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Varietal performance of Peach [*Prunus persica* (L.) Batsch] under northern hill zone of Chhattisgarh

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Abstract

Peach [*Prunus persica* (L.) Batsch] is one of the most important temperate stone fruit belong to the family rosaceae and sub family Prunoideae is widely held to state a distinct group of cultivar which require low chilling hours for bud burst and growth is known as low chill peach. In northern hill zone of Chhattisgarh hilly tract of Mainpat (Surguja) Samri & Jokapat in Balrampur and Pendrapat area in Jushpur district has been agro-ecological situation for growth of fruit chilling in peach. Seven peach cultivars viz; Shan-e-Punjab, Flordaprince, Pratap, Early Grand, Glow heaven, Suncrist and Punjab red (Nacterin) were cultivated for evaluation purposes to come up with a suitable cultivar for commercial production under hilly zone condition of Chhattisgarh, India. The experiment was laid out in a randomized block design with 3 replications at Potato & Temperate Horticulture Research Station, Mainpat, Surguja, Chhattisgarh in the year 2016-17. The result revealed that the early bearing cultivars were Punjab red (Nectarine), Pratap, Early grand and Flordaprince gave potential yield on last week of April-May. Stone weight was minimum in Punjab red (Nectarine) 13.96g which gave 57.33g pulp but highest pulp: stone ratio (6.38) in Early grand with pulp weight was (79.40g) followed by cultivar Shan-e-Punjab (5.03) with pulp weight 62.39g. The maximum TSS was observed in cultivar Early Grand (18.86⁰B) being comparable with Flordaprince (17.53⁰B) statistically. Lowest acidity found in Early grand (0.18%) followed by Shan-e-Punjab (0.22%) and Pratap (0.23%). Ascorbic acid found highest in variety Punjab red (Nectarine) 164.33mg/kg followed by Shan-e-Punjab (124.33mg/kg) and Pratap (112.25mg/kg). Reducing sugar found highest in the variety Shan-e-Punjab (7.40%) and highest total sugar found in early grand. The cultivar Punjab Red (Nectarine) gave yield 23.5 Kg per tree followed by Pratap (15.85kg) and Early Grand (14.25kg) per tree. From the present study it is concluded that vigorous and spreading type peach cv. Punjab Red (Nectarine) was the best performer followed by Pratap and Shan-e-Punjab under northern hill zone Chhattisgarh for commercial cultivation.

Keywords: Prunus, Peach, Nectarine, Low chilling, Varieties, yield etc.

Introduction

In the genus *Prunus*, Peach (*Prunus persica* L.) is a most important stone crop in India. Its flower has light pink colour with 5 petals brought forth in early spring before the leaves. The fruit has yellow, dark red or whitish flesh and some fruit contains pink colour around the stone possessing a delicate aroma. Skin of the fruit that is either velvety (peaches) or smooth or hairless (nectarines) in different cultivars due to single gene mutation (dominant to recessive). The tree is rather small and mature tree grown up to 15 ft tall (Huxley, 1992) [4]. It is the most preferred and legendary fruit species among the stone fruits which is grown under low temperature in hilly areas of the temperate world. Due to stunning colors and high texture, peaches are generally used as table fruits. Introduction of new crops or crop cultivars provide an ample opportunity for crop diversification in a particular weather condition to check economical feasibility for growing them commercially. It is one of the most important temperate fruit crop grown mainly in Jammu and Kashmir, Himachal Pradesh, Punjab, Uttarakhand, Nilgiri hills, Jharkhand and North Eastern States (Josan *et al.*, 2009) [6] valued for its fresh and canned fruits. Now days peach has become pride to poor and marginal hilly farmers of sub mountainous regions, plains of northern India and Southern hills and also in irrigated arid and plateau ecosystem. It is relatively performed well at an altitude ranging between 600-1000m from mean sea level. In recent times, it has been found that peach production has a declining trend mingled with a number of factors such as diseases, overdependence on a selective cultivars and global warming (Singh *et al.* 2014). With advance

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of breeding efforts low chilling peach cultivars have been developed and their cultivation stretches from temperate regions to subtropical worlds (Kuden *et al.* 2004). Keeping this in view some prominent low-chill peach genotypes were studied in this experiment to assess the performance with context to fruit quality characteristics and yield for commercial cultivation.

