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Pomegranate (*Punica granatum*)-A Potential Fruit Crop in Temperate Ecosystem

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Abstract: Pomegranate is native of Iran and cultivated extensively in the Mediterranean countries like Spain, Morocco, Egypt, Iran, Afghanistan and Baluchistan etc. It is also grown to some extent in Burma, China, Japan, USA, USSR and India. Pomegranate has been cultivated since ancient times under diverse agro-climatic conditions. Traditionally it is growth in tropical, subtropical and arid regions. In India its mainly grown Maharashtra, Karnataka, Andhra Pradesh, Gujarat, Tamil Nadu and Rajasthan. It grows wild in Western Himalayan regions that include states like Himachal Pradesh, Jammu and Kashmir and Uttarakhand. Huge variability of wild types pomegranate (Acidic) also found in Sunny, Tatapani and adjoining areas in Shimla Himachal Pradesh which can be exploited for anardana purpose. It is deciduous in temperate ecosystem and an evergreen or partially deciduous in tropical and subtropical conditions. In temperate region, pome and stone fruits are the major fruit crops widely grown as a commercial venture. With the changing scenario of climatic conditions in hilly areas, pomegranate is becoming an alternative fruit crop for this region and it has great potential to grow in Himachal Pradesh and other hilly states. In Kullu, Bajaura area of Himachal Pradesh, pomegranate cultivation become boon for orchardist where apple quality was not upto the mark due to climate change. Study showed that pomegranate need mild chilling requirement for flowering and fruiting particularly mid and foot hilly region.

Keyword: Pomegranate, Potential, Temperate Ecosystem,

INTRODUCTION

Pomegranate (*Punica granatum)* belongs to family Punicaceae. It is deciduous, sometimes evergreen shrub. Pomegranate can be grown on a wide range of soils but well drained light and medium type of soil found better. Fruit quality and colour development in light soils is good but poor in heavy soils. It has wider adaptability, drought resistance, low maintenance cost, prolific yielder with better shelf life. The pomegranate fruit has therapeutic value, high export potential and is mainly grown for table purpose. There are two flowering seasons in North India whereas Nalawadi *et al*. (1973) reported three flowering seasons in Western India. There are three types of flowers present on same plant of pomegranate i.e. male, hermaphrodite and intermediate. Ovary of male flower is rudimentary whereas that of intermediate flowers are degenerating type. If fruit set takes place in such flowers they may drop before reaching to maturity, even if some fruits reach maturity that become misshaped. Heterostyly is also common in pomegranate, in this case hermaphrodite flowers are pin eyed and male flowers are thrumb type. The flowers are orange red, calyx is tubular, persistent, five to ten-lobed, petals five to seven in numbers, are lanceolate, inserted between the calyx lobes. The ovary is embedded in the calyx tube and contains several locules in two series one above the other.

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Both self and cross-pollination are reported in pomegranate. The greater percentage of fruit set was observed by hand pollination and pollination under natural condition. i.e. open pollination (Nath and Randhawa, 1959). According to Singh (1977) pomegranate is often cross-pollinated crop where as Nalawadi *et al*. (1973) reported it as cross pollinated crop. The seeds in some pomegranate varieties are very soft, while in others they are large and hard. Pomegranate fruits consist of about 60-67 per cent seeds and 33-40 per cent peel (Jagtap *et al*., 1992). Whole pomegranate fruits contain 45-61 per cent juice, while arils yield 76-85 per cent juice (Patil and Sanghavi, 1980). Pomegranate fruits are the good sources of carbohydrates and minerals such as Ca, Fe and S and a moderate source of pectin. Glucose and fructose are the main sugars in pomegranate. Pomegranate is known for its high antioxidant activity and presence of a variety of biologically active compounds (Aviram, 2002). The edible part of the fruit contains considerable amount of acids, sugar, vitamins, polysaccharides, polyphenols and minerals (Kulkarni *et al*., 2004). Now a days there are wide range of varietal wealth in pomegranate across the country which need to harness in mid to high hilly region. With the changing scenario of climatic conditions pomegranate is becoming a potential alternative fruit crop for temperate region.

GERMPLASM RESOURCES

Being a cross pollinated crop, a lot of variability exists in seedling population, which can be utilized in further improvement programme. At present 150 genotypes of pomegranate have been maintained at ICAR-CIAH, Bikaner (Anon., 2002). Out of these genotypes 55 are deciduous and rest 95 are of evergreen in nature. Besides, ICAR-IARI, Regional Station is also maintaining 37 genotypes including Russian types germplasm provided by NRC on Pomegranate, Solapur. Field gene banks of pomegranate are maintained at Solapur, Abohar, Rahuri, Bikaner, Bengaluru, Shimla, Jodhpur and Ludhiana etc.

