care of bacterial blight and fungal spots during rest / stress

period.

- Wilt / borer affected plants, if any, should be removed carefully and burnt. Follow the wilt management treatments given at the end of the advisory, if not taken in previous months.

## II. Crop Season: Winter Season / *Hasta Bahar* (Sep-Oct Crop regulation)

### CURRENT STAGE OF THE ORCHARD: ABOUT TO HARVEST AND REST PERIOD AFTER HARVEST

#### A. Horticultural Practices:

- If very late *hasta bahar* has been taken, then fruit bagging with White butter paper bags open at the bottom is recommended **OR** protective crop cover covering the entire row at the top and 1.5-3 ft. from top to sides is recommended to avoid sun burn /scald on fruits.
- The width of crop cover depends on the height and canopy of the plants and the side where sun is after 12 noon / sunset side should be covered 60% as that receives more sunlight by afternoon. This also protects fruits from abiotic fruit cracking to some extent.
- Bearing branches having optimum crop load may be staked and tied for support.
- After harvest of *hasta bahar* fruits, medium to deep pruning (removal of criss cross, diseased, broken and overcrowded branches) should be done and basal dose application of nutrition is recommended.



Before Pruning



After Pruning

Photos of main pruning just after fruit harvest

#### B. Nutrient Management:

##### (i) Crop stage is around 1 month to harvest:

- Fertigate urea @ 41.44 - 69.56 kg per ha per application; N:P:K::00:52:34 Mono-Potassium Phosphate @ 22.20 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 @ 22.20 kg per ha per application. Give 4 applications at 7 days' interval through irrigation.

- Give 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.

**(ii) Rest period:**

- Immediately after harvest of fruits and pruning, 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.
- 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), 488 g Ca (2.80 kg gypsum) and 80 g Mg (800 g MgSO<sub>4</sub>) per plant depending on the age of the plant (lower dose of N till 5<sup>th</sup> year plants and higher dose for > 6-year-old plants) followed by light irrigation for 2-3 months during rest period.
- Apply bio-formulation of *Azospirillum* sp., *Aspergillus niger* AN 27, *Trichoderma viridae* and *Penicillium pinophilum* after incubating separately as mentioned previously in rainy season / *mrig bahar* crop.
- Just before application mix Arbuscular Mycorrhizal Fungi, AMF (*Glomus* sp.) in the FYM and apply @ 10-20 g per plant. Give light irrigation immediately after manures and bio-fertilizers application.
- During rest period, 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.
- **Note: Apply bio-formulations 20-30 days after application of chemical fertilizers.**

**C. Insect Pest Management:**

- Regular monitoring / observation should be done for stem borer, shot hole borer, termites, mites, leaf eating caterpillars and sucking pests (Mealy bugs, scale insects etc.).
- If low foliar insect pest infestation is observed, spray only Azadirachtin / Neem oil 1% (10000 ppm) @ 3 ml/L water. If harvesting of crops is due in 1 month avoid any insecticide spray, if any emergency, consult an expert before taking any spray.
- Depending on insect pest observed, take 2 - 3 sprays at 15 to 20 days' interval with any of the insecticides mentioned below:

## Rest Period:

- 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 **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.
- b) **If shot hole /stem borer infestation** is observed in the orchard: Follow the advisory: <https://nrcpomegranate.icar.gov.in/files/Advisory/107.pdf>.
- c) **Mealy bugs/scale insect:**
- In 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.
- d) **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** Phosalone 35% EC @ 2 ml/L water.

## D. Disease Management:

(i) **Harvesting of crop due in 1 month:** Avoid any sprays, if emergency, take 1 spray of Copper fungicide **OR** Sulphur 80% WP @ 2.5 g/L.

(ii) **In rest period:**

- **Wilt and Nematode affected plots** should take wilt treatment soon after harvest. Details given at the end of the advisory.
- 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 @ 3 g/L **OR** Copper hydroxide 53.8% WP @ 2 g/L altered with 2-Bromo-2- nitropropane-1,3-diol (Bronopol 95%) @ 0.5 g/L. Still if any fungal disease observed, one spray can be taken using fungicide mentioned in Adhoc list of agrochemicals (<https://nrcpomegranate.icar.gov.in/files/Advisory/142.pdf>).

### III. Crop Season: Autumn Crop / *Ambia Bahar* (Jan-Feb Crop regulation)

#### **CURRENT STAGE OF THE ORCHARD: Fruit Set and Fruit Enlargement**

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

- Shoot pinching if too much vegetative growth is there.
- Staking and support to the bearing trees and branches.
- When the fruit is lemon size or about 100 g fruit bagging or protective crop cover over on the entire row is recommended to avoid sun scald.