Materials and Methods

The present studies were carried out at Potato & Temperate Horticulture Research Station, Mainpat, Surguja, Chhattisgarh under university of Indira Gandhi Krishi Vishwavidyalaya in the year 2016-17 on 3 years old junior adult bearing peach trees. The Mainpat Block, district Surguja is situated at latitude 22°45' N, longitude 83°18' E and height 1075 meter from the mean sea level (MSL) with average rainfall 1125-1230 mm per year. Seven peach cultivars namely, Shan-e-Punjab, Flordaprince, Pratap, Early Grand, Glow heaven, Suncrest and Punjab red (Nectarine) were evaluated for flowering, fruiting and fruit quality parameters. The trees were planted at 4 x 3m apart accommodating 800 plants per ha. The flowering behaviour was noted for all the seven cultivars visually. TSS of the fruits was estimated by Atago Digital refractometer with a scale of 0-32 ° Brix. Data were subjected to ANOVA test for statistical analysis under randomized block design. Tree characters, flowering and harvestings dates were recorded in standard methods.

Results and Discussion

Growth and Flowering

Data recorded on flowering revealed that flowering initiation was earlier in Pratap followed by Early Grand, Punjab Red and Flordaprince harvested in April last and second week of May. The cultivar Shan-e-Punjab was very late cultivar regarding flowering and harvesting whereas, Suncrest and Glow heaven were mid season cultivars harvested in third week of May. Duration of flowering varied from 30 days (Shan-e-Punjab) to 40 days (Flordaprince). To some extent same trend of flowering behaviour was observed by Josan *et al.* (2009) [6] and Singh *et al.* (1967) [11] under Ludhiana conditions. Nijjar and Khajuria (1979) also stated that bigger fruits were harvested in Ludhiana condition as the weather was suitable to grow. Regarding flowering, a peculiar habit was observed from Flordaprince, Shan-e-Punjab, Punjab Red (Nectarine) and Pratap giving two times flowering in a season likely at temperature decreasing down (September to October) and temperature rising up (2nd and 3rd week of January) after dormancy. The cultivars Flordaprince, Early grand and Pratap were earlier to attain maturity followed by Shan-e-Punjab and Punjab Red (Nacterin) harvested at last.

Physico-chemical Characters

Data on table -1 showed that the maximum average fruit weight of 120.25g in Early Grand cultivar followed by Shan-e-Punjab (88.31g) Pratap (85.34g) were observed under Mainpat, Chhattisgarh condition. Cultural practices like pruning and irrigation markedly increases the fruit size (Oluch *et al.*, 1993 and Nyambo *et al.* 2005) [10, 9]. Kanwar *et al.* (2002) [7] found that the peach cv. Valle grand exhibited the

highest fruit weight (88.8 g) followed by Early grand (87.2 g) under the climate of Punjab, India. Stone weight was minimum in Punjab red (Nectarine) 13.96g which gave 57.33g pulp but highest pulp: stone ratio (6.38) in Early grand which gave pulp weight (79.40g) followed by cultivar Shan-e-Punjab (5.03) pulp weight 62.39g showed in Table-1. The maximum TSS was observed in cultivar Early Grand (18.86⁰B) being comparable with Florida prince (17.53⁰B) statistically. Lowest acidity found in Early grand (0.18%) followed by Shan-e-Punjab (0.22%) and Pratap (0.23%). Ascorbic acid found highest in variety Punjab red (Nectarine) 164.33mg/kg followed by Shan-e-Punjab (124.33mg/kg) and Pratap (112.25mg/kg). Reducing sugar found highest in the variety Shan-e-Punjab (7.40%) and highest total sugar found in early grand (14.60%) showed in table-2). The cultivar, Punjab Red (Nectarine) hairless accounted for the maximum yield per tree (3years) 23.50 kg/plant followed by Pratap (15.85kg/Plant), Flordaprince (15.23kg/Plant) and Early grand (14.25kg/plant) showed in Table-2. Yield is most important parameter for peach production under different soil and climatic condition (Jana, B. R. 2015) [5]. From the present study it is concluded that vigorous, spreading type Punjab Red (Nectarine) hairless was the best performer followed by Early Grand, Pratap and Shan-e-Punjab under northern hill zone of Chhattisgarh. Several workers have worked on the physico-chemical properties of peach fruits (Kher and Dorjay 2001, Neelam and Ishtiaq 2002) in the past and the maximum variability was observed in peach genotypes prevailed in our country India.