BAHAR REGULATION

In Himachal Pradesh pomegranate mainly harvested during rainy season (Ambe Bahar) which coincides with high moisture regime provides congenial condition to the plants for fruit growth and development. However, there are variation in flowering and fruiting season of pomegranate in various growing areas. Flowering period of pomegranate in different parts of India are as follows (Shukla, 2020 and updated)

S.No.	*State/ Zone/Region*	*Flowering period*
1	Central and Western India	Ambe bahar (January – February) Mrig bahar (June – July) Hast bahar (September – October)
2	Karnataka	June – August (For 80 to 87 Days) March (For 22 – 30 Days) September (For 20 – 30 Days)
3	Punjab	April to June
4	Delhi	Once or twice in a year
5	Bihar	February – March July – August
6	Rajasthan	Mrig bahar (June – July), Ambe and Hast bahar also comes but fruit quality is poor.
7	Himachal Pradesh	Ambe Bahar- April-May

Commercial varieties from different countries (Jyotsana *et al*., 2014))

S.No.	*Country*	*Varieties*
1	India	Bhagwa, Ganesh, Ruby,Phule Arakta, Mridula, Kandhari Kabuli
2	Iran	Schahvar, Robab
3	Israel	Wonderful
4	Spain	Mollar, Tendral
5	Turkey	Hicaznar, Beynar
6	USA	Wonderful, Granada

Cultivars of pomegranate grown in different states (Shukla *etal* 2020)

S.No.	*Name of the states*	*Cultivars*
1	Rajasthan	Jalore Seedless, Jodhpur Red, Jodhpuri White.
2	Haryana	Ganesh, Muskat Red, Paper Shell.
3	Gujarat	Dholka, Muskat Red, Kandhari, Ganesh.
4	Maharashtra	Ganesh, G137, P23, P26, Muskat, Mridula.

5	Karnataka	Bassein Seedless, Jyothi, Paper Shell, Madhugiri.
6	Tamil Nadu	Co-1, Yercaud, Vellodu, Kabul Red.
7	Himachal Pradesh	Kandhari Kabuli, Kandhari Hansi, Chawla, Nabh, Ichakdana, Sherin Moamad Ali

Important varieties of Pomegranate (Shukla, *etal* 2020 and updated)

Kandhari Kabuli- highly suitable for temperate and sub-temperate region with bright pink (blood red) aril and rind colour. Fruit weight ranges from 275-390 g. Harvesting time varied from mid July to mid August.

Kandhari Hansi- it is also grown in temperate and sub-temperate region with pink aril and rind colour. Fruit weight ranges from 215-295 g. Harvesting time varied from mid July to mid August.

Kandhari Yellow-Aril colour is bright red with yellowish red rind colour. Fruit weight varied from 185-255g. It is also grown in temperate region.

Chawla- it is also grown in mid and foot hilly region. Fruit size is medium 120-180g.

Ichakdana- It is anardana type variety with bold fruit size ranges from 290-400g. Arid colour is mid red taste is acidic.

Dholka- Large fruit size, greenish white rind, fleshy testa, pinkish white or whitish with sweet juice, soft seeds and acidic juice.

Kabul- Large fruit size, rind deep red mixed with pale yellow, thick, fleshy testa dark red, slightly bitter juice.

Kandhari-Fruit large in size, rind deep red, fleshy testa, blood red or deep pink with sweet , slightly acidic juice, hard seeds.

Muskat red- Fruit small to medium in size, rind some what thick, fleshy testa with moderately sweet juice, seeds are semi hard.

Spanish Ruby- Fruit small to medium in size, rind thin, fleshy testa rose coloured, soft seed.

Ganesh-Prolific bearer, medium fruit size, soft seeds, sweet in taste.

Bhagwa- It is developed by MPKV, Rahuri. It is tolerant to thrips and mites, it is free from blackening of arils and there is no incidence of fruit cracking. Fruits have cherry red bold aril.

Phule Arakta- It is also developed by MPKV, Rahuri. Plant is heavy yielder with bigger fruits and sweet soft seed. It is less susceptible to fruit spots and thrips.

Ruby-It is a multiple hybrid of pomegranate developed by IIHR, Bangalore for aril colour and seed mellowness. The skin colour of Ruby is reddish brown with green streaks. The rind is thin (0.24 cm), fruit contains red bold arils (37.2 g/100 arils) with sweet juice.

CONCLUSION

With the changing scenario of climatic change from last few decades and intensive research and development activities carried out in different research organizations, pomegranate is become as a potential alternative fruit crop in temperate region particularly mid and foot hilly tract.

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