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Bimonthly Pomegranate Advisory for Bearing Orchards (August-September 2022)

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

CURRENT STAGE OF THE ORCHARD: (i) Fruit enlargement stage (ii) Flowering stage or Fruit setting

A. Horticultural Practices:

(i) In fruit bearing orchards after rains are over; take the spray of Napthyl Acetic Acid (NAA) @10 ppm OR formulation with NAA 4.5 % @ 22.5 ml/100 L water twice at fortnightly interval if sprays were not taken in earlier months.

(ii) Where orchards are in flowering stage in September end after rains are over one shoot pinching is recommended.

B. Nutrient Management:

(i) Orchards with 100% fruit set and Fruit enlargement stage:

- Two foliar application of Gibberellic acid (GA) @ 50 ppm at 15 days interval.
- Foliar application of micronutrient mixture @ 1.0 -1.5 kg/ha should be taken OR Foliar spray of $ZnSO_4$ @ 3 g/L + $MnSO_4$ @ 6 g/L + Boric acid @ 2.5 g/L can be taken.
- Three foliar application of 00:52:34 (Mono-Potassium Phosphate) @ 5 g/L should be taken at 15-20 days interval.
- Fertigate N:P:K::00:52:34 (Mono-Potassium Phosphate) @ 11 kg/ha/application and $N:P_2O_5:K_2O$::00:00:50 (Potassium Sulphate) @ 11 kg/ha/application – Give one application through irrigation.
- Fertigate urea @ 13.70-23.13 kg/ha/application - Give 8 applications at 7 days interval through irrigation.

(ii) Orchards in Flowering stage or Fruit setting stage:

- Foliar application of micronutrient mixture @ 1.0 -1.5 kg/ha should be taken OR Foliar spray of $ZnSO_4$ @ 3 g/L + $MnSO_4$ @ 6 g/L + Boric acid @ 2.5 g/L can be taken.
- Fertigate $N:P_2O_5:K_2O$::00:52:34 (Mono-Potassium Phosphate) @ 11 kg/ha/application and $N:P_2O_5:K_2O$::00:00:50 (Potassium Sulphate) @ 11 kg/ha/application - Give 7 applications at 7 days interval through irrigation.
- Apply Gypsum @ 1.14 kg/tree and $MgSO_4$ @ 300 g/tree followed by thorough mixing with the soil and watering.

C. Insect Pest Management:

- **Orchards with 100% fruit set and Fruit enlargement stage:**
- **First Spray:** 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 + 0.25 ml/L of spreader sticker.
- **Second spray:** 7-10 days after first spray with Neem oil 1% (10000 ppm) @ 3 ml/L + 0.25 ml/L of spreader sticker OR Pongamia oil @ 3 ml/L + 0.25ml/L spreader sticker OR combination of both of the above @ 3 + 3 ml/L with 0.25 ml/L of spreader sticker.
- Based on the level of pest incidence any of the pesticides mentioned for the first spray may be used alternatively for subsequent sprays. Do not take any spray more than 2-3 times in a season.

(i) Orchards in Flowering stage or Fruit setting stage:

- Install yellow/ blue sticky traps @ 25-30 traps/acre randomly in a zigzag manner and traps should be tied/hanged 15 cm below from the top canopy of the plant. Take the following sprays.
- **First spray:** Spinetoram 12 % SC @ 1.0 ml/L OR Spinosad 45 % SC @ 0.5 ml/L + 0.25 ml/L of spreader sticker.
- **Second spray:** 7-10 days after first spray of Spinosad 45% SC @ 0.5 ml/L OR Neem oil 1% (10000 ppm) @ 3.0 ml/L OR Pongamia oil @ 3 ml/L OR combination of both of oils @ 3 ml/L + 3 ml/L along with 0.3 ml/L of spreader sticker.
- **Third spray:** Spinetoram 12 % SC @ 1.0 ml/L OR Spinosad 45% SC @ 0.5 ml/L + 0.25 ml/L of spreader sticker.

D. Disease Management:

(i) Take 4 sprays of each of Salicylic acid (SA) @ 0.3 g/L at 1 month interval starting from pre-flowering.

(ii) Take sprays at 7-10 days interval depending on rains. 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 once a month (sometimes 2 sprays/month may be taken and suitable fungicide along with spreader sticker + 0.25 – 0.5 ml/L).

