



Short Communication

Influence of Weather Parameters on Yield and Yield Attributes of Areca Nut (*Areca catechu* L.)

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ABSTRACT

Studies were conducted at Regional Agricultural Research Station, Ambalavayal, Wayanad, Kerala on the relationship between the yield of Areca nut and weather parameters viz. temperature, relative humidity and rainfall. Results revealed that during the flowering stage i.e., January to March, an increase in minimum temperature, relative humidity and rainfall had significant positive influence on nut yield. In contrast, rainfall during the nut development stage (from June to July) adversely affected the crop yield. Areca nut prefers high relative humidity particularly during the morning period throughout its growth period. Multiple regression equations were developed for predicting the areca nut yield based on rainfall and minimum temperature.

Key words: Weather, Areca nut, Rainfall, Temperature, Yield

Areca nut, (*Areca catechu* L.), also popular by the names betel nut and supari is used world wide for consumption and chewing purpose. It is one of the important commercial plantation crops in the South East Asia. In the context of both area and production, India contributes to around 51% of World's total production. In India, it is extensively used by large section of people and is very much used in several religious practices. Major states cultivating this crop in India are Karnataka (40%), