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Region specific technology inventory for pomegranate cultivation in Maharashtra

Compiled & Submitted by

RK Pal, Ashis Maity, RA Marathe, DT Meshram, NV Singh, Jyotsana Sharma & NN Gaikwad

ICAR-NRCP, NH-65, Solapur-Pune Highway

Kegaon, Solapur-413255

Indian Council on Agricultural Research
National Research Centre on Pomegranate
NH-65, Solapur-Pune Highway, Keagon, Solapur
Maharashtra - 413 255

e-Published by : **Dr. R.K. Pal,**
Director,
ICAR-National Research Centre on Pomegranate,
P.O. Kegaon, Solapur (Maharashtra) 413 255

Contributors : **RK Pal, Ashis Maity, RA Marathe, DT Meshram, NV Singh, Jyotsana Sharma & NN Gaikwad**

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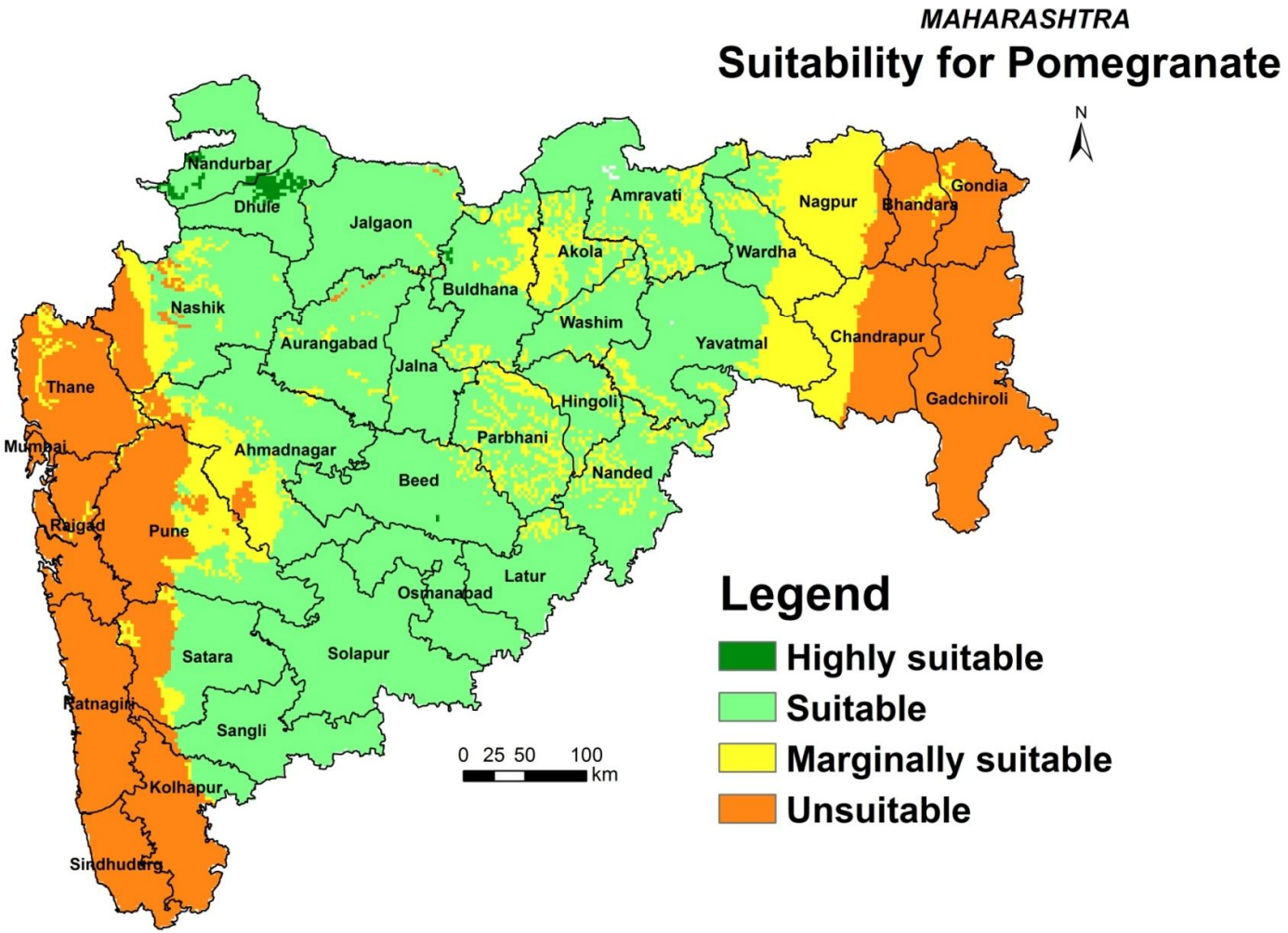
Website : http//www.nrpomegranate.org

Introduction

The natural resources (soil, climate and water) have profound influence on the cropping pattern and crop productivity in different regions. The lands for agriculture are under the threat owing to multi-sectoral demand, soil degradation and conversion of good fertile land for civilian and other infrastructural development. There is remote possibility of horizontal expansion of agricultural land in the country. It has been observed that the per capita land availability decreased from 0.48 ha in 1951 to 0.26 ha in 1981 and has further decreased to 0.14 ha during 2000. So, it is therefore imperative that the land resources should be interpreted in terms of their suitability for a particular agricultural uses with a view to maximise the production of crop.

Pomegranate (*Punica granatum* L.), an economically important fruit plant species belong to the family Lytheraceae. The plant is drought tolerant, winter hardy and can thrive well under desert condition. It is a good source of protein, carbohydrate, minerals, antioxidants, vitamins A, B and C, also been used in controlling diarrhoea, hyperacidity, tuberculosis, leprosy, abdominal pain and fever. Pomegranate juice contains antioxidants such as soluble polyphenols, tannins, anthocyanins and may have antiatherosclerotic properties and can be used in the treatment of cancer and chronic inflammation. Because of its medicinal properties and high return of investment, the area under pomegranate cultivation is growing at rapid pace. Pomegranate requires specific soil site condition for its optimum growth. So, identifying the area for pomegranate cultivation is prerequisite for optimizing land use and maximizing return. Suitable areas in Maharashtra for pomegranate cultivation have been identified on the basis of rainfall, soil depth, slope of land, erosion, soil textural class, drainage condition, soil pH, electrical conductivity and surface stoniness etc. Soil suitability map for pomegranate cultivation has been prepared in the GIS environment Technological interventions have been suggested district-wise in order to get higher productivity of pomegranate.


MAHARASHTRA
Suitability for Pomegranate
N
Nandurbar
Dhule
Jalgaon
Amravati
Akola
Buldhana
Washim
Nagpur
Wardha
Gondia
Bhandara
Chandrapur
Yavatmal
Gadchiroli
Nashik
Aurangabad
Jalna
Hingoli
Parbhani
Nanded
Thane
Mumbai
Ahmadnagar
Beed
Raigad
Pune
Latur
Osmanabad
Satara
Solapur
Ratnagiri
Sangli
Kolhapur
Sindhudurg
0 25 50 100
km
Legend
Highly suitable
Suitable
Marginally suitable
Unsuitable

Ahmednagar district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability for pomegranate
Ghoshpuri Tahsil:Ahmednagar	550	28	Gentle slope (3-8 %)	Moderate	Clay	Well drained, slow permeability	8.0	0.20	3-5%	Ahmednagar, Koporgaon, Rahata, Srirampur, Rahuri, Pathondi, Karjat, Jamkhed area are suitable for pomegranate cultivation
Bhoirepathar Tahsil:Ahmednagar	624	60	Very gentle slope (1-3%)	Moderate	Clay	Well drained, slow permeability	8.3	0.50	5-8%	
Ghospuri Tahsil:Ahmednagar	550	5	Moderately steeply sloping (15-30%)	Severe	Clay	Well drained, moderately slow permeability	7.2	<0.20	60-70%	
Kolyachiwadi Tahsil:Rahuri	550	105	Very gently sloping (1-3%)	Very slight	Sandy clay loam	Moderately well drained, moderate permeability	8.1	0.30	15-20%	
Nimbhore Tahsil:Rahuri	550	42.0	Very gentle slope (1-3%)	Moderate	Sandy clay loam	Well drained, moderate permeability	8.3	0.3	3- 5%	
Nandgaon Tahsil:Karjat	550	17.0	Gentle Slope (3-8 %)	Moderate	Clay	Somewhat excessive, slow permeability	8.1	0.2	10 %	

Jhikri Tahsil:Jamkhed	550	47.0	Gentle slope (3-8 %)	Moderate	Clay	Well drained, slow permeability	7.3	0.3	3-5 %	
Virgaon Tahsil:Akola	550	14	Gentle slope (3-8 %)	Severe	Sandy loam	Somewhat excessive, moderately rapid permeability	8.0	<0.25	25-30%	Shrigonda, Akole and Sangamner area are marginally suitable for pomegranate cultivation
Deothan Tahsil: Akole	550	150	Gentle Slope (3-8 %)	Moderate	Sandy loam	Well drained, very rapid permeability	8.4	0.25	20-25%	

Suggested technological interventions

- In high slope areas, plantation should be carried out across the slope and sod culturing may be promoted.
- Planting should be carried out on raised bed system having 4 feet width and 1.0-1.5 feet height.
- Rhizospheric soil pH may be reclaimed using elemental sulphur @ 20-30 g per plant depending upon the soil pH in calcareous soil. In non-calcareous soil with high pH, gypsum @ 25 % gypsum requirement along with 15 kg/plant well decomposed sugarcane press mud may be used.
- In clay soil biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation.
- *Mrig bahar* should preferred in areas having no assured irrigation facilities however, if assured irrigation facility is available then based on market demand *bahar* should be decided.
- A stress period of 1-2 months will be sufficient to induce optimum flowering.

Akola district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability for pomegranate
Chandhani Tahsil:Mangrulpir	840	30	Very gentle slope (1-3%)	Moderate	Clay	Well drained, slow permeability	7.5	<0.20	7%	Barshitakali and Akot area are suitable for pomegranate cultivation Telhana, Balapur, Patura, Murtizapur area are marginally suitable for pomegranate cultivation

Suggested technological interventions

- Planting should be carried out on raised bed system having 4 feet width and 1.5-2.0 feet height.

- *Mrig bahar* should preferred in areas having no assured irrigation facilities however, if assured irrigation facility is available then based on market demand *bahar* should be decided.
- A stress period of 2-3 months will be required to induce optimum flowering. Mrig*bahar* may be preferred, however, in mrig*bahar* there may be chances of flower drop due to heavy rainfall which can be overcome by two sprays of NAA @ 10 ppm (Planofix® @ 22.5 ml per 100 L of water) at 15 days interval at flower bud initiation stage.
- In soils having slow permeability sub surface tile drain may be laid out with protected water ways in order to remove excess water from the root zone of pomegranate plants.
- Biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.

Aurangabad district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability for pomegranate
Satana Tahsil:Vaijapur	750	49	Very gentle slope (1-3%)	Moderate	Clay	Well drained, very slow permeability	7.6	<0.20	8-10%	Soygaon, Aurangabad, Sillod, Phulambri, Khultabad, Vaijapur, Paithan area are suitable for pomegranate cultivation

										Eastern part of Khultabad, southern part of Aurangabad, part of Gangapur area are marginally suitable for pomegranate cultivation Some part of Kannad is unsuitable for pomegranate cultivation

Suggested technological interventions

- Planting should be carried out on raised bed system having 4 feet width and 1.5-2.0 feet height.
- *Mrigbahar*should preferred in areas having no assured irrigation facilities however, if assured irrigation facility is available then based on market demand *bahar* should be decided.
- A stress period of 2-3 months will be required to induce optimum flowering. Mrig*bahar* may be preferred, however, in mrig*bahar* there may be chances of flower drop due to heavy rainfall which can be overcome by two sprays of NAA @ 10 ppm (Planofix® @ 22.5 ml per 100 L of water) at 15 days interval at flower bud initiation stage.
- In soils having slow permeability sub surface tile drain may be laid out with protected water ways in order to remove excess water from the root zone of pomegranate plants.

- Biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.

Beed district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability for pomegranate
Dhondrai Tahsil:Gevarai	750	160	Very gentle slope (1-3%)	Moderate	Clay	Moderately well drained, very slow permeability	8.6	<0.20	3-5%	Except some parts of Majalgaon, all area are suitable for pomegranate cultivation
Beed Tahsil:Beed	700	34	Moderate slope (8-15 %)	Moderate	Clay	Well drained, slow permeability	8.3	0.20	10-15%	
Wagha Tahsil:Kaij	700	150	Gently sloping (1-3%)	Moderate	Clay	Moderately well drained, very slow permeability	8.0	0.40	5-8%	

Suggested technological interventions

- Planting should be carried out on raised bed system having 4 feet width and 1.5-2.0 feet height.
- In high slope areas, plantation should be carried out across the slope and sod culturing may be promoted
- In soils having slow permeability sub surface tile drain may be laid out with protected water ways in order to remove excess water from the root zone of pomegranate plants.

- *Mrigbahar*should preferred in areas having no assured irrigation facilities however, if assured irrigation facility is available then based on market demand *bahar* should be decided.
- A stress period of 2-3 months will be required to induce optimum flowering. Mrig*bahar* may be preferred, however, in mrig*bahar* there may be chances of flower drop due to heavy rainfall which can be overcome by two sprays of NAA @ 10 ppm (Planofix® @ 22.5 ml per 100 L of water) at 15 days interval at flower bud initiation stage.
- Biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.
- Additional application of well decomposed farm yard manure (FYM) @20 -50 kg as per the age of the pomegranate plant.
- Rhizospheric soil pH may be reclaimed using elemental sulphur @ 20-30 g per plant depending upon the soil pH in calcareous soil. In non-calareous soil with high pH, gypsum @ 25 % gypsum requirement along with 15 kg/plant well decomposed sugarcane press mud may be used.

Bhandara district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability for pomegranate
Palandur Tahsil:Deori	1400	5.8	Gently sloping (3-8%)	Moderate	Sandy loam	Well drained, moderate permeability	5.8	0.07	3%	Only Mohadi and Tumsar area are marginally suitable for pomegranate cultivation

Suggested technological interventions

- Planting should be done on raised bed with soil collected from in-between row space and transported soil. Addition of Sugar factory distillery spent wash can help in mineralization of organic material as well as the nutrient present in spent wash will increase the amount of plant nutrients in the soil.
- Areas with low soil pH should be reclaimed with lime @ 25% of the lime requirement analysed through soil testing along with 40-60 FYM/plant or biochar and thoroughly mixed with rhizospheric soil.
- A stress period of 1 month will be sufficient to induce optimum flowering.

Chandrapur district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability for pomegranate
Phutki Tahsil:Sindewahi	1420	131	Very gentle slope (1-3%)	Moderate	Clay loam	Well drained, slow permeability	7.40	<0.20	1%	Unsuitable for pomegranate cultivation Only small part of Chimur, Varoda, Bhadrawati, chandrapur, Korpana, Rajura area are marginally suitable for pomegranate cultivation
Khatera Tahsil: Sindewahi	1420	130	Very gentle slope (1-3%)	Moderate	Clay	Moderately well drained, very slow permeability	7.4	<0.20	1-2%	
Bamhni Tahsil: Sindewahi	1420	140	Very gentle slope (1-3%)	Moderate	Clay loam	Well drained, very slow permeability	5.9	<0.20	10-12%	
Nandgaon Tahsil:Gondpipri	1420	40	Very gentle slope (1-3%)	Moderate	Sandy clay loam	Well drained, moderate permeability	7.2	<0.20	10%	

Dhule district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability
Bodla Tahsil:Dhudgaon	1476	7	Gently sloping (3-8%)	Severe	Sandy clay loam	Excessively drained, moderate permeability	6.5	<0.20	9%	All area are suitable for pomegranate cultivation
Mulgi Tahsil:Akkalkuwa	670	15	Steeply sloping (30-50%)	Severe	Clay loam	Excessively drained, moderately slow permeability	6.5	<0.30	10%	
Chimanipada Tahsil:Navapur	674	55.0	Very gentle slope (1-3%)	Very slight	Clay	Well drained, slow permeability	6.9	Less than 0.2	2-3 %	
Kolada Tahsil:Navapur	674	36.0	Very gentle slope (1-3%)	Moderate	Clay	Moderately Well drained, moderate permeability	6.9	Less than 0.2	10 %	

Suggested technological interventions

- Planting should be done on raised bed with soil collected from in-between row space and transported soil. Addition of Sugar factory distillery spent wash can help in mineralization of organic material as well as the nutrient present in spent wash will increase the amount of plant nutrients in the soil.
- In light textured soil a stress period of 1 month will be sufficient to induce optimum flowering however in heavy soil stress period of 2-3 months will be required to induce optimum flowering.

- Biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.

Gadchiroli district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability for pomegranate
Andhali Tahsil:Kurkheda	1550	145	Very gentle slope (1-3%)	Very slow	Clay	Moderately well drained, slow permeability	7.20	0.25	-	Unsuitable for pomegranate cultivation
Nalikasa Tahsil:Kurkheda	1550	145	Gently sloping (3-8%)	Moderate and excessive	Sandy clay loam	Well drained, slow permeability	6.1	<0.20	5%	
Pediguradom RF Tahsil:Ahiri	1550	125	Gently sloping (3-8%)	Moderate	Loam	Well drained, moderate permeability	5.9	0.08	5%	
Elgartola Tahsil:Ahiri	1550	12	Gently sloping (3-8%)	Severe & excessive	Clay loam	Somewhat excessively drained, moderate permeability	6.0	0.13	5%	
Kasansur Tahsil:Etapalli	1550	57	Very gentle slope (1-	Moderate	Clay loam	Moderately well drained,	5.70	<0.20	5%	

			3%)			slow permeability				
Tekala Tahsil:Etapalli	1550	135	Very gentle slope (1-3%)	Moderate	Loam	Well drained, moderate permeability	5.80	<0.20	5%	

Kolhapur district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability
Kondvan Tahsil:Shahuwadi	1900	98	Gently sloping (3-8%)	Moderate	Clay	Well drained, moderate permeability	5.6	0.14	5-8%	Shahuwadi, Radhanagar, Gargoti, Ajra, Chandgad, Gaganbawada area are unsuitable for pomegranate cultivation. Small parts of Panhala, Kolhapur, Hatkalangane, Shirol and Kagal area are suitable for
Shiwre Tahsil:Shahuwadi	710	165	Very gently sloping (1-3%)	Slight	Clay	Moderately well drained, slow permeability	7.7	0.40	5%	
Golevane Tahsil:Sahuwadi	1904	100.0	Moderately sloped (8-15%)	Moderate	Sandy clay loam	Well drained, moderate permeability	5.5	Less than 0.2	5 %	
Manjra Tahsil:Sahuwadi	1904	40.0	Moderately sloped (8-15%)	Severe	Clay loam	Well drained, moderate permeability	5.9	Less than 0.2	10 %	
Ambarde	1904	125.0	Moderately	severe	Clay	Well	5.6	Less	5%	

Tahsil:Ajra			steeply sloped (30-50 %)			drained, moderate permeability		than 0.2		pomegranate cultivation
Parpoli Tahsil:Ajra	1904	80.0	Gentle slope (3-8 %)	Moderate	Clay	Well drained, slow permeability	5.7	Less than 0.2	5 %	
Ramghat Tahsil: Chandgad	1904	9.0	Moderately steeply sloped (15-30 %)	Severe	Clay loam	Somewhat excessively drained, moderate permeability	5.3	Less than 0.2	10 %	
Wadkudi Tahsil:Chandgad	1904	135.0	Gentle slope (3-8 %)	Moderate	Clay loam	Well drained, moderately slow permeability	5.5	0.15	5 %	
Balkawadi Tahsil:Gargoti	1904	95.0	Moderately steeply sloped (15-30 %)	Severe	Clay	Somewhat excessive, moderate permeability	5.4	Less than 0.2	15 %	
Bumne Tahsil:Gargoti	1904	160.0	Gentle slope (3-8 %)	Very slight erosion	Clay	Well drained, very slow permeability	7.1	Less than 0.2	5 %	
Kodekhurd Tahsil:Gaganbavda	1904	27.0	Moderately steeply sloped (15-30 %)	Severe	Clay loam	Well drained, moderate permeability	5.3	Less than 0.2	40 %	

Suggested technological interventions

- Planting should be carried out on raised bed system having 4 feet width and 1.5-2.0 feet height.
- Biogaents like *Trichderma viride* and *T. harzianum, Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.
- Areas with low soil pH should be reclaimed with lime @ 25% of the lime requirement analyzed through soil testing along with 40-60 FYM/plant or biochar and thoroughly mixed with rhizospheric soil.
- A stress period of 2-3 months will be required to induce optimum flowering. Mrig*bahar* may be preferred, however, in mrig*bahar* there may be chances of flower drop due to heavy rainfall which can be overcome by two sprays of NAA @ 10 ppm (Planofix® @ 22.5 ml per 100 L of water) at 15 days interval at flower bud initiation stage.

Latur district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability
Karkata Tahsil:Ausa	880	43.0	Very gentle slope (1-3%)	Moderate	Clay	Moderately Well drained, slow permeability	6.9	Less than 0.2	2-5 %	All area are suitable for pomegranate cultivation
LamanTanda Tahsil:Ahmadpur	880	18.0	Gentle slope (3-8 %)	Moderate	Clay loam	Well drained, moderate permeability	7.2	Less than 0.2	5-10 %	
Ambulga Tahsil:Ahmadpur	880	42.0	Very gentle slope (1-	Moderate	Clay	Well drained, slow	7.0	0.4	2-5 %	

			3%)			permeability				
Bamni Tahsil:Latur	880	150.0	Very gentle slope (1-3%)	Moderate	Clay	Moderately Well drained, slow permeability	7.6	0.2	2-5 %	

Suggested technological interventions

- Planting should be carried out on raised bed system having 4 feet width and 1.5-2.0 feet height.
- A stress period of 2-3 months will be required to induce optimum flowering. *Mrig bahar* may be preferred, however, in *mrig bahar* there may be chances of flower drop due to heavy rainfall which can be overcome by two sprays of NAA @ 10 ppm (Planofix® @ 22.5 ml per 100 L of water) at 15 days interval at flower bud initiation stage.
- *Mrig bahar* should preferred in areas having no assured irrigation facilities however, if assured irrigation facility is available then based on market demand *bahar* should be decided.
- In soils having slow permeability sub surface tile drain may be laid out with protected water ways in order to remove excess water from the root zone of pomegranate plants.

Nagpur district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability for pomegranate
Bahadura Tahsil:Nagpur	1160	70	Very gentle slope (1-3%)	Moderate	Clay	Well drained, slow permeability	7.8	<0.2	3-5%	Savner, Kalmeshwar, Hingna, Parshiwani, Kamthi, Ramtek area are marginally suitable for
Bhugaon Tahsil:Nagpur	1160	125	Very gentle slope (1-3%)	Moderate	Clay	Moderately well drained, very slow permeability	7.9	<0.20	1-3%	

Palora Tahsil:Ramtek	1160	100	Very gentle slope (1-3%)	Moderate	Sandy clay loam	Well drained, moderate permeability	8.0	<0.20	1-2%	pomegranate cultivation
Hatodi Tahsil:Ramtek	1160	26	Very gentle slope (1-3%)	Moderate	Sandy clay loam	Well drained, moderate permeability	7.0	0.30	5-8%	
Abola Tahsil:Ramtek	1160	80	Gently sloping (3-8%)	Moderate	Sandy clay loam	Moderately well drained, moderately slow permeability	6.5	<0.20	1-5%	
Bhiwkund Tahsil: Kuhi	1160	9	Moderately steeply sloping	Very severe & excessive	Sandy loam	Excessively drained, rapid permeability	5.80	0.60	30-40%	Unsuitable for pomegranate cultivation
Sawarkhanda Tahsil:Kuhi	1160	75	Gently sloping (3-8%)	Moderate	Clay	Well drained, slow permeability	6.8	<0.20	15-20%	
Takali Tahsil:Kuhi	1160	125	Very gentle slope (1-3%)	Very slow erosion	Clay	Moderately well drained, very slow permeability	8.0	<0.20	2-3%	
Sitagondi RF Tahsil:Parseoni	1160	75	Gently sloping (3-8%)	Moderate	Sandy loam	Well drained, rapid permeability	6.5	<0.20	-	
Kinhala	1160	145	Very gentle	Moderate	Clay	Well	8.5	0.25	1%	

Tahsil:Umrer			slope (1-3%)			drained, very slow permeability				
Manori Tahsil:Umrer	1660	28	Very gentle slope (1-3%)	Moderate	Clay loam	Well drained, moderately slow permeability	8.0	0.25	1%	
Umrer Tahsil:Umrer	1160	150	Very gentle slope (1-3%)	Moderate	Clay	Well drained, very slow permeability	7.9	0.25	5%	
Mendki Tahsil:Katol	1420	125	Very gentle slope (1-3%)	Moderate	Clay	Well drained, very slow	8.4	<0.20	1-3%	Narkhed and Katol area are suitable for pomegranate cultivation

Suggested technological interventions

- Planting should be carried out on raised bed system having 4 feet width and 1.5-2.0 feet height.
- A stress period of 2-3 months will be required to induce optimum flowering. Mrig*bahar* may be preferred, however, in mrig*bahar* there may be chances of flower drop due to heavy rainfall which can be overcome by two sprays of NAA @ 10 ppm (Planofix® @ 22.5 ml per 100 L of water) at 15 days interval at flower bud initiation stage.
- Biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.
- Rhizospheric soil pH may be reclaimed using elemental sulphur @ 20-30 g per plant depending upon the soil pH in calcareous soil. In non-calareous soil with high pH, gypsum @ 25 % gypsum requirement along with 15 kg/plant well decomposed sugarcane press mud may be used.