Phenology and Fruit Quality and Market Acceptance

Seven peach cultivars were tried for evaluation purposes to detect suitable cultivars for commercial production under northern hill zone of Chhattisgarh. The result revealed that the early bearing cultivars were Pratap, Punjab Red (Nacterin) and Flordaprince bearing potential yield on last week of March to April. Kanwar *et al.*, (2002) [7] also reported that the first to attain fruit maturity was Flordaprince on 3rd week of April. Due to differences in agro-climatic conditions, there was variability among the genotypes. Fruit size and quality were generally affected by environment (Chadha *et al.*, 1968 and Edward and Watson, 1994) [1, 2] Jana, B. R. (2015) [5]. Diurnal variations in temperature are also responsible for early and late flowering in peach (Fishman and Genard, 1998) [3]. It was found that all seven genotypes were statistically different in fruit growth period from flowering. Data revealed that Flordaprince DFB of Pratap and Punjab Red (Nectarine) was the minimum of 60-70 days as compared to Shan-e-Punjab (100-110 days). This is an important parameter and taken into consideration for distant marketing. The colour of fruit (skin) and pulp are also important indices to differentiate between peach cultivars as it influences market acceptability. Punjab Red (Nectarine) dark red hairless, Flordaprince, Early grand and Pratap had the maximum red blush. In Indian domestic market has had likeness towards big peach fruits having high sugar content. Therefore, early grand, Punjab Red (Nectarine), Shan-e-Punjab and Pratap had better market acceptability than other cultivars.

Table 1: Physical Properties of Peach Fruits Grown under northern hill zone of Chhattisgarh

Cultivars	Fruit Weight (g)	Fruit size (cm ²)	Skin Weight (g)	Stone Weight (g)	Pulp Weight (g)	Pulp : seed Ratio
Shane-e-Punjab	88.31	21.72	8.32	17.60	62.39	5.03
Flordaprince	79.30	19.49	7.59	15.89	55.82	3.53

Pratap	85.34	20.30	7.33	17.56	60.45	5.01
Early grand	120.25	22.62	15.23	25.62	79.40	6.38
Glow heaven	52.81	11.87	4.65	14.86	33.30	3.38
Suncrist	51.68	12.23	5.10	14.23	32.35	3.25
Punjab red (Nacterin)	75.38	18.72	4.09	13.96	57.33	3.86
CD at 5%	02.93	NS	2.60	2.15	3.25	3.25

Table 2: Physico- Chemical Properties and Yield of Different Peach Cultivars

Cultivars	TSS (°B)	Acidity	Ascorbic acid	Reducing	Total	Yield/ kg
		(%)	(mg/kg)	Sugar (%)	Sugar (%)	/plant
Shane-e-Punjab	17.30	0.22	124.33	7.40	13.50	14.18
Florida prince	17.53	0.30	55.00	6.43	10.50	13.23
Pratap	16.22	0.23	112.25	6.66	11.42	15.85
Early grand	18.86	0.18	65.25	7.25	14.60	14.25
Glow heaven	15.40	0.27	75.50	5.96	11.60	11.59
Suncrist	15.80	0.24	85.66	4.67	12.12	09.62
Punjab red (Nacterin)	14.23	0.33	164.33	4.35	10.25	23.50
CD at 5%	1.35	0.45	10.47	NS	3.17	5.02

Table 3: Tree, Flower and Fruit Characters of Different Cultivars of Peach

Cultivars	Tree growth	DFB	Stone Type	Fruit blush	Skin types	Presence of groove on stone	Market acceptability
Shan-e-Punjab	Vigorous	100-110	Semi Clingstone	Yellow with red spot	With hair	Less groves	Very good
Florida prince	Vigorous	80-85	Semi cling stone	Red	With hair	Present	Good
Pratap	Semi vigorous	90-100	Free stone	Red	With hair	Present	Very Good
Early grand	Vigorous	90-95	Free stone	Red	With hair	Present	Very Good
Glow heaven	Semi vigorous	90-100	Semi Clingstone	Red	hairless	Present	Very Good
Suncrist	Semi Vigrous	90-95	Semi Clingstone	Dark red	hairless	Present	Very Good
Punjab red (Nectarine)	Vigorous	70-80	Semi Clingstone	Dark red	hairless	Less groves	Excellent
CD at 5%	-	7.60	-	-	-	-	-

**Photographs: Peaches and Nectarine**



NECTARINE

Peaches and Nectarines fruits at Potato & Temperate Horticulture Research Station, Mainpat

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