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Suitability of low chilling peach cultivars on the basis of flowering characteristics under agro-climatic conditions of Bihar

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Abstract

Peach (*Prunus persica* L.) is one of the most important temperate stone fruit belongs to the family Rosaceae and sub family Prunoidae. Five peach cultivars like Shan-e-Punjab, Florida prince, Pratap, Early Grand, Prabhat, were cultivated for evaluation purposes to come up with a suitable cultivar for commercial production under agro-climatic conditions of Bihar, India. The experiment was laid out in a randomized block design with 4 replications at Bihar Agricultural College Sabour, Bhagalpur in the year 2018-19. The result revealed that the early bearing cultivars were Early Grand, Pratap & Prabhat. Pratap and Prabhat gave potential yield on 1st week of April. Duration of flowering was varied from (40 to 49 days). Maximum duration of flowering was seen in Shan-e-Punjab (49 days) and minimum duration of flowering was seen in Early Grand (40 days). From the present study it was concluded that the best performer cultivar was Early grand followed by Pratap & Prabhat under agro-climatic condition of Bihar on the basis of duration of flowering.

Keywords: Prunus, peach, low chilling, varieties, yield, TSS, etc

Introduction

Prunus persica grows up to 7 m (23 ft) tall and wide, but when pruned properly, trees are usually 3–4 m (10–13 ft) tall and wide.^[8] The leaves are lanceolate, 7–16 cm (3–6+½ in) long, 2–3 cm (¾–1¼ in) broad, and pinnately veined. The flowers are produced in early spring before the leaves; they are solitary or paired, 2.5–3 cm diameter, pink, with five petals. The fruit has yellow or whitish flesh, a delicate aroma, and a skin that is either velvety (peaches) or smooth (nectarines) in different cultivars. The flesh is very delicate and easily bruised in some cultivars, but is fairly firm in some commercial varieties, especially when green. The single, large seed is red-brown, oval shaped, around 1.3–2 cm long, and surrounded by a wood-like husk. Peaches, along with cherries, plums, and apricots, are stone fruits (drupes). The various heirloom varieties including the 'Indian Peach', or 'Indian Blood Peach', which ripens in the latter part of the summer, and can have color ranging from red and white, to purple. The area and production of peaches in India during 2017 were 18.00 thousand hectare and 13 MT respectively (3rd estimates of NHB, 2017-18). The economic life of the peach is 12 -20 yrs for the commercial production. Peach cultivation is mostly strenuous in temperate region of the world diagonally all the continents. The predominance cultivars of peach have need of 200-850 chilling hrs. below 7.2 °C and usually flourish in the spring. It require warmest climate of all temperate fruits so it can prefers for subtropical climatic conditions. Low chilling cultivars are grown in a submountainous region of Punjab, Haryana, Delhi and western UP. yet, several current attempt comprise lead towards a expansion of chilly cultivars of peaches require 100-300 hours of chilling which can fruitfully developed in subtropical area (Nijjar and Khajuria, 1979) ^[5]. The choice of Peach Varieties For a particular area is depends upon the adaptability to local soil and climatic conditions. With the introduction of low chilling varieties its cultivation is extended in almost all the states of the north east India. Among the low chilling varieties, Flordasun, Shane- Punjab and Partap found suitable for mid hill conditions of northeast (Patel *et al.*, 2007) ^[7]. The experiment entitled “suitability of some low chilling peach cultivars under agro-climatic conditions of bihar on the basis of floer characteristics was conducted at the Horticulture Garden, Department of Horticulture (Fruit & Fruit Tech.), Bihar Agricultural College, Sabour, Bhagalpur, Bihar during the year 2018-19.

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Experimental details

Following peach cultivars were used for the present study. All the trees were maintained under uniform cultural schedule during the course of investigation. The cultivars under study were:

➤ Early Grand	:	(V1)
➤ Florida Prince	:	(V2)
➤ Shan-e-Punjab	:	(V3)
➤ Prabhat	:	(V4)
➤ Pratap	:	(V5)
Spacing	:	2x2m
No. of treatments	:	5
No. of replications	:	4
Time of planting	:	02-03-2012
Statistical design of experiment: Randomised Block Design		

Site and Location

The present study was carried out in *kharif* season in 2018 at Bihar Agricultural College, Sabour, Bhagalpur, Bihar, India. The geographical location of Bhagalpur comes under Middle Gangetic Plain region of Agro-climatic Zone IIIA. It is situated between 25° 14' N latitude and 87° 02' E longitudes at an altitude of 52.73m above mean sea level.