- In soils having slow permeability sub surface tile drain may be laid out with protected water ways in order to remove excess water from the root zone of pomegranate plants.

Nanded district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability for pomegranate
Ancholi Tahsil:Biloli	890	12	Moderate slope (8-15 %)	Severe	Clay loam	Somewhat excessive, moderately slow permeability	7.2	Nil	40%	Mahur, Madgaon, part of Himayatnagar, western part of Bhokan, Dhormabad, Biloli, Loha, Kandhar, Mukhed, Deglur area are suitable for pomegranate cultivation
Phulwari Tahsil:Kinwat	890	10	Gently sloping (3-8%)	Moderate	Clay	Well drained, slow permeability	7.6	<0.20	5%	Eastern part of Ardhapur, Nanded, eastern part of Mudkhed &Umbri, part of Himayatnagar, Kinwat area are maginally suitable for pomegranate cultivation.

Suggested technological interventions

- Planting should be done on raised bed with soil collected from in-between row space and transported soil. Addition of Sugar factory distillery spent wash can help in mineralization of organic material as well as the nutrient present in spent wash will increase the amount of plant nutrients in the soil.
- Organic mulch/pervious mulch can help in overcoming evaporation loss of irrigation water.
- Additional application of well decomposed farm yard manure (FYM) @20 -50 kg as per the age of the pomegranate plant
- Biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.
- In soils having slow permeability sub surface tile drain may be laid out with protected water ways in order to remove excess water from the root zone of pomegranate plants.

Nashik district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability
Golakhal Tahsil:Kalvan	1030	14	Gently sloping (3-8%)	Moderate	Clay loam	Well drained, very slow permeability	7.1	<0.20	5-8%	Satana, Malegaon, part of Kalvan, Chanduad, Nandgaon, Niphad, Yewla and Sinnar area suitable for pomegranate cultivation
Jaipur Tahsil:Kalvan	1035	152	Very gently sloping (1-3%)	Moderate	Clay	Moderately well drained, slow permeability	7.7	<0.20	3-5%	
Belbare Tahsil:Kalvan	1035	150	Very gently sloping (1-3%)	Slight	Clay	Moderately well drained, very slow permeability	7.7	<0.20	3-8%	
Pimple Tahsil:Kalvan	1035	13.0	Moderately steeply	Severe	Clay	Somewhat excessively	7.1	Less than 0.2	70 %	

			sloped (15-30 %)			drained, moderately rapid permeability				
Mohbari Tahsil:Kalvan	1035	58.0	Moderately sloped (8-15 %)	Severe	Clay	Well drained, moderate permeability	7.4	Less than 0.2	10-12 %	
Girnar Tahsil:Malegaon	1035	8.0	Moderately sloped (8-15 %)	Very severe	Clay loam	Excessively drained, moderate permeability	7.6	Less than 0.2	20-35 %	
Girnar Tahsil:Malegaon	1035	18.0	Very Gentle slope (1-3 %)	Moderate	Clay loam	Well drained, moderate permeability	8.0	Less than 0.2	10-15 %	
Nandurdi Tahsil:Niphad	1035	30	Very gently sloping (1-3%)	Moderate	Clay	Well drained, slow permeability	7.4	0.20	10-15%	
Devargaon Tahsil: Niphad	1035	8.0	Moderate slope (8-15 %)	Severe	Loam	Excessively drained, rapid permeability	7.5	Less than 0.2	15-18 %	
Gulvanch Tahsil:Sinner	1035	19	Very gently sloping (1-3%)	Moderate	Sandy loam	Well drained, rapid permeability	8.2	0.2	5-8%	
Khaprale Tahsil:Sinnar	1035	13.0	Moderately sloped (8-15 %)	Severe	Clay loam	Excessive drained, rapid permeability	6.8	Less than 0.2	8-10 %	
Sonmbre	1035	18.0	Gentle	Moderate	Loam	Well drained,	7.5	Less	3-5 %	

Tahsil: Sinnar			slope (3-8 %)			moderate permeability		than 0.2		
Nirguda Tahsil:Peint	1035	8.0	Moderately steeply sloped (15-30 %)	Severe	Clay	Somewhat excessive drained, moderate permeability	6.2	0.17	50-60 %	Eastern part of Satana, Deola, Nashik, Surgana, eastern part of Dindori area are marginally suitable for pomegranate cultivation Part of Trimbakeshwar, Igatpuri and part of Kalvan area are unsuitable for pomegranate cultivation
Chinchoda Tahsil:Peint	1035	30.0	Gentle slope (3-8 %)	Severe	Clay	Well drained, slow permeability	6.4	0.22	20-35 %	
RajurBabala Tahsil:Nasik	1035	18	Moderately sloping (8-15%)	Moderate	Sandy clay loam	Well drained, moderate permeability	6.4	<0.20	3-5%	
Borvan RF Tahsil:Dindori	1035	12.0	Moderately steeply sloped (30-50 %)	Severe	Clay	Somewhat excessively drained, moderate permeability	6.2	Less than 0.2	8-10 %	

Suggested technological interventions

- Planting should be carried out on raised bed system having 4 feet width and 1.5-2.0 feet height.
- Biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.
- Bio-fertilizers particularly nitrogen fixer (*Azospirilliumbrasilense*), phosphate and potash solubilizers and *Pseudomonas fluorescens* should be mixed with well decomposed FYM in the ratio of 1:25 and incubated for 15 days with periodical turning(except for AMF which should be applied directly to the plant).

- *Mrig bahar* should preferred in areas having no assured irrigation facilities however, if assured irrigation facility is available then based on market demand *bahar* should be decided.

Parbhani district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability for pomegranate
Wadachiwadi Tahsil: Jintur	840	107	Very gentle slope (1-3%)	Moderate	Clay	Moderately well drained, slow permeability	8.3	0.20	5%	Pathri, Gangakhed, eastern part of Parbhani area are suitable for pomegranate cultivation. Jintur, western part of Parbhani, Purna, Palam, eastern part of Sonpet and part of Manvat area are marginally suitable for pomegranate cultivation.

JamthiBabala Tahsil: Hingoli	840	20	Very gentle slope (1-3%)	Moderate	Clay loam	Well drained, slow permeability	8.1	0.25	4%	

Suggested technological interventions

- Planting should be carried out on raised bed system having 4 feet width and 1.5-2.0 feet height.
- Biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.
- *Mrig bahar* should preferred in areas having no assured irrigation facilities however, if assured irrigation facility is available then based on market demand *bahar* should be decided.
- Rhizospheric soil pH may be reclaimed using elemental sulphur @ 20-30 g per plant depending upon the soil pH in calcareous soil. In non-calareous soil with high pH, gypsum @ 25 % gypsum requirement along with 15 kg/plant well decomposed sugarcane press mud may be used.
- In soils having slow permeability sub surface tile drain may be laid out with protected water ways in order to remove excess water from the root zone of pomegranate plants.

Pune district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability
Penjalwadi Tahsil:Bhor	700	54	Level to nearly level (1-3%)	Moderate	Clay	Moderately well drained to well drained, slow permeability	7.6	0.20	2-5%	Bhor, Velhi, eastern part of Pune, Paud, Vadgaon, eastern part of Khed,
Ambade	700	12	Steeply	Very	Clay	Well	6.7	<0.2	5-10%	

Tahsil:Bhor			sloping (30-50%)	severe	loam	drained, moderate permeability				Ambegaon, Junnar area are unsuitable for pomegranate cultivation
Ranjsni Tahsil:Ambegaon	1150	13.0	Very steeply sloped (>50 %)	Severe	Clay loam	Well drained with rapid permeability	6.3	Less than 0.2	20 -25 %	
Rokdwadi Tahsil:Ambegaon	700	17.0	Gentle slope (3-8 %)	Severe	Clay loam	Well drained with moderate permeability	8.5	Less than 0.2	20 %	
Karlewadi Tahsil:Ambegaon	700	76.0	Very gentle slope (1- 3 %)	Moderate	Clay	Well drained, moderately slow permeability	8.2	3.35	4 %	Part of Saswad, Baramati, Indapur area are suitable for pomegranate cultivation. Daund, northern part of Saswad, Shiron area are marginally suitable for pomegranate cultivation
Khodal Tahsil: Junnar	700	17.0	Gentle slope (3-8 %)	Severe	Clay loam	Somewhat excessive, moderately rapid permeability	8.3	0.25	30-35 %	
	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	
Indalkarwadi Tahsil:Purandar	1150	8.0	Moderately steeply sloped (15-30 %)	Severe	Clay	Somewhat excessive, moderate permeability	7.2	Less than 0.2	70-80 %	

Suggested technological interventions

- Planting should be carried out on raised bed system having 4 feet width and 1.0-1.5 feet height.
- Biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.
- Organic mulch/pervious mulch can help in overcoming evaporation loss of irrigation water
- A stress period of 1-2 month will be sufficient to induce optimum flowering.
- *Mrigbahar*should preferred in areas having no assured irrigation facilities however, if assured irrigation facility is available then based on market demand *bahar* should be decided.
- Organic mulch/pervious mulch can help in overcoming evaporation loss of irrigation water.
- Biofertilizers particularly nitrogen fixer (*Azospirilliumbrasilense*), phosphate and potash solubilizers and *Pseudomonas fluorescens* should be mixed with well decomposed FYM in the ratio of 1:25 and incubated for 15 days with periodical turning(except for AMF which should be applied directly to the plant).

Raigard district										
Name of Place	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability
Ambet Tahsil:Man	1804	70.0	Steeply sloped (30-50 %)	Severe	Clay	Well drained, moderate permeability	5.8	0.4	20 %	Except small part of Pali, all other areas are unsuitable for pomegranate cultivation.
Tamhane Tahsil:Mahad	1804	70.0	Very steeply sloped (more than 50	Very severe	Clay	Well drained, moderate permeability	5.8	0.2	20-30 %	

			%)							
Sakhar Tahsil:Poladpur	1804	90.0	Steeply sloped (15-30 %)	Severe	Clay	Well drained, slow permeability	6.2	0.2	3-5 %	
Bhorghar Tahsil:Mangaon	1804	82.0	Steeply sloped (30-50 %)	Severe	Gravely clay	Well drained, moderate permeability	5.9	0.2	15-20 %	

Sangli district										
	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability
Dhulgaon Tahsil:KavtheMahankal	690	100	Gentle slope (3-8 %)	Moderate	Sandy clay	Well drained, slow permeability	8.3	0.2	10%	All parts are suitable for pomegranate cultivation.
KavtheMahankal Tahsil: KavtheMahankal	700	5	Gentle slope (3-8 %)	Moderate	Sandy loam	Well drained, rapid permeability	7.3	<0.20	10%	
Sulaiwadi Tahsil:Vite	690	12	Moderately sloping (3-8%)	Moderate	Clay	Somewhat excessive, moderately slow permeability	7.5	<0.20	30%	
Kurli Tahsil:Vite	685	100	Very gentle	Moderate	Clay	Moderately well	8.5	0.35	15%	

			slope (1-3%)			drained, very slow permeability				
Ambawadi Tahsil:Shirala	690	15.0	Moderate slope (8-15 %)	Severe	Clay loam	Well drained, moderate permeability	7.4	0.25	5 %	
Kameri Tahsil:Valva	690	105.0	Very gentle slope (1-3%)	Moderate	Clay	Moderately well drained, very slow permeability	8.0	0.25	5 %	

Suggested technological interventions

- In shallow soil depth, planting should be done on raised bed with soil collected from in-between row space and transported soil. Addition of Sugar factory distillery spent wash can help in mineralization of organic material as well as the nutrient present in spent wash will increase the amount of plant nutrients in the soil.
- In deep clay soil, planting should be carried out on raised bed system having 4 feet width and 1.5-2.0 feet height.
- Biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.
- A stress period of 1 month will be sufficient to induce optimum flowering however, in deep clay soil 2-3 month stress period is required to induce good flowering. *Mrigbahar*should preferred in areas having no assured irrigation facilities however, if assured irrigation facility is available then based on market demand *bahar* should be decided.
- Biofertilizers particularly nitrogen fixer (*Azospirilliumbrasilense*), phosphate and potash solubilizers and *Pseudomonas fluorescens* should be mixed with well decomposed FYM in the ratio of 1:25 and incubated for 15 days with periodical turning(except for AMF which should be applied directly to the plant).

Satara district										
	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	
Wathar Tahsil:Koregaon	710	150	Level to nearly level (0-1%)	Very slow	Clay	Well drained, slow permeability	8.0	0.50	<3%	Phaltan, Koregaon, Karad, Waduj, Dahiwadi areas are suitable for pomegranate cultivation.
Targaon Tahsil:Koregaon	710	165	Very gentle slope (1-3%)	Moderate	Clay	Imperfectly drained, very slow permeability	8.1	0.30	2-3%	
Sonawadi Tahsil:Phaltan	710	86	Level to nearly level (0-1%)	Very slight	Clay	Well drained, very rapid permeability	8.0	0.35	2-5%	
Dudhebari Tahsil:Phaltan	700	20	Level to nearly level (0-1%)	Very slight	Clay loam	Well drained, moderately slow permeability	7.2	0.40	15%	
Barsewadi Tahsil:Wai	710	12.0	Very steep sloped (>50 %)	Very severe	Clay	Well drained with moderate permeability	7.1	0.4	5-8 %	Patan, eastern part of Satara, Medha, eastern part of Wai area are unsuitable for
Davri Tahsil:Patan	710	28	Gentle slope (3-8 %)	Moderate	Clay	Well drained, moderate permeability	6.6	<0.20	20%	

										pomegranate cultivation

Suggested technological interventions

- Planting should be carried out on raised bed system having 4 feet width and 1.5-2.0 feet height.
- Biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.
- Additional application of well decomposed farm yard manure (FYM) @20 -50 kg as per the age of the pomegranate plant.
- A stress period of 2-3 months will be required to induce optimum flowering. Mrig *bahar* may be preferred, however, in mrig*bahar* there may be chances of flower drop due to heavy rainfall which can be overcome by two sprays of NAA @ 10 ppm (Planofix® @ 22.5 ml per 100 L of water) at 15 days interval at flower bud initiation stage.
- In soils having slow permeability sub surface tile drain may be laid out with protected water ways in order to remove excess water from the root zone of pomegranate plants.
- Rhizospheric soil pH may be reclaimed using elemental sulphur @ 20-30 g per plant depending upon the soil pH in calcareous soil. In non-calcareous soil with high pH, gypsum @ 25 % gypsum requirement along with 15 kg/plant well decomposed sugarcane press mud may be used.

Solapur district										
	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability
Masala Tahsil:North Solapur	580	59	Very gentle slope (1-3%)	Moderate	Clay	Moderately well drained, slow permeability	8.4	0.17	10%	All the area are suitable for pomegranate cultivation.