(iii) If orchard has bacterial blight history then only 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. **Please note blight pathogen has developed resistance to streptomycin sulphate at doses below 0.5 g/L and will not be controlled if taken below the recommended dose.**

(iv) In fruit bearing orchards only during enlargement stage to in order to check bacterial blight, 2 emergency sprays at 4 days interval may be taken if 10 - 25% fruit infection is observed. These sprays can stop further spread of blight; later as per need single blight spray may be taken.

Emergency Sprays

First spray: Copper hydroxide 53.8% @ 2 g/L + Streptocycline 100 % @ 0.5 g/L + Bronopol 95 -98 % @ 0.5 g/L + Spreader sticker @ 0.5 ml/L. Do not take any spray for next 4 days, on 5th day take second spray.

Second spray: Carbendazim 50% WP @ 1 g/L + Streptocycline 100% @ 0.5 g/L + Bronopol (95-98%) 0.5 g/L + Spreader Sticker @ 0.5 ml/L.

(v) Depending on fungal problems present in the orchard take sprays of appropriate fungicides as given in **Table 1: Some promising fungicides for pomegranate fungal scab, spots and rots at the end of the advisory**.

(vi) **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)

STAGE OF THE ORCHARD: (Release of stress and Crop regulation)

A. Horticultural Practices:

- After rains/ rainy season is over, do not irrigate the orchard for 20-25 days. Fallen leaves and debris in the orchard should be removed/ buried in soil at the time of fertilizer application

(i) Defoliation can be done using ethephon 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/L followed by second Ethephon spray @ 1 to 1.5 ml/L after 5-8 days depending on yellowing. Mix 18:46:00 **OR** 12:61:00 **OR** 00:52:34 @ 5 g/L with each 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.

(ii) Remove water shoots and do light pruning by removing of shoots 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

(i) Stage of the Orchard – Release of stress

- Apply 15 - 20 kg FYM **or** 10 - 15 kg FYM + 2 kg vermicompost + 2 kg neem cake per plant
- 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 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.

(i) Stage of the Orchard – leaf and flower bud initiation:

- If new leaves have opened and flower bud initiation is observed, give foliar application of Napthyl Acetic Acid (NAA) 4.5% @ 22.5 ml/100 L water for good flower induction.
- Foliar application of micronutrient mixture @ 1.0-1.5 kg/ha should be taken OR Foliar spray of $ZnSO_4$ @ 3 g/L + $MnSO_4$ @ 6 g/L + Boric acid @ 2.5 g/L can be taken.
- Fertigate $N:P_2O_5:K_2O$::00:52:34 (Mono-Potassium Phosphate) @ 11 kg/ha/application and $N:P_2O_5:K_2O$::00:00:50 Potassium Sulphate @ 11 kg/ha/application - Give 7 applications at 7 days interval through irrigation.
- Apply Gypsum @ 1.14 kg/tree and $MgSO_4$ @ 300 g/tree followed by thorough mixing with the soil and 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/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. One or 2 sprays can be taken at 7-10 days' interval.

(iii) **Flower bud/flowering initiation stage:** 7-10 days after first spray, take second spray with Cyantraniliprole 10.26% OD @ 0.75 ml/L + 0.25 ml/L spreader sticker OR Chlorantraniliprole 18.5% EC @ 0.75 ml/L + 0.25 ml/L spreader sticker OR Flubendiamide 19.92% w/w + Thiacloprid 19.92% w/w @ 0.5 ml/ L. + 0.25 ml/L spreader sticker.

D. Disease Management

- Take one spray of freshly prepared 1 % Bordeaux mixture just before defoliation.
- Take 1 spray of Salicylic acid (SA) @ 0.3 g/L when leaves are fully open/ 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 ml/L, altered with 2-Bromo, 2-Nitro Propane-1, 3-diol (Bronopol 95%) @ 0.5 g/L + 0.25 ml/L spreader sticker can be taken at 7-10 days interval depending on rain.

- If orchard has bacterial blight history take spray of Streptocycline (Streptomycin sulphate 90 % + tetracycline hydrochloride 10%) @ 0.5 g/L once a month after a gap of 10 days' interval from Bronopol. Avoid frequent sprays, it will increase blight.
- 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.

