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Bimonthly Pomegranate Advisory for Bearing Orchards (October-November 2022)

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

STAGE OF THE ORCHARD: (i) Fruit development and maturity

A. Horticultural Practices:

1. The orchard must be very well drained without any water stagnation in the root zone of plants due to rains.
2. There must be proper staking or plant support system to support fruit laden branches.
3. Excessive bunch bearing may be thinned out for improving fruit size.
4. Too many fruits may be avoided and thinning should be carried out to keep about 80-100 fruits per plant for a five years old plant.
5. There may be even some incidences of fruit dropping due to excess moisture and even colour development or maturity may be slightly delayed.
6. If early mrig bahar has been taken; fruits may have attained full maturity with significant rind and aril colour. The fruits may be harvested to avoid dropping and fungal spots.

B. Nutrient Management:

1. Three foliar applications of 00:52:34 (Mono-Potassium Phosphate) @ 7 g/L at 15-20 days interval should be taken for good fruit development and increasing the fruit size.
2. Two foliar application of Manganese sulphate @ 6 g/L at 10-15 days interval.
3. Fertigate with N:P: K: 00:52:34 (Mono-Potassium Phosphate), Urea and 00:00:50 @ 12.80 kg, 31.40 kg and 11.50 kg per ha per application respectively. Give 10 such applications at 7 days interval through irrigation water.

C. Insect Pest Management:

- **Fruit fly damage**: Install 12 McPhail/water bottle traps/ha with Torula yeast/*Bactrocera dorsalis* lure and replace at 15-20 days' interval.

❖ **Southern stink bug**

- **Egg stage**: Spray Azadirachtin/Neem oil 1 % (10000 ppm) @ 3 ml/L + Pongamia oil @ 3 ml/L +0.25 ml/L spreader sticker.
- **Nymph and adult stage:** 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** Lambdacyhalothrin 5 % EC @ 0.5-0.75 ml/L + 0.25 ml/L spreader sticker.

❖ **Fruit piercing moths:**

1. Remove Tinospora/Gulvel from field boundaries.
2. Take bagging of individual fruits/tree/rows with Poly Propylene Non-Woven bags (PPNW)/butter paper bags. Before bagging, take the spray if bacterial blight, mealy bugs or as per presence of pest and diseases.
3. If bagging is delayed; take spray with Azadirachtin/Neem oil 1 % (10000 ppm) @ 3 ml/L + Fish Oil Resin Soap @ 0.5-1.0 ml/L water preferably on border row plants.

Figure 1: Fruit sucking Moth in Pomegranate. a) Adult moth feeding on pomegranate fruit. b) Rotting of infested fruit.

D. Disease Management: Different diseases of developing fruit and their management is given at the end of the advisory.

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

STAGE OF THE ORCHARD: (Flowering and fruit setting)

A. Horticultural Practices:

1. Due to continuous rains in major parts of Maharashtra the hasta bahar may be delayed.
2. Do not defoliate with ethrel till rainy season/ rainy period is over.
3. Two repeated applications of lower doses of ethrel @ 0.75-1.0 ml/L + 00:52:34/DAP @ 5 g/L at weekly interval should be taken for defoliation instead of

one single higher dose in sub-optimally or unstressed orchards due to continuous rains.

4. The orchard must be very well drained and there should not be any excess soil moisture in the rhizosphere due to excess rains.
5. Pomegranate cultivation on raised bed is always beneficial under conditions of excessive rains or excess soil moisture.

B. Nutrient Management:

- **During flowering:**

1. 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.
2. Foliar application of micronutrient mixture @ 1.0-1.5 kg/ha.
3. Fertigate N:P: K: 00:52:34 (Mono-Potassium Phosphate) @ 8.5 kg per ha per application. Give 3 applications at 7 days interval through irrigation.
4. Apply Gypsum @ 1.14 kg/tree and MgSO4 @ 300 g/tree followed by thorough mixing with the soil and watering.

- **After completion of fruit setting:**

1. Fertigate N:P: K::00:52:34 (Mono-Potassium Phosphate), Urea and 00:00:50 @ 8.50 kg, 22.50 kg and 16.30 kg per ha per application respectively. Give 5 such applications at 7 days interval through irrigation.
2. Foliar application of micronutrient mixture @ 1-1.5 kg/ha.
3. Two foliar application of Gibberellic Acid (GA) @ 50 ppm at 15 days interval.