Bandhalwadi Tahsil:Malsiras	580	35	Very gentle slope (1-3%)	Moderate	Clay	Moderately well drained, slow permeability	8.0	0.20	8%	
Purandarwada Tahsil:Malsiras	580	78	Very gentle slope (1-3%)	Moderate	Clay	Moderately Well drained, slow permeability	8.3	0.30	12%	
Bhalvani Tahsil:Malsiras	584	18	Very gentle slope (1-3%)	Moderate	Clay	Well drained, slow permeability	8.0	<0.2	15%	
Kumbhoj Tahsil:Karmala	584	18	Very gentle slope (1-3%)	Moderate	Clay	Well drained, slow permeability	7.5	0.20	5-10%	
Nizampur Tahsil:Sangola	584	5	Gentle slope (3-8 %)	Severe	Loam	Somewhat excessive, moderate permeability	8.5	<0.20	3%	
Patharwadi Tahsil:Atpadi	580	7	Moderately sloping (8-15%)	Severe	Clay	Somewhat excessive, moderately slow permeability	7.6	0.30	15%	
Sarole, Tahsil:Mohol	584	8.0	Very gentle slope (1-3%)	Moderate	Loam	Well drained, moderate permeability	7.7	Less than 0.2	10 %	
Karvali	584	22.0	Gentle	Moderate	Clay	Well	8.3	0.25	35 %	

Tahsil:Mohol			slope (3-8 %)			drained, moderate permeability				

Suggested technological interventions

- Planting should be done on raised bed with soil collected from in-between row space and transported soil. Addition of Sugar factory distillery spent wash can help in mineralization of organic material as well as the nutrient present in spent wash will increase the amount of plant nutrients in the soil.
- Biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.
- Organic mulch/pervious mulch can help in overcoming evaporation loss of irrigation water or sub surface drip irrigation system may be installed for water economy.

Thane district										
	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability
Bhurapada Tahsil:Palghar	2477	50	Gentle slope (1-3 %)	Moderate	Clay	Poorly drained, slow permeability	6.9	6.5	2-3 %	Palghar, Jawahar, Vikramgadh, Vada, Bhivandi, Borivali, Thane, Kalyan, Vihasnagar,
Virthane Tahsil:Palghar	2477	85.0	Gentle (3-8 %)	Moderate	Clay	Moderately well drained, moderately slow	7.9	0.38	1-2 %	

						permeability				Murbad, Ambornath areas are unsuitable for pomegranate cultivation.
Dahisar Tahsil:Palghar	2477	13.0	Gentle (3-8 %)	Moderate	Clay	Moderately well drained, moderate permeability	6.5	0.52	20-25 %	
Haloli Tahsil:Palghar	2477	76.0	Gentle slope (3-8 %)	Moderate	Clay	Moderately well drained, slow permeability	6.9	0.2	5-8 %	
Nane Tahsil:Wada	2477	56.0	Gentle (3-8 %)	Moderate	Clay	Well drained, slow permeability	7.3	Less than 0.2	8-10 %	
Manivili Tahsil:Murbad	2477	33.0	Moderately sloped (8-15%)	severe	Clay Loam	Well drained and moderately permeable	6.3	Less than 0.2	5 %	
Mhakoshi Tahsil:Jawahar	2470	16.0	Moderately sloped (8-15%)	Severe	Clay	Excessively drained, moderate permeability	5.9	Less than 0.2	8-10 %	
Gunde Tahsil:Shahapur	2588	23.0	Gentle slope (1-3 %)	Moderate	Gravely clay loam	Moderately well drained, moderate permeability	6.3	Less than 0.2	15 %	
Talasari, north-eastern part of Vikramgardh and small parts of Mokhada areas are marginally suitable for pomegranate cultivation.										

Suggested technological interventions

- Planting should be carried out on raised bed system having 4 feet width and 1.5-2.0 feet height.
- In soils having slow permeability sub surface tile drain may be laid out with protected water ways in order to remove excess water from the root zone of pomegranate plants.
- Biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.
- Areas with low soil pH should be reclaimed with lime @ 25% of the lime requirement analyzed through soil testing along with 40-60 kg FYM/plant or biochar and thoroughly mixed with rhizospheric soil.
- A stress period of 2-3 months will be required to induce optimum flowering. Mrig*bahar* may be preferred, however, in *mrig bahar* there may be chances of flower drop due to heavy rainfall which can be overcome by two sprays of NAA @ 10 ppm (Planofix® @ 22.5 ml per 100 L of water) at 15 days interval at flower bud initiation stage.
- *Mrig bahar* should preferred in areas having no assured irrigation facilities however, if assured irrigation facility is available then based on market demand, *bahar* should be decided.

Wardha district										
	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability for pomegranate
Sewagram Tahsil:Wardha	1080	8	Gently sloping (3-8%)	Severe	Clay loam	Well drained, moderately slow permeability	7.7	0.30	8-10%	Aani, Selu, Wardha, Deoli area are suitable for pomegranate cultivation
Sewagram Tahsil:Wardha	1090	150	Very gentle slope (1-	Moderate	Clay	Moderately well drained,	8.2	0.17	8-10%	

			3%)			slow permeability				
Sirpur Tahsil:Deoli	1090	125	Gently sloping (3-8%)	Moderate	Clay	Moderately well drained, slow permeability	8.5	0.30	5-10%	
Talegaon Tahsil:Karanja	1080	28	Very gentle slope (1-3%)	Severe	Clay	Well drained, slow permeability	7.9	<0.20	2-3%	Karanja, Ashti, Samudrapur, Hinganghat area are marginally suitable for pomegranate cultivation.
Garpit Tahsil:Karanja	1090	18	Moderately sloping (8-15%)	Severe	Loam	Well drained	7.5	<0.30	30-40%	

Suggested technological interventions

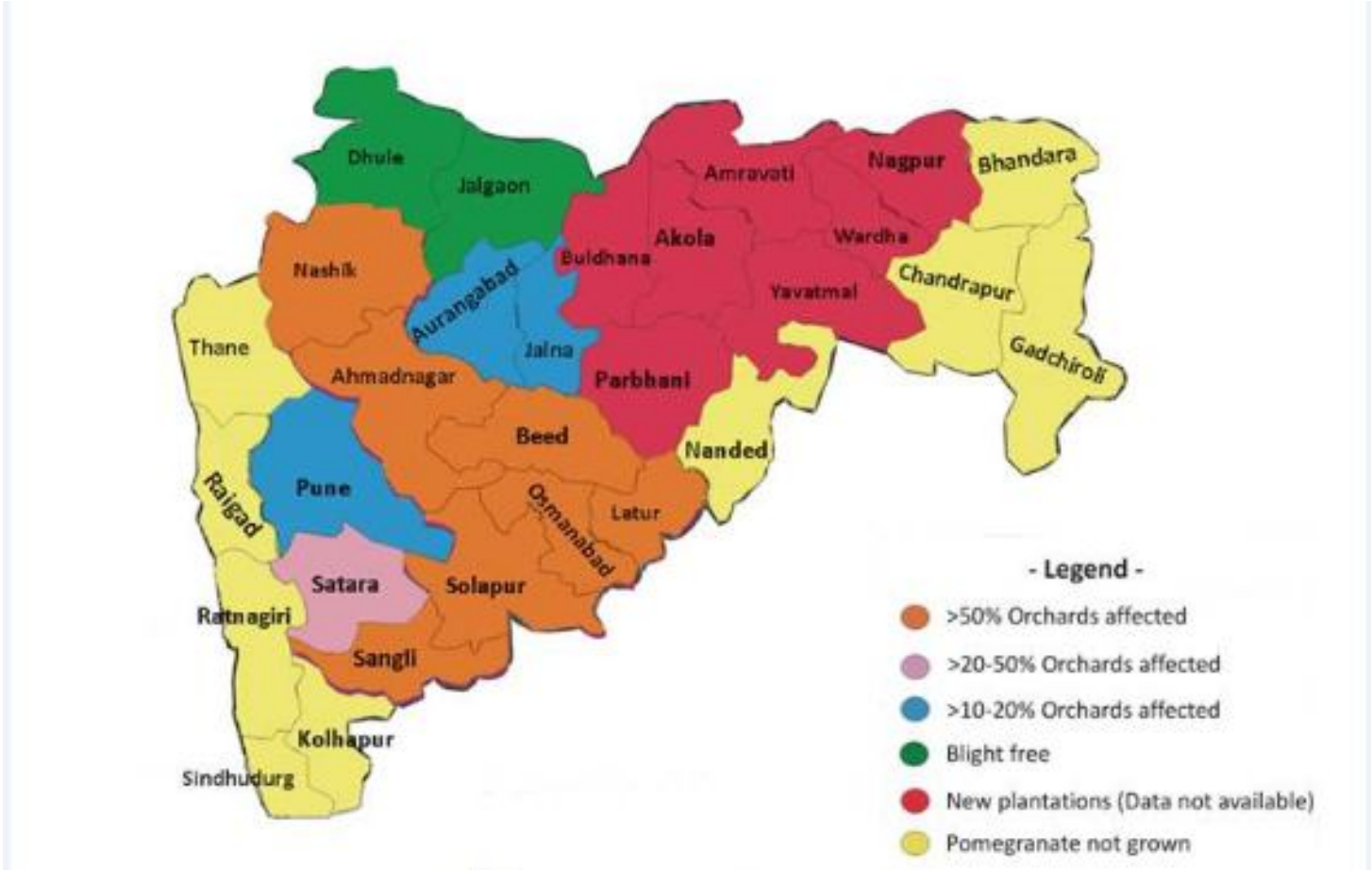
- Planting should be carried out on raised bed system having 4 feet width and 1.5-2.0 feet height.
- In soils having slow permeability sub surface tile drain may be laid out with protected water ways in order to remove excess water from the root zone of pomegranate plants.
- Biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.
- Rhizospheric soil pH may be reclaimed using elemental sulphur @ 20-30 g per plant depending upon the soil pH in calcareous soil. In non-calcareous soil with high pH, gypsum @ 25 % gypsum requirement along with 15 kg/plant well decomposed sugarcane press mud may be used.
- A stress period of 2-3 months will be required to induce optimum flowering. Mrig *bahar* may be preferred, however, in *mrig bahar* there may be chances of flower drop due to heavy rainfall which can be overcome by two sprays of NAA @ 10 ppm (Planofix® @ 22.5 ml per 100 L of water) at 15 days interval at flower bud initiation stage.

