

PALYNOLOGICAL STUDIES IN GUAVA AND ITS RELATED SPECIES

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ABSTRACT

The pollen grains of guava and its relatives are triangular, oval and round in shape with size varying from 15.6 μ to 25.2 μ and 14.7 μ to 21.1 μ in acetocarmine media for Safeda and Seedless respectively. The minimum and maximum size of pollen grains were 12.6 μ to 16.8 μ in *Psidium polycarpum* and 16.8 μ - 48.3 μ in *P. molle*. The maximum percentage of fertility was recorded in *P. polycarpum* (98.85%) and the minimum in *P. cattleianum* (18.64%) respectively. The pollen grains of all the species could be stored well up to 210 days in shallow pan (refrigerator) at $15 \pm 2^\circ\text{C}$ for prolonging the storage life of the pollen in *Psidium* species. The pollen has lost its viability within 30 days at room temperature.

KEY WORDS: Guava, Palynological studies, Pollen.

The guava belongs to the genus *Psidium* which contains 150 species. Exploitation of these species with rich genetic heritage is of immense importance to the plant breeders as well as to horticulturists. Very little information is available on palynological aspects of guava species except for *P. guajava*. Hence, studies were undertaken on palynological aspects of guava and its relatives at Allahabad Agricultural Institute, Allahabad in the Department of Horticulture.

MATERIALS AND METHODS

Two trees of 10 years old in each of *P. guajava* var Safeda

and Seedless, *P. cujavillus*, *P. pumilum*, *P. polycarpum*, *P. cattleianum*, *P. cattleianum* var *lucidum*, *P. molle* and *P. friedrichsthalianum* species were selected at random. From each tree four branches were selected representing four directions. Pollen grains were collected from freshly opened flowers from the selected trees in each of species. The pollen grains were collected from 6.00 am to 8.00 am in a clean and sterilized watch glass by brushing the anthers with the help of a camel brush. The collected pollen grains were transferred to sterilized glass vial and the bottles were labelled for

Table 1. *Psidium* species-pollen shape, size and fertility

Species	No. of pollen studies	Shape				Dry %	Water %	Size (μ)		Percentage of fertile pollen	
		Triangular		Round				Minimum	Maximum		
		%	%	%	%						
<i>P. guajava</i> var. <i>Safeda</i>	566	73.50	26.50	-	16.43	31.47	15.60	25.2	20.37	96.85	
<i>P. guajava</i> var. <i>Seedless</i>	668	-	75.46	16.62	7.92	15.69	18.94	21.0	16.88	74.25	
<i>P. cujavillus</i>	626	73.45	15.10	4.18	7.27	17.96	22.04	21.0	19.06	98.32	
<i>P. pumilum</i>	687	78.15	7.30	-	14.55	18.42	23.96	14.68	22.7	21.02	97.00
<i>P. polycarpum</i>	387	93.34	4.66	-	-	13.43	18.45	12.60	16.6	14.28	98.85
<i>P. cattleianum</i>	660	66.51	22.12	11.37	-	21.68	27.56	18.90	42.0	25.62	18.64
<i>P. cattleianum</i> var. <i>lucidum</i>	620	63.70	25.50	10.80	-	22.59	29.75	16.80	44.1	26.04	84.21
<i>P. molle</i>	728	2.77	72.52	17.71	7.00	26.49	22.98	16.80	48.3	28.98	78.00
<i>P. friedrichsthalianum</i>	613	-	37.04	62.96	-	25.44	26.27	22.10	31.5	26.20	77.22

individual species. The work was carried out based on the method adopted by Nair et al. (1964) and Teatitia et al. (1970).

RESULTS AND DISCUSSION

Pollen grains of both guava and its relatives were fine yellowish powder when observed with naked eye and brownish yellow under microscope. The shapes of the fresh pollen grains were triangular, square, oval and round in dry and water media whereas in acetocarmine only triangular and oval shapes were observed in var. Safeda. In var. Seedless it was oval, round and square in all the three media. In Safeda the triangular shape was more (73.50%) while in Seedless oval was dominant (75.46%). The triangular, oval and square pollen grains had 3,1,1 germ pores respectively, one at each corner. The shape of sterile pollen grains was variable. The size of Safeda pollen grain was 16.43 μ , 21.47 μ and 20.37 μ and that of Seedless 15.69 μ , 16.9 μ and 16.88 μ in dry, water and acetocarmine media respectively (Table 1).

