

Original Research Article

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Flowering Behavior of Wax Apple Germplasms in New Alluvial Zone of West Bengal, India

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ABSTRACT

The flowering behavior of wax apple in new alluvial zone of West Bengal with five germplasm was carried out at Horticulture Research Station, Mondouri, Bidhan Chandra Krishi Viswavidyalaya in the year 2015-16 with an objective to provide a wealth of usable information to improve wax apple breeding programme. A wide range of variation was noted in respect of different parameters of flowering behavior. Flower bud emerged from 3rd week of October to last week of April with a period of bud development of 15.25 to 31.75 days among different germplasm of wax apple. The germplasms of wax apple flowered from 2nd week of November to 1st week of June with two (Type 1 and Type 2) or three (Type 3, Type 4 and Type 5) flowering seasons. The flowering duration was wide during 2nd flowering season (16.25-51.00 days) as compared to 1st (16.45-22.00 days) and 3rd flowering season (20.50-30.25 days). The duration of 2nd flowering season was higher in Type 3 (43.25 days), Type 4 (30.75 days) and Type 5 (51.00 days). It is concluded that this knowledge of reproductive characters will be useful for efficient and purposeful breeding programme as well as for using these germplasm as desirable parent.

Keywords

Wax apple,
Flowering, West
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Introduction

Wax apple, a member of the Myrtaceae family, is botanically identified as *Syzygium javanicum* Miq. (Syn. *S. samarangense* Merr. and Perry, *Eugenia javanica* Lam.). The various vernacular names are Java apple, samarang rose apple, makopa, wax jamboo etc. This tropical fruit tree is indigenous to

regions extending from Malaya to the Andaman and Nicobar Islands (Morton, 1987a). Wax apple and water apple (*Syzygium aqueum* Alst.) are somewhat similar fruits of the genus *Syzygium* but the later has originated in south India and the fruits have uneven shape, being wider at the apex than base. On the other hand, wax apple fruits are nearly round or bell shaped or pear shaped with long

neck. Wax apple fruits are usually eaten fresh mainly as a thirst quencher and in salads. Fruit has a cooling effect which makes it useful as a summer time fruit like cucumber. The greenish fruits are eaten raw with salt or may be cooked as a sauce. They are also stewed with true apples. Fruits have aromatic flesh, sweet taste and become crisp when ripe. The edible portion is about 80 per cent and water 90 per cent (Nakasone and Paull, 1998).

Wax apple is a newly introduced fruit crop in India mainly from Bangladesh and Thailand. There are no recommended standard or named varieties in the country. Selection of suitable cultivars for a particular region is an important aspect of wax apple cultivation. Improvement is needed in order to combine maximum desirable traits in a cultivar, adapt some cultivars to particular environmental stresses and to improve the quality of fruits besides yield increase.

Knowledge of flowering behaviour is the essential prerequisite for a successful hybridization programme and to formulate the appropriate cultural practices that may influence the fruit yield and quality. Hence, the present research work entitled "Flowering behavior of wax apple germplasm in New Alluvial Zone of West Bengal" was carried out with an objective to provide a wealth of usable information to improve wax apple breeding programme.

Materials and Methods

The experiment was carried out at Horticultural Research Station, Mondouri of Bidhan Chandra Krishi Viswavidyalaya with five germplasm of wax apple consisting of four replications during the year 2015-16. Appearance of at least first 10 inflorescences in a plant on a particular week was considered as emergence of flower bud. Four branchlets were tagged in all directions in each plant for

recording period of flower bud development. Opening of at least first 10 flowers in a plant and last 10 flowers in a plant were considered as start and end of flowering, respectively. The period between start and end of flowering was considered as duration of flowering. The period between start and end of peak flowering was considered as duration of flowering. Ten cymes were tagged randomly considering all directions in a plant for recording flower bud and fruit set per cyme. Fruit set was counted at marble stage.

Results and Discussion

Time of flower bud emergence

Table 1 exhibited that flower bud emerged twice in Type 1 and Type 2 and thrice in Type 3, Type 4 and Type 5. The flower bud from 1st flush appeared earliest in Type 5 (3rd week of October). The variation in the time of flower bud emergence during 2nd flush was noted from 3rd week of January to 1st week of March. Earliest flower bud emergence was observed in Type 5 whereas it was late in Type 1 (last week of February) and Type 2 (1st week of March). Similarly, the variation in the time of flower bud emergence during 3rd flush was noted from 1st week of March to last week of April.