- *Mrig bahar* should preferred in areas having no assured irrigation facilities however, if assured irrigation facility is available then based on market demand, *bahar* should be decided.

Yeotmal district										
	Rainfall (mm)	Soil Depth (cm)	Slope (%)	Erosion	Textural Class	Drainage	pH	EC (dS/m)	Surface stoniness (coarse fragment in %)	Remark regarding suitability for pomegranate
Umri Tahsil:Yeotmal	990	65	Very gentle slope (1-3%)	Moderate	Clay	Moderately well drained, slow permeability	8.3	0.20	5%	Babholgaon, Ner, Kalamb, Ralegaon, Ghatanji, Aarni, Darvha, Digros, part of Pusad, part of Mahagaon, Umorkhed area are suitable for pomegranate cultivation. Maregaon, Wani, part of Pandharkavda, part of Pusad and part of Mahagaon area are marginally suitable for pomegranate cultivation.
Wanjri Tahsil:Kelapur	990	56	Very gentle slope (1-3%)	Moderate	Clay	Moderately well drained, slow permeability	8.0	0.20	10%	
Koregaon Tahsil:Wani	990	27	Gently sloping (3-8%)	Moderate	Clay	Moderately well drained, slow permeability	8.1	<0.20	5%	

Suggested technological interventions

- Planting should be carried out on raised bed system having 4 feet width and 1.5-2.0 feet height.
- Biogaents like *Trichderma viride* and *T. harzianum*, *Aspergillus niger* strain AN27, Arbuscular mycorrhizal fungi, *Pseudomonas fluorescens*. They should be mixed with well decomposed FYM in the ratio of 1:500 and incubated for 15 days with periodical turning (except for AMF which should be applied directly to the plant) and applied to the planting pit at the time plantation. These bio-agents should be applied two times in year followed by light irrigation.
- A stress period of 1 month will be sufficient to induce optimum flowering. *Mrig bahar* should preferred in areas having no assured irrigation facilities however, if assured irrigation facility is available then based on market demand, *bahar* should be decided.
- Organic mulch/pervious mulch can help in overcoming evaporation loss of irrigation water or Sub surface drip irrigation system may be installed for water economy.
- Rhizospheric soil pH may be reclaimed using elemental sulphur @ 20-30 g per plant depending upon the soil pH in calcareous soil. In non-calcareous soil with high pH, gypsum @ 25 % gypsum requirement along with 15 kg/plant well decomposed sugarcane press mud may be used.
- In high slope areas, plantation should be carried out across the slope and sod culturing may be promoted. Additional application of well decomposed farm yard manure (FYM) @20 -50 kg as per the age of the pomegranate plant will also improve drainage condition of soil.


Dhule
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Gadchiroli
Ahmadnagar
Parbhani
Beed
Nanded
Pune
Raigad
Osmanabad
Latur
Satara
Solapur
Ratnagiri
Sangli
Kolhapur
Sindhudurg
- Legend -
>50% Orchards affected
>20-50% Orchards affected
>10-20% Orchards affected
Blight free
New plantations (Data not available)
Pomegranate not grown

INTEGRATED DISEASE AND INSECT PEST MANAGEMENT SCHEDULE FOR POMEGRANATE CULTIVATION

INTEGRATED DISEASE AND INSECT PEST MANAGEMENT (IDIPM) SCHEDULE FOR POMEGRANATE CULTIVATION

This schedule can be used in general for getting disease and insect free yield in any season, however, farmers should not use Streptocycline (streptomycin sulphate 90%+ tetracycline hydrochloride 10%) and Bronopol (2-bromo, 2-nitropropane-1, 3-diol) if their orchards are free from bacterial blight and are in bacterial blight free areas.
The spray interval of 7 days should be adopted in *mrig bahar* and 10-14 days in *hasta* and *ambe bahar* season.

Foliar Sprays			
S. No.	**Days after defoliation**	**Stage**	**Pesticides**
Sprays During Crop Period			
1.	0-7	Defoliation	Spray 1% Bordeaux mixture before defoliation
2.	8-14	85-100 % leaf fall	Remove fallen leaves and debris from the orchard and burn Drench soil with bleaching powder (33% Cl) @25Kg/1000 liters/1 ha Spray copper oxychloride 50WP (2.5g/l) + Bronopol (0.5g/l)
3.	15-21	First flush of leaves	Morning spray salicylic acid formulation @a.i.0.3g/l Evening spray streptocycline (0.5g/l) + carbendazim 50WP (1g/l) + Thiamethoxam 25WG @ 0.3g/l
4.	22-28	Flower initiation	Bronopol (0.5g/l) + Ziram 80% WP 2g/l
5.	29-35	Flowering	Morning spray mixture of zinc sulphate (3g/l), solubor (2g/l), chelated iron (3g/l) Evening spray streptocycline (0.5g/l) + Carbendazim 50WP (1g/l) + Acetamiprid 20SP @ 0.3g/l/
6.	36-42	Flowering	Spray Captan 50WP(2.5g/l) + Bronopol (0.5g/l)
7.	43-49	Flowering 100%	Spray streptocycline (0.5g/l) + Mancozeb 75% WP (2g/l)+ Imidacloprid 17.8SL @ 0.3ml/l

8.	50-56	Fruit set starts	Morning spray salicylic acid formulation @ a.i. 0.3g/l Evening spray streptocycline 0.5g/l) + Propineb 70WP (3g/l) or Ziram 80% WP(2g/l)
9.	57-63	Fruit setting	Morning spraysolubor 2 g/lit + commercial micronutrient mixture 1g/l Evening spray Steptocycline (0.5g/l)+Thiophanate Methyl 70WP (1g/l) + Cypermethrin 25%EC (1 ml/l) + Neem Seed Kernel Extract @50g/l (75g if entire seed is used) in evening
10.	64-70	Fruit setting	Morning spray Magnesium sulphate (2g/l) Evening spray Bronopol (0.5g/l) +Fosetyl Al 80% WP (2g/l)
11.	71-77	Fruit enlargement	Morning spray salicylic acid formulation @ a.i.0.3g/l Evening spray Bordeaux mixture (0.5%)
12.	78-84	Fruit enlargement	Morning spray calcium nitrate (15 g/l) Evening spray Bronopol (0.5g/l) (0.5g/l) + Mancozeb 75% WP (2g/l)
13.	85-91	Fruit enlargement	Spray streptocycline (0.5g/l) + carbendazim 50WP (1g/l) + methomyl 40%SP@ 1g/l +Neem seed kernel extract @50g/l (75g if entire seed is used)
14.	92-98	Fruit enlargement	Morning spray salicylic acid formulation @ a.i.0.3g/l Evening spray Bronopol (0.5g/l) (0.5g/l) + ziram 80% Wp (2g/l) + Azadirachtin 10000 ppm (3ml/l)
15.	99-105	Fruit enlargement	Spray Bordeaux mixture (0.5%)
16.	106-112	Fruit enlargement	Spray Steptocycline (0.5g/l) (0.5g/l) + Mancozeb 75% WP (2g/l)
17.	113-119	Fruit enlargement	Spray Captan 50WP(2.5g/l) + Bronopol (0.5g/l)+ Methomyl 40%SP@ 1g/l Drench with bleaching powder (33% Cl) @25Kg/1000 liters/1 ha
18.	120-126	Fruit enlargement	Morning spray Calcium nitrate (8-10 g/l) Evening spray steptocycline (0.5g/l) (0.5g/l) + copper hydroxide 77WP (2g/l) 77% WP (2g/l)