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

###### **(i) 100% Fruit setting and Fruit Enlargement stage:**

- Fertigate N:P:K::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 4 applications at 7 days' interval through irrigation.
- Fertigate urea @ 13.70 - 23.13 kg per ha per application. Give 8 applications at 7 days' interval through irrigation.
- Foliar application of micronutrient mixture @ 2 -2.5 gram/L **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 one month after 1<sup>st</sup> application.
- Two foliar application of pure Gibberellic acid @ 50 ppm (5 grams per 100 liter) at 15 days' interval.
- Apply Gypsum @ 640 gram per plant and MgSO<sub>4</sub> @ 400 gram per plant followed by thorough mixing with the soil and watering.
- Remove weeds from plant basin.

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

###### **(i) Sucking pests- Thrips**

- 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.
- **First spray:** 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.
- **Second spray:** After 7-10 days of 1<sup>st</sup> spray, 2<sup>nd</sup> spray can be taken with either Cyantraniliprole 10.26% OD @ 0.75 ml/L **OR** Thiamethoxam 25% WG @ 0.5 g/L water with 0.25 ml/L of spreader sticker.
- **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) 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 Azadirachtin / Neem oil 1% (10000 ppm) @ 3 ml/L **OR** Pongamia oil @ 3 ml/L **OR** combination of both the above @ 3 + 3 ml/L water at 7-10 days' interval.
- Remove all the damaged fruits with holes 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.



a) Pomegranate fruit infested by Thrips; (b) Fruit Borer (c) Mite infestation on leaves

**(iii) Mealybugs / Scale insect:**

- **Early infestation:** Spray Azadirachtin / Neem oil 1% (10000 ppm) @ 3 ml/L + Pongamia oil @ 3 ml/L water.
- **Late stage:** If the infestation is at the late stage, spray Thiamethoxam 12.6% + Lambda-cyhalothrin 9.5% ZC @ 0.75 ml/L water.

**(iv) Mite infestation:**

- **Early infestation:** In early stages, take the spray with Azadirachtin / Neem oil 1% (10000 ppm) @ 3 ml/L water.
- **Late stage:** Take the spray with Fenazaquin 10% EC @ 1.5 ml/L **OR** Fenpyroximate 5% EC @ 0.4 ml/L **OR** Phosalone 35% EC @ 2 ml/L water.

**D. Disease Management:**

**(i) Spray during crop season (Take sprays at 10-14 days' interval)**

- Take 4 sprays of Salicylic acid (SA) @ 0.3 g/L at 1-month interval from pre-flowering to relieve the plants stress.
- Bordeaux mixture 0.5% **OR** Copper oxychloride 50% WP @ 2.5 g/L **OR** Copper hydroxide 53.8% WP @ 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 at 10 days' interval.

- If orchard has bacterial blight history; take spray of 2-bromo, 2-nitro propane-1, 3-diol (Bronopol 95%) @ 0.5 g/L.
- Avoid too many sprays, if rain is there; take an additional spray of Bronopol + Copper based fungicide.
- 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:**

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% WG @ 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. Azaoxystrobin 20% + Difenoconazole 12.5% SC @ 2 ml/L.	11. Fluopyram 17.7% + Tebuconazole 17.7% w/w SC @ 1 ml/L.
5. Chlorothalonil 50% + Metalazxyl M 3.75% SC @ 2 ml/L.	12. Tebuconazole 50% + Trifloxystrobin 25% w/w WG (75WG) @ 0.5g/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.	

**PLEASE NOTE:**

- Remove rot infected fruits and destroy before each spray; do not dump or throw anywhere.
- Avoid spray if rain is expected on the spray day; Spraying after a few hours of rain is better and very important to prevent diseases.
- Spray pH should be checked and adjusted from 6.5-7 pH.
- Best results are obtained with 2-3 sprays starting during flowering and fruit setting stage at 15 days' interval with any of the above. This will avoid several sprays at later stages.
- Always use spreader sticker with sprays except Bordeaux mixture.

- Need based sprays be used later.
- No pesticide should be used more than 2-3 times in a season except copper fungicides.
- Sprays can be taken in rotation as per pre-harvest interval for residue free production (<https://nrcpomegranate.icar.gov.in/files/Advisory/142.pdf>).

## ❖ Wilt 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 *Fusarium*, *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 stem/root and splitting of stem

1. **Wilt due to *Ceratocystis*, *Fusarium*, *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% WP @ 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 on each side 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: 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 Agrochemicals with European Union (EU) Maximum Residue Level (MRL) And Pre Harvest Interval (PHI) For Pomegranate Production:**

<https://nrcpomegranate.icar.gov.in/files/Advisory/142.pdf>

3. **IDIPM schedule:** <https://nrcpomegranate.icar.gov.in/files/Advisory/146.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=k\\_ZQ6ii4vzM&t=18s](https://www.youtube.com/watch?v=k_ZQ6ii4vzM&t=18s)  
& <https://nrcpomegranate.icar.gov.in/files/Advisory/89.pdf>

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