Period of flower bud development

The data in Table 1 clearly indicated that maximum period (22.25 days) required for flower bud development was in Type 5 during 1st flush. During 2nd flush, the maximum and minimum period of flower bud development was observed in Type 3 (31.75 days) and Type 2 (21.25 days), respectively.

However, flower bud development during 3rd flush was maximum in Type 3 (27.25 days) and minimum in Type 2 (15.25 days).

Table 1: Emergence and development of flower bud and fruit set of different wax apple germplasm

Types	Flower bud emergence			Period of flower bud development (Days)			Number of flower bud/cyme			Number of fruit set/cyme		
	1 st Flush	2 nd Flush	3 rd Flush	1 st Flush	2 nd Flush	3 rd Flush	1 st Flush	2 nd Flush	3 rd Flush	1 st Flush	2 nd Flush	3 rd Flush
Type 1	--	Last week, February	Last week, April	--	25.25	15.50	--	3.72	3.00	--	2.25	1.70
Type 2	--	1 st week, March	Last week, April	--	21.25	15.25	--	3.25	3.20	--	2.27	1.97
Type 3	Last week, October Last week, October 3 rd week, October	Last week, January	1 st week, April	20.10	31.75	27.25	3.20	3.80	3.45	1.86	2.32	2.60
Type 4		3 rd week, February	1 st week, April	21.45	23.00	23.75	2.85	4.60	3.02	1.65	2.90	2.62
Type 5		3 rd week, January	1 st week, March	22.25	27.00	20.00	3.25	5.00	3.62	1.84	3.30	2.55
SE(m)±	--	--	--	--	0.77	0.86	--	0.11	0.10	--	0.10	0.11
LSD(0.5)	--	--	--	--	2.41	2.69	--	0.36	0.33	--	0.33	0.36

Table 2: Flowering behaviour of different wax germplasm

Types	Start of Flowering			End of Flowering			Flowering Duration (Days)			Peak Flowering Duration (Days)		
	1 st Flush	2 nd Flush	3 rd Flush	1 st Flush	2 nd Flush	3 rd Flush	1 st Flush	2 nd Flush	3 rd Flush	1 st Flush	2 nd Flush	3 rd Flush
Type 1	--	3 rd week, March	1 st week, May	--	1 st week, April	Last week, May	--	16.25	20.50	--	6.50	6.25
Type 2	--	3 rd week, March	2 nd week, May	--	1 st week, April	1 st week, June	--	16.25	24.25	--	6.00	7.00
Type 3	2 nd week, November	Last week, February	Last week, April	Last week, November	1 st week, April	Last week, May	16.45	43.25	20.25	5.85	13.25	6.50
Type 4	2 nd week, November	2 nd week, March	Last week, April	1 st week, December	2 nd week, April	3 rd week, May	22.00	30.75	20.75	7.55	13.00	7.50
Type 5	2 nd week, November	3 rd week, February	3 rd week, March	Last week, November	1 st week, April	3 rd week, April	19.25	51.00	30.25	6.20	15.50	9.00
SE(m)±	--	--	--	--	--	--	--	0.59	0.76	--	0.52	0.43
LSD(0.5)	--	--	--	--	--	--	--	1.84	2.37	--	1.62	1.34

Number of flower bud per cyme

It is revealed from Table 1 that the number of flower bud was recorded higher (3.25-5.00/cyme) during 2nd flush as compared to 1st flush (2.85-3.25/cyme) and 3rd flush (3.00-3.62/cyme) irrespective of germplasms. Second flush produced higher number of flower buds in Type 5 (5.00/cyme) and Type 4 (4.60/cyme). Type 1 and Type 3 showed moderate number of flower buds (3.72 and 3.80/cyme, respectively) whereas Type 2 had least number of flower bud (3.25/cyme).

Number of fruit set per cyme

It is clearly noted from Table 1 that the number of fruit set was very less during 1st flush (1.65-1.86/cyme). Fruit set varied significantly during 2nd flush (2.25-3.30/cyme) and 3rd flush (1.70-2.62/cyme). Maximum fruit set from 2nd flush was recorded in Type 5 (3.30/cyme) and lesser in Type 1 (2.25/cyme) and Type 2 (2.27/cyme). During 3rd flush, maximum fruit set was recorded in Type 4 and minimum in Type 1.