All the species of guava recorded maximum percentage of triangular shape pollen grains except *P. molle* (oval, 72.52) and *P. friedrichsthalianum* (round,

62.96). All the species expressed similar shape in all the three media with a minor difference and *P. polycarpum* recorded bigger shape than guava cultivars. *P. molle* had the biggest pollen size among the species studied.

The maximum percentage of fertility was 96.85 and 74.25 for Safeda and Seedless. The Seedless was showing very poor fruit set which might be due to low percentage of fertility. Among the relatives maximum percentage fertility was recorded in *P. polycarpum* followed by *P. cujavillus*, *P. pumilum*, *P. cattleianum* var. *lucidum*, *P. molle*, *P. friedrichsthalianum* while, *P. cattleianum* recorded only 18.64 percent (Table 1).

The pollen grains were viable at room temperature till 30 days whereas it maintained its viability upto 210 days in shallow pan (refrigerator). The cultivars showed 9.85 and 4.72 per cent viability after 30 days while it recorded a viability of 50.36 and 20.64 per cent after 210 days in refrigerator. The viability decreased more rapidly in Seedless. All the related species maintained a poor viability at room temperature (Table 2) whereas in refrigerator more than 50 per

Table 2. Pollen viability of Psidium species stored at room temperature

Viability tested after	<i>P. guajava</i> var. Sareda		<i>P. guajava</i> var Seedless		<i>P. cujavillus</i>		<i>P. pumilum</i>		<i>P. molle</i>	
	Room tem. %	Shallow pan %	Room tem. %	Shallow pan %	Room tem. %	Shallow pan %	Room tem. %	Shallow pan %	Room tem. %	Shallow pan %
Fresh	96.85		74.25		98.32		97.00		78.00	
15 days	50.27	93.72	40.07	62.13	71.09	92.80	49.76	95.74	25.67	70.57
30 days	9.85	90.36	4.72	58.48	7.89	91.52	8.56	94.69	6.93	65.96
45 days	-	86.46	-	54.19	-	89.13	-	90.64	-	56.53
60 days	-	84.84	-	52.94	-	85.80	-	87.56	-	52.52
90 days	-	80.68	-	48.49	-	74.40	-	79.64	-	44.84
120 days	-	72.79	-	40.28	-	62.70	-	66.96	-	39.64
150 days	-	67.50	-	35.94	-	54.63	-	57.86	-	31.69
180 days	-	54.64	-	30.28	-	44.71	-	48.68	-	24.46
210 days	-	50.36	-	20.64	-	33.36	-	36.78	-	18.70

cent longevity was maintained in *P. cujavillus* and in *P. pumilum*. The storage of pollen at shallow freeze proved to be a better medium for guava pollen grains with enhanced longevity. It was also clear that the pollen grains of *P. pumilum* stored longer than that of other two

species.

Sareda had more or triangular pollen while it was oval in Seedless. *P. molle* recorded more of oval pollen while it was round in *P. friedrichsthalianum* while the other species were dominated with triangular

pollen. Among the species, *P. polycarpum* recorded the smallest pollen size of 14.28 μ while the biggest pollen was in *P. molle* (28.98 μ). Similar observations were recorded by Nair et al. (1964), Tewari (1969) and Teotia et al. (1970). However, there was no significant difference between the species in shape of the pollen grain. In guava Seedless, the fertility of pollen was 74.25 and the minimum of 18.64 per cent was recorded in *P. cattleianum*. All the other species recorded good pollen fertility. These findings were in conformity with the earlier reports of Singh and Seghal (1968) and Ranganath (1973). However, Teotia et al. (1970) recorded only 9.82 per cent fertility in *P. friedrichsthalianum*. The difference in

fertility might be due to either weather, physiological or soil factors.

The pollen grains stored at $15 \pm 2^\circ\text{C}$ were better than those at room temperature. Pollen grains were viable up to 30 days at room temperature and 120 days in refrigerator. However, Tewari (1969) stored guava pollen up to 6 months at 0°C with 25 per cent relative humidity and Ranganath (1973) stored pollen of related species in cold and dry method up to 180 days.

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