			in evening same day
19.	127-133	Fruit enlargement +Aril colour development	Spray Bronopol (0.5g/l) + Thiophanate Methyl 70WP (1g/l) +Acetamiprid 20SP@ 0.3g/l+
20.	134-140	Fruit enlargement +Aril colour development	Spray Steptocycline (0.5g/l) (0.5g/l) + Propineb 70WP (3g/l)
21.	141-147	Fruit enlargement and development	Spray Bordeaux mixture (0.5%)
22.	148-154	Fruit enlargement and development	Spray Bronopol (0.5g/l) + Captan 50% WP (2.5g/l)
23.	155-161	Fruit enlargement and development	Spray Steptocycline (0.5g/l) (0.5g/l) + copper oxychloride 50WP (2.5g/l) +Lambda cyhalothrin 5EC/CS (0.5g/l)
24.	162-168	Fruit enlargement and development	Bordeaux mixture (0.5%)
25.	169-184	Fruit enlargement &development	Spray Potassium dihydrogen phosphate @10g/l + Spray Bronopol (0.5g/l) + Captan 50% WP (2.5g/l)
26.	185-199	Fruit Maturity	Spray Neem seed kernel extract @50g/l (75g if entire seed is used) or Azadirachtin 1500ppm @ 3ml/l
27.	200-214	Fruit Maturity (1 month before harvest)	Spray Potassium nitrate@10g/l or 0:0:50 @10g/l Bordeaux mixture @ 0.5% only under adverse weather conditions
28.	215-230	Fruit ripening	Harvest

Sprays During Rest Period

Apply Bordeaux paste (10%) on pruned ends. Immediately after pruning spray Bordeaux Mixture (1%)

Spray Bordeaux Mixture (1%) at 15 days interval or alternate with Bronopol @0.5g/l+ Copper oxychloride 50WP (2.5g/l) spray. Continue through defoliation.

Points to remember:

1. A pomegranate surfaces are glossy, hence, preferably add good quality non non-ionic spreader sticker with sprays for uniform coverage with pesticide. DO NOT USE SPREADER STICKER WITH BORDEAUX MIXTURE

2. To prepare spray mixture, prepare dilute solutions of each chemical separately and mix to make total volume. If precipitate is formed, either mixture chemicals are not compatible or pH is not proper.
3. The spray solution should have a pH of 6.5 -7 for good results.
4. In case no rains are there for long duration or blight is not increasing, sprays can be taken at 10-15 days interval instead of 7 days

The active ingredients (a.i.) in Streptocycline are streptomycin sulphate 90%+oxy tetracycline 10% and in Bronopol '2-bromo, 2-nitropropane-1, 3-diol 95%.' Both streptocycline and bronopol are available with different trade names from different companies. check if a.i. is less then increase the dose accordingly.

EMERGENCY MEASURES FOR BACTERIAL BLIGHT MANAGEMENT

In case of sudden increase in BB on fruits take 2-3 combination sprays of Streptocycline (0.5g/l) + 2-bromo, 2-nitro propane-1, 3-diol @ 0.5g / l + copper fungicides (2.0 – 2.5g/ l)or carbendazim 1g/lor mancozeb or 2g/l in alteration at 5 days interval, however, the PHI of chemicals should be kept in mind while taking emergency sprays.

PRECAUTIONS

1. Take only need based sprays at recommended doses, too many sprays increase the disease.
2. Always remove and burn all affected fruits before starting any spray.
3. Combine insecticides, fungicides or micronutrient sprays with bactericidal sprays depending on compatibility to reduce number of sprays. Mixture should not form precipitate.
4. Take without fail, additional spray with a bactericide after the rains -when plant surfaces dry up
5. Always prepare Bordeaux mixture fresh and use on the same day

CULTURAL OPERATIONS

S. No.	Days after Defoliation	Stage	Operation
1.	0-7	Defoliation	• Defoliate with Ethrel (1.5-2ml/l)+DAP5g/l • Remove weeds and suckers • Apply 2/3rd dose of FYM + Micronutrients depending on deficiency + poultry manure (1-1.5 kg/plant), vermicompost (1Kg/plant), Neem cake (1.5-3Kg/plant)Neem Cake 1-2 Kg /plant + Vermicompost 1 Kg/plant+ Phorate10G @25g/plant or Carbofuran 3G@40g/plant in wet soil in a ring around the plant • Apply 1/4th dose of nitrogen

			• Give light irrigation immediately after fertilizer application
2.	8-14	85-100 % leaf fall	• Remove fallen leaves and debris from the orchard and burn • Drench soil with bleaching powder (33% Cl) @25Kg/1000 liters/1 ha
3.	15-21	First flush of leaves	Irrigate
4.	22-28	Flower initiation	Apply 1/4th dose of nitrogen
5.	29-49	100% Flowering	Fertigate N:P:K::12:61:00 @ 8 kg/ha/application. Give 15 applications on alternate days for a month through irrigation. Irrigate
6.	50-63	Fruit set starts	Apply 1/4th dose of nitrogen in soil Fertigate N:P:K::19:19:19 @ 8 kg/ha/application. Give 15 applications on alternate days for a month through irrigation
7.	64-70	Fruit setting	Remove weeds Irrigate regularly
8.	71-126	Fruit set 100% Fruit enlargement	Fertigate N:P:K::00:52:34 Mono-Potassium Phosphate @ 2.5 kg/ha/application -Give 15 applications on alternate days for a month through irrigation Apply 1/4th dose of nitrogen in soil in August first week Irrigate Drench soil with bleaching powder (33% Cl) @25Kg/1000 liters/1 ha in last week of Aug. or first week of Sep.
9.	127-140	Fruit enlargement +Aril colour development	
10.	141-184	Fruit enlargement &development	• Remove weeds and suckers • Irrigate
11.	185-199	Fruit Maturity	
12.	200-214	Fruit Maturity 1 month before harvest	Fertigate Calcium Nitrate @12.5 kg/ha/application give 2 applications at 15 days interval Give moderate Irrigation
13.	215-230	Fruit ripening	Harvest mature fruits

Operations During Rest Period			
14.	-	Rest	Do heavy pruning to remove blight affected and old dry branches Drench soil with bleaching powder (33% Cl) @25Kg/1000 liters/1 ha Apply 1/3rd dose of FYM + 1/4th dose of nitrogen + Neem cake @ 1Kg /plant and full dose each of phosphorus and potash , poultry manure (1-1.5 kg/plant), vermicompost (1Kg/plant), Neem cake (1.5-3Kg/plant) Light Irrigation
15.	-	Rest	Light Irrigation
16.	-	Stress	Stop Irrigation

Note:

1. Irrigate depending on soil type, plant age and stage and weather conditions
2. Apply nitrogen, phosphorus and potash depending on plant age as given in section on Nutrient management

Quantity of Different Fertilizers to be Applied Per Tree Depending on Age and Source

Age of Plant (Yrs)	FYM (Kg)	Nitrogen (g/tree)			Phosphorus (g/tree)					Potassium (g/tree)	
		N Req.	Source		P_2O_5 Req.	Source				K_2O Req.	Source
			Urea	CAN		TSP	SSP	DAP			MOP
			46% N	25% N		43% P	16% P	46% P	#18% N		60% K
1	10	**250**	540	1000	**125**	290	780	271	50	**125**	210
2	20	**250**	540	1000	**125**	290	780	271	50	**125**	210
3	30	**500**	1090	2000	**125**	290	780	271	50	**125**	210
4 & above	40	**625**	1360	2500	**250**	580	1560	544	100	**500**	840

Note:

Depending on availability add poultry manure (1-1.5 kg/plant), vermicompost (1Kg/plant), Neem cake (1.5-3Kg/plant) once or twice a year.

Doses are total requirement/year, should be reduced depending on available nutrients in the specific orchard soil in different regions.

 # Quantity to be subtracted from Urea/CAN dose if DAP is source of phosphorous.

Indian Council on Agricultural Research

National Research Centre on Pomegranate

NH-65, Solapur-Pune Highway, Keagon, Solapur
Maharashtra - 413 255
www.nrcpomegranate.org

Tel. (0217) 2350074, 2354330 Fax – (0217) 2353533