Start of Flowering

Table 2 revealed that flowering occurred twice in Type 1 and Type 2 whereas it was thrice in remaining three types. The start of flowering from 1st flush was noted from 2nd week of November in Type 3, Type 4 and Type 5. The variation of start of flowering from 2nd flush among different wax apple germplasm was noted from 3rd week of February to 3rd week of March whereas it was from 3rd week of March to 2nd week of May during 3rd flush. Type 5 produced flowering earliest in both 2nd flush (3rd week of February) and 3rd flush (3rd week of March).

End of flowering

In Table 2, it is clearly noted that the end of flowering ranged from last week of

November to 1st week of December during 1st flush, 1st week of April to 2nd week of April during 2nd flush and 3rd week of April to 1st week of June during 3rd flush. All the types completed flowering from 2nd flush on 1st week of April except Type 4 which ended on 2nd week of April.

Duration of flowering

It is clearly noted from the Table 2 that the duration of flowering during 2nd flowering season varied widely (16.25-51 days) among different germplasm whereas the variation was less during 1st (16.45-22 days) and 3rd (20.25-30.25 days) flowering season. Type 5 showed maximum flowering duration in both 2nd flush (51.00 days) and 3rd flush (30.25 days). Flowering duration of 2nd flush was least (16.25 days) in both Type 1 and Type 2.

Peak flowering periods

Table 2 showed peak flowering period with duration of 5.85 to 15.50 days irrespective of type and flush. However, the variation was wide during 2nd flush with higher duration of peak flowering period in Type 3 (13.25 days), Type 4 (13.00 days) and Type 5 (15.50 days) and lesser in Type 1 (6.50 days) and Type 2 (6.00 days). The variation of peak flowering period was less during 1st flush (5.85-7.55 days) and 3rd flush (6.25-9.00 days), irrespective of types.

In the present experiment, flower bud emerged from 3rd week of October to last week of April with a period of bud development of 15.25 to 31.75 days. Saha Ray (1995) obtained more duration for development of flower bud. Wax apple, in the present studies, flowered from 2nd week of November to 1st week of June with two (Type 1 and Type 2) or three (Type 3, Type 4 and Type 5) flowering seasons. The flowering duration was wide during 2nd flowering season (16.25-51.00 days) as compared to 1st

(16.45-22.00 days) and 3rd flowering season (20.50-30.25 days). The duration of 2nd flowering season was higher in Type 3 (43.25 days), Type 4 (30.75 days) and Type 5 (51.00 days). Morton (1987 b) noticed that the tree blooms in March and April in India and from April to June in Java. The number of flowering and fruiting times in the present studies was more as compared with the earlier findings of Al Saif *et al.*, (2011).

It is concluded that there is a wide variation of flowering behaviours among different germplasm which will be useful for efficient and purposeful breeding programme as well as for using these varieties as desirable parent.

References

- A.O.A.C. (1984). *Official Methods of Analysis*, 14th Ed. Association of Official Agricultural Chemist, Washington D. C., Pp. 16.
- Al Saif, A.M; Hossain, A.B.M.S; Taha, R.M and Moneruzzaman, K.M. (2011). Photosynthetic yield, fruit ripening and quality characteristics of cultivars of *Syzygium samarangense*, *African J. Agric. Res.* 6(15): 3623-30.
- Morton, J. (1987a). Java apple. In: *Fruits of Warm Climates* (Ed. Morton, J. F.), Miami, Fl. pp. 381-83.
- Morton, J.F. (1987b). Malay apple. In: *Fruits of Warm Climates*. pp: 378-81.
- Nakasone, H.Y. and Paull, R.E. (1998). *Tropical fruits*, CAB International, New York, 369-72.
- Panase, V.G. and Sukhatme, P.V. (1978). *Statistical methods for agricultural workers*. ICAR, New Delhi, pp.145-52.
- Rangana, S. (2000). *Manual of analysis of fruit and vegetable product*. 3rd Ed., Tata and Rao, McGraw Hill Publishing Co. Ltd. New Delhi.
- Saha Roy, S. (1995). Studies on the floral biology of *Syzygium spp.* M.Sc. (Ag). Thesis, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal.

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