C. Insect Pest Management:

- **Leaf initiation stage/Vegetative stage/Flower bud/flowering initiation stage:** Spray Azadirachtin/Neem oil 1 % (10000 ppm @ 3ml/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 spreader sticker/L water.
- **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 of spreader sticker/L water.

Figure 2: sucking pest in Pomegranate. a & b) thrips and aphids on young foliage c) thrips affected fruits.

D. **Disease Management:** Disease management is given at the end of the advisory in tabular format.

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

STAGE OF THE ORCHARD: Rest and stress period

A. Horticultural Practices:

The orchard must be very well drained and there should not be any water stagnation in the root zone of plants due to excess rains.

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/plant) 50 g P_2O_5 (315 g Single Super Phosphate/plant) and 152 g K_2O (254 g Murate of Potash or 304 g Sulphate of Potash per plant) followed by light irrigation.
3. 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* @ 1 kg/acre **OR** *Trichoderma viride* @ 1 kg/acre and *Penicillium pinophilum* @ 3 kg/acre (10 g/plant) after incubating separately with 200-500 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/1 acre. Alternatively the instructions given on the pack of brand purchased for multiplication and dose/acre may be followed.

- **Note:** These recommendations for N-P_2O_5-K_2O are applicable if the leaf test report reveals N-P_2O_5-K_2O 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%.

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

C. Insect Pest Management:

- 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.
- **Note:** Stem pasting needs to be taken after the end of south-west monsoon for all the bahar crops/seasons crops. Make the paste mixing Red soil 4 kg + Chlorpyriphos 20 % EC 20 ml + COC 25 gram in 10 litres of water and paste on a stem up 2-2.5 ft. from the bottom.
- Above suggested management practice need to be taken based on the insect pest incidence/examination.
- Adhoc list of chemical may be referred for list of chemicals.

D. Disease Management:

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 high incidence of fungal disease is 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).

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

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

Management of Diseases for all seasons

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 IP 90 % w/w, + Teracycline Hydrochloride IP 10 % w/w) 0.5 g/L or 2-bromo, 2-nitro propane-1, 3-diol (Bronopol 95%) @ 0.5 g/L + copper oxychloride or copper hydroxide @ 2-2.5 g/L + Spreader sticker @ 0.5 ml/L.
2. Depending on fungal problems present in the orchard Copper based formulations may be replaced with appropriate fungicides.

Emergency Sprays for bacterial blight

3. Take 1-2 sprays at 4 day interval soon after blight infection seen on fruits in green lemon stage:
4. Streptocycline (Streptomycin Sulphate IP 90 % w/w, Tetracycline Hydrochloride IP 10 % w/w) 100 % @ 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 IP 90 % w/w, Tetracycline Hydrochloride IP 10 % w/w) @ 0.5 g/L + Bronopol (95-98 %) @ 0.5 g/L + Carbendazim @ 1 g/L + Spreader sticker @ 0.5 ml/L.

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.

During rest period (10-15 days interval)

Bordeaux mixture (1%) or Copper Oxychloride or Copper Hydroxide or suitable fungicide (at recommended dose) + Spreader sticker @ 0. 5 ml/L.

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

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

Method I:

- 1st drenching Propiconazole 25 % EC @ 2 ml/L + Chlorpyriphos 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 2nd soil application with *Aspergillus niger* AN 27 (New Packs have AN 27 with IRAG 07) fungus @ 5 g/plant with 2 Kg FYM/plant.
- 3rd application after 30 days of 2nd 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 + Chlorpyriphos 20 % EC @ 2 ml/L (3 drenching at 20 days interval).

OR

Method III:

- 1st and 3rd drenching Fosetyl Al 80 % WP @ 6 g/plant (10 L solution)]; [2nd and 4th 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, chlorpyriphos 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.

E. 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 3: Heavy root-knot nematode infestation on the new roots of the plant

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 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.

- Adhoc list of chemicals: https://nrcpomegranate.icar.gov.in/files/Advisory/91.pdf
- IDIPM Schedule: - http://nrcpomegranate.icar.gov.in/files/Advisory/12.pdf
- Wilt disease management: https://nrcpomegranate.icar.gov.in/files/Advisory/86.pdf
- **Fruit piercing moth :** nrcpomegranate.icar.gov.in/files/Advisory/104.pdf
- **Shot hole borer :** nrcpomegranate.icar.gov.in/files/Advisory/108.pdf
- Six step bacterial blight management **:** (https://nrcpomegranate.icar.gov.in/files/Advisory/89.pdf)