Influence of weather factors on the floral characteristics of coconut

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Coconut (*Cocos nucifera* L.) is unique in all respects among the horticultural crops grown in the country. Varieties with high fruit set are desirable for crop improvement strategies. In general, varieties exhibit lower female flower production in post monsoon season as compared to summer (February to May) and monsoon (June to September) months. Fluctuation in coconut yield during different years have been explained due to the variation in rainfall pattern (Rajagopal *et al.*, 1996) and rainfall during first three months of nut development determines the size of the crop per year (Smith, 1966). The small sized nuts, low copra content and poor yield observed in the harvests during September to November are caused by the dry spell, the crop faces at the time of spadix primordia initiation (occurring 44 months before the ripening of nuts) and early stage of kernel formation (Aravindakshan, 1991).

The understanding of weather relations of coconut will ultimately lead to better production of crop performance and proper planning of crop management. Scanty information is available on these aspects specially in West Bengal and considering the importance of weather parameters, an attempt was made to study the effect of weather parameters on floral characteristics of coconut.

The investigation was carried out in a 23 year old plantation, at Horticultural Research Station, Mondouri, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal during September, 2003 to September, 2005. The experiment with five varieties namely East Coast Tall, Hazari, Jamaican Tall, Java and Zanzibar was laid out in randomised block design with five palms in each variety, to study the influence of weather parameters on eight floral characters of coconut. All the cultural management and plant protection measures were done as per the need of crop. The characters studied were length of inflorescence, length of stalk, length of spikelet, number of female flowers per inflorescence, length of spikelets bearing portion, number of spikelets per inflorescence, percentage of fruit set and the interval between the two successive spadices. The inflorescence emerged during each month was marked separately indicating the month of emergence by aluminum tag. After one month of emergence, different observations on floral characters were documented from each palm. Five spikelets were selected randomly from middle portion of inflorescence for measuring the length of spikelet.

The data presented in Table 1 clearly revealed the variation of floral characters in different months irrespective of varieties but significant variations were noticed in respect of length of spikelet bearing portion, percentage of nut set and interval between two successive spadices. The maximum length of inflorescence (39.54 cm) was found during the month of December followed by 38.32 cm during the month of November and January, thereby the winter months can be demarked as the period for maximum length of inflorescence. The lowest length (35.10 cm) of inflorescence was recorded in the month of July. In the case of length of spikelets bearing portion, the maximum length (29.76 cm) was recorded in the month of December followed by August (29.45 cm), November (29.09 cm) and May (29.68 cm). The shortest (8.98 cm) stalk length was observed in the month of February followed by July (9.42 cm) and March (9.45 cm). The maximum length of stalk was recorded in the month of January (10.40 cm) followed by April (10.02 cm) and September (10.00 cm).

The maximum length of spikelets (16.33 cm) was observed during the month of May followed by December (16.19 cm) and November (15.84 cm) whereas, the shortest (14.67 cm) spikelet was recorded in the month of February followed by March (15.11 cm) and January (15.19 cm). The highest number of spikelets per inflorescence was observed in winter months *i.e.*, October (37.31), November (37.20)January (36.00) and February (35.53) but lower number of spikelets per inflorescence was observed in summer months *i.e.*, June (30.36), March (30.76), April (30.77) and May (31.46). Maximum number of female flowers was recorded during the month of May (35.75) followed by month of September (32.51), while the lowest number of female flower per inflorescence was recorded during month of December (15.01) followed by January (18.57) and February (21.38). The maximum nut set percentage was noticed in the month of December (42.88) followed by January (39.10), February (31.71) and November (30.78). The coolest months of year *i.e.*, December – January recorded the maximum percentage of nut set but the lowest nut set (20.98) was noticed in the month of May followed by June (25.73). The interval between two successive spadices was minimum (28.18 days) during the month of May followed by June (30.33 days), September (31.95 days) and August (32.26 days). Whereas, the maximum (38.44 days) time taken for opening of two successive spadices was observed during the month of January followed by February (38.00 days), March (36.37 days) and December (34.94 days).

The data presented in Table 2 clearly showed significant variations among different characters under study except percentage of nut set and interval between the two successive spadices. The variety Hazari produced the longest inflorescence (40.13 cm) with maximum length of spikelets bearing portion (29.77 cm), stalk length (10.30 cm), length of spikelets (16.96 cm) and number of spikelets per inflorescence (36.38). The maximum number of female flowers per inflorescence was recorded in Java (32.06) but maximum nut set was noticed in case of Jamaican Tall (30.44%). The minimum time was required for opening of two successive spadices in East Coast Tall (32.82 days). Variations among the different cultivars in respect of floral characteristics were also reported by many workers (Panda, 1982; Ratnambal *et al.*,2003 and Kumaran *et al.*,2004).