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

STAGE OF THE ORCHARD: (i) **Harvesting stage** (ii) **Rest Period**

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 center of the canopy for better light penetration.

B. Nutrient Management

- Apply 15-20 kg FYM OR 10-15 kg FYM + 2 kg Vermicompost + 2 kg neem-cake per tree.
- Apply 225-280 g N (490-610 g urea), 63 g P_2O_5 (395 g SSP), 200 g K_2O (335 g MOP), 488 g Ca (2.80 kg gypsum) and 80 g Mg (800 g $MgSO_4$) per tree followed by light Irrigation.
- 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/acre. Alternatively the instructions given on the pack of brand purchased for multiplication and dose/acre may be followed.

C. Insect Pest Management

If the fruits are yet to be harvested then regular monitoring for presence of fruit fly/sucking bugs/insects etc. should be done.

(i) Fruit piercing moths:

- Remove *Tinospora* (Gulvel) from field and surrounding areas.
- Install the 150-200 watts fluorescent light in each corner of the field, lights of the corner should focus each other and should be switched on at 7 pm every day.
- If moth population/fruit damage is high and fruits are to be harvested in late August/ September bagging of individual fruits/trees/rows with Polypropylene Non-Woven Bags (PPNW)/ covers in first 10 days of August. Please note bagging/covering can increase bacterial blight or fruit rot and mealybugs if orchard is having these diseases and insect. Appropriate sprays before bagging for bacterial blight, fruit rot; mealy bugs may be taken.
- If bagging is delayed then 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.

(ii) Fruit fly damage:

- Install McPhail traps with Torula yeast/*Bactrocera dorsalis* lure and replace at 15-20 days' interval.

D. Disease Management

(i) **In plots where last harvest is expected within 10-20 days:** No sprays required. If essential, one spray of sulphur 85%WP @ 2.5 g/L may be taken.

(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 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).

(iii) **Wilt and Nematode Management:** Wilt and Nematode affected plots should take treatments soon after harvest. Details given 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. 2. Metiram 55% + Pyraclostrobin 5% EC @ 3 g/L. 3. Propiconazole 25% EC @ 1 ml/L + Azoxystrobin 23% SC @ 1 ml/L. 4. Azoxystrobin 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% WP @ 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 @ 1 ml/L 12. 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

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

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

OR

Method II:

- Three drenching at 20 days interval with Propiconazole 25% EC @ 2 ml/L + Chlorpyriphos 20% EC @ 2 ml/L.

OR

Method III:

- **1st and 3rd drenching:** Fosetyl Al 80% WP @ 6 g/plant (10 L solution)
- **2nd and 4th drenching**: Tebuconazole 25.9% EC w/w @ 3 ml/plant (10 L solution). Drenching interval of 20 days should be followed.

(iii) *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 *Phytopthora* 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.

B. Nematode Management:

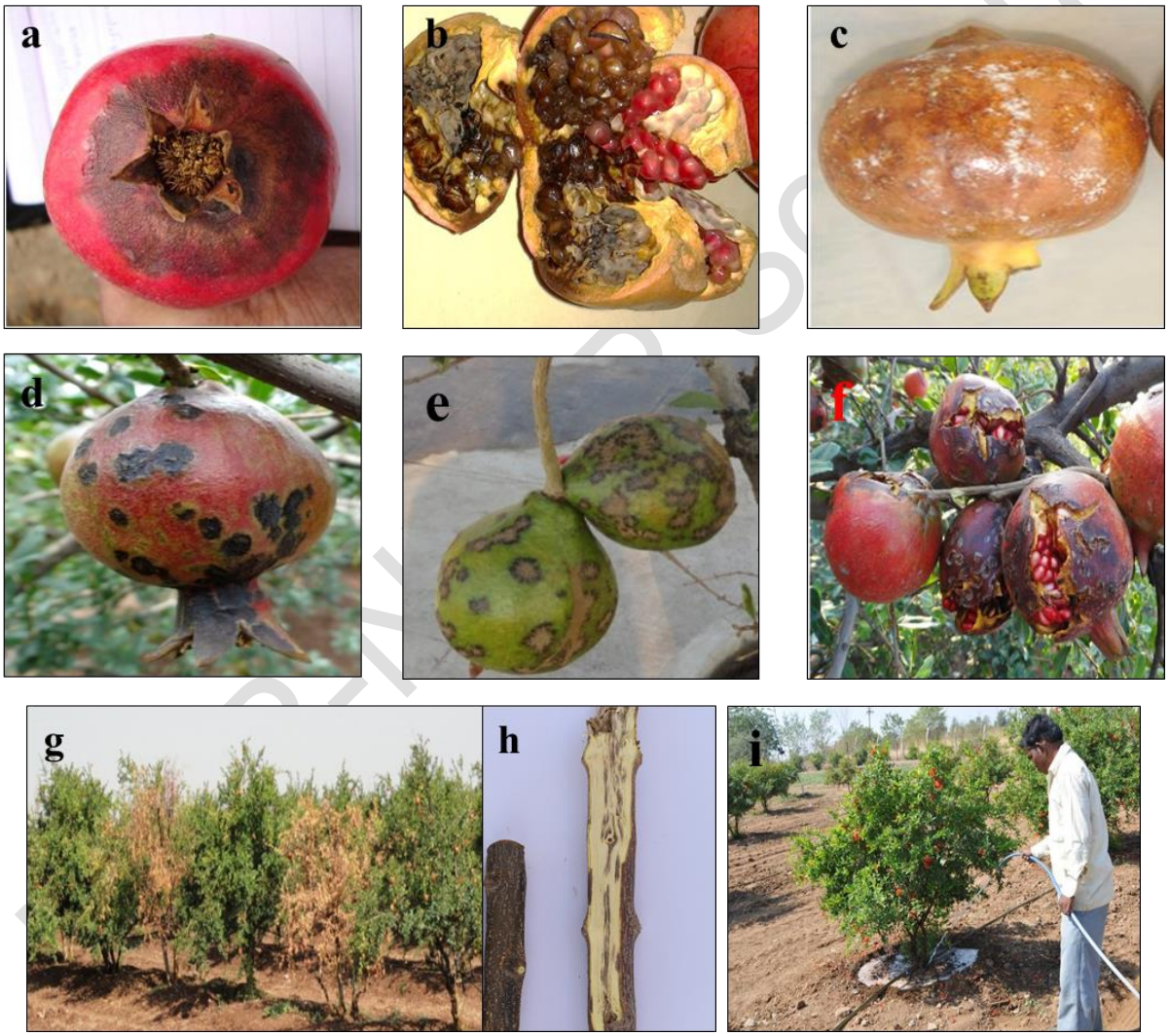
- If the orchard is known to have moderate to very severe root-knot nematode infestation (evident from the presence of galls on the white root of the plant below the dripper.
- The bio control formulations used in Method I, in fungal wilt management also reduces the infestation of root knot nematode. Alternatively other promising bio formulations like *Paecilomyces* spp. **OR** *Pseudomonas* spp. **OR** *Trichoderma* spp. OR *Pochonia chlamydposporia* may be added right from planting every 6 months in order to have sustainable nematode management or as a prophylactic measures. 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 the chemical 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).
- Depending on the severity one or two applications of nematicides will reduce the root knot nematode population below the damage threshold. After these chemical application, above mentioned biological agents should be regularly used for sustainable nematode management.

PLEASE NOTE

The recommendations for N-P_2O_5-K_2O mentioned above are applicable if the leaf test report reveals N-P_2O_5-K_2O concentrations are within the optimum concentration range given below. 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



Economically Important Diseases in Pomegranate a) *Colletotricum* Rot b) *Alternaria* Heart Rot c) *Phytophthora rot* d) Cercospora spots e) *Sphaceloma* Scab f) Bacterial Blight g) Wilt infected plant and Ceratocystis fimbriata symptoms on lower stem i) Correct way of Drenching.

Important Links for details:-

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

1. Adhoc list of chemicals: https://nrcpomegranate.icar.gov.in/files/Advisory/91.pdf
2. Wilt Management: https://nrcpomegranate.icar.gov.in/files/Advisory/86.pdf
3. Nutrient management: https://nrcpomegranate.icar.gov.in/files/Advisory/41.pdf
४. Six steps Bacterial blight management: https://nrcpomegranate.icar.gov.in/files/Advisory/89.pdf