Climate and weather conditions

The climate of the tract is typically subtropical characterized by aridity of the atmosphere, scarcity of water, with extreme temperatures, both during summer and winter. Maximum temperature in summer, ranges between 35 to 39°C, whereas, in winter temperature falls down from 5 to 10°C. The average rainfall 1231.4 mm, most of which is received in rainy season from July to September. Wells are the only source of irrigation and water table is quite deep (about 55-60 metres).

Table 1: Meteorological data (2018-19)

Months	Temperature (°C)		Relative Humidity (%)		Wind Speed (Km/hr)	Rainfall (mm)
	Max.	Min.	7.00 am	2.00 pm		
Oct. 2018	31.27	19.75	89.58	72.84	2.46	2.53
Nov. 2018	29.56	12.85	88.37	61.27	0.00	1.89
Dec. 2018	24.21	7.44	89.26	59.65	0.36	2.57
Jan. 2019	23.01	5.63	89.58	54.23	0.14	3.59
Feb. 2019	25.18	10.08	88.04	60.75	1.51	4.76
March 2019	30.47	15.44	83.42	62.32	0.04	2.98
April 2019	33.56	21.46	77.93	57.20	1.27	3.21
May 2019	38.78	24.28	75.74	50.42	1.97	2.55
Average	29.51	14.62	85.24	59.83	0.97	3.01

Soils

Taxonomically, the soils of Sabour fall under the order "Inceptisols" and sub-group Typic Ustifluvents. In the genetic system of classification, the soils of this area is recent

alluvium in origin, mostly medium to coarse textured, white to light grey in colour deposited by the river Ganga. These soils are slightly acidic in reaction.

Table 2: Layout of Experimental Design

V1R1	V3R1	V4R1	V5R1	V2R1	
V2R2	V4R2	V1R2	V3R2	V5R2	
V5R3	V4R3	V2R3	V1R3	V3R3	
V3R4	V1R4	V4R4	V5R4	V2R4	

Material and methodologies have been used, these were explained as under:

Flowering Characteristics

Time and duration of flowering of whole tree was taken as sample for taking observations. Dates were recorded of 1st flower opening, full bloom and last flower opening. Days to full bloom was recorded by calculating the days from 1st flower bud open to full bloom (last flower opening). Total duration of flowering was estimated by counting the number of days between 1st flower opening to the last flower opening.

Date of Bud Swell

The date was recorded on which 25% bud is swelled in each cultivars.

Date of First Flower Opening

The date was recorded on which 25% first flowers were opened in each cultivars.

Date of Last Flower Opening

The date was recorded on which 90 % flower opened in each cultivars.

Duration of Flowering (Days)

The duration of flowering as determined by counting the number of days from 25% flower open to the 90% flower open in each cultivars was determined.

Date of Harvesting

Date of fruit harvesting was recognized when 50% fruit is ready for harvest were harvested.

Result and Discussion

Flowering The analysis of variance shown significant differences for flowering. The data on various flowering characters viz. bud swell, first day of flower initiation, last day of flowering and duration of flowering stages recorded during 2019 has been presented. The results are describe as follows:

Date of bud swell

It was found that bud swell stage was ranged from 13th

December to 28th January The earliest bud swell stage was observed by 'Florida Prince' (13th December), while 'Early Grand' shows delayed Bud swell stage (28th January).

Date of First Flower opening

First flowering appear on 28th December to 12th February in different cultivars during study. First flowering stage was seen in 'Florida prince (28th December) whereas last to attain first flowering stage was 'Early Grand' (12th February).

Duration of flowering

It would be evident duration of flowering was observed among different cultivars under study. Duration of flowering ranged from 31 to 42 days. 'Shan-e-Punjab' shows the minimum duration of flowering (31 days) while maximum duration was observed in Florida prince (42 days) which was statistically at Par with cultivar Prabhat and Pratap.

Table 3: Duration of flowering

Varieties	Date of bud swell	Date of first flowering	Date of last flowering	Date of harvesting	Duration of flowering
Early Grand	28 january	12 february	23 march	28 April	39 days
Florida prince	13 december	28 december	12 february	17 April	42 days
Shan-e-punjab	13 january	22 january	23 february	18 April	31 days
Prabhat	25 december	3 january	12 february	16 April	39 days
Pratap	3 january	12 january	21 february	14 April	35 days
Sem (+_)					0.99
CD(0.05)					3.07
CV(%) 5.37					

Conclusion

From the present study it was concluded that the best performer cultivar was Early grand followed by Pratap & Prabhat under agro-climatic condition of Bihar on the basis of duration of flowering.

Review of literature

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