Experimental results revealed a number of interesting findings about the floral characters in relation to months and variations in weather parameters. The observation from the present investigation in respect of female flower production is in good conformity with the findings of Ratnambal *et al.* (2003) who obtained the highest female flower production during April – June and the highest female flower was produced during the month of May in the present study. Menon and Pandalai (1958) observed higher female flower production during March – July at Kasaragod. Sreelatha and Kumaran (1991) observed higher female flower production during February to May in T x D.

Table 1. Influence of different months on floral characters of coconut

Month	Ch 1	Ch 2	Ch 3	Ch 4	Ch 5	Ch 6	Ch 7	Ch 8
January	38.32	28.55	10.40	15.19	36.00	18.57	39.10	38.44
February	36.48	28.05	8.98	14.67	34.53	21.38	31.71	38.00
March	36.06	26.46	9.45	15.11	30.76	22.49	28.50	36.37
April	37.56	27.80	10.02	15.72	30.77	30.01	26.20	32.75
May	37.23	28.68	9.73	16.33	31.46	35.75	20.98	28.18
June	36.98	26.42	9.73	15.78	30.36	26.14	25.73	30.33
July	35.10	24.27	9.42	15.48	32.95	28.50	26.69	32.31
August	37.16	29.45	9.67	15.74	33.08	27.36	28.25	32.26
September	37.37	27.29	10.00	15.72	34.01	32.51	28.35	31.95
October	35.40	27.11	9.55	15.57	37.31	28.25	26.46	32.48
November	38.32	29.09	9.72	15.84	37.20	27.55	30.78	32.81
December	39.54	29.76	9.63	16.19	35.34	15.01	42.88	34.94
S.Em.(+)	1.075	1.063	0.519	0.451	1.794	4.407	2.404	0.624
CD (P=0.05)	N.S.	3.009	N.S.	N.S.	N.S.	N.S.	6.806	1.766

Ch 1 = Length of inflorescence (cm)
Ch 2 = Length of spikelets bearing portion (cm)
Ch 3 = Length of stalk (cm)
Ch 4 = Length of spikelets (cm)
Ch 5 = Number of spikelets per inflorescence
Ch 6 = Number of female flower per inflorescence
Ch 7 = Percentage of nut set
Ch 8 = Interval between two successive spadices (days)
N.S. = Not Significant

Table 2. Variation in floral characteristics of different coconut varieties

Varieties	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8
East Coast tall	36.71	28.18	8.86	15.09	35.29	23.53	29.96	32.82
Hazari	40.13	29.77	10.30	16.96	36.38	29.88	29.53	34.36
Jamaican Tall	35.97	26.54	9.89	15.19	34.47	24.64	30.44	32.89
Java	35.91	26.66	9.89	15.26	30.56	32.06	28.54	33.60
Zanzibar	36.90	27.56	9.52	15.57	31.54	20.52	29.70	33.34
S.Em. (±)	0.694	0.686	0.335	0.291	1.158	2.845	1.552	0.403
C.D. (P=0.05)	1.964	1.942	0.948	0.824	3.278	8.054	N.S.	N.S.

Ch 1 = Length of inflorescence (cm) **Ch 5** = Number of spikelets per inflorescence **N.S.** = Not Significant
Ch 2 = Length of spikelets bearing portion (cm) **Ch 6** = Number of female flower per inflorescence
Ch 3 = Length of stalk (cm) **Ch 7** = Percentage of nut set
Ch 4 = Length of spikelets (cm) **Ch 8** = Interval between two successive spadices (days)

The present findings are also in good conformity with the observations of Thampan (1981) who noticed that in India, the female flower production rate is generally found to be high during the period from March to May, the highest being in May and the lowest from September to January. It is the female flowers that set into nuts and good rainfall during March and May removes water stress during April to June and the crop responds positively by inducing more flower setting in August to December. In the present study the highest nut set was also noticed in the month of December (42.88%), followed by January (39.10%).

Excess rainfall during this setting period causes premature nutfall and decline in productivity (Vijayakumar *et al.*, 1988). Excess rainfall during March to May was not found harmful probably due to the accelerated transpiration facilitated by a high temperature and low humidity (Shanmugham, 1973). In respect of nut setting, the present findings (the highest during December and the lowest during May) are in good agreement with the observation of Ratnambal *et al.* (2003) who recorded higher setting during October to December. Sreelatha and Kumaran (1991) also observed high setting during August, September and December and the lowest in June at Nileshwar (Kerala). From the study it is clear that floral characteristics of a particular cultivar is greatly influenced by the weather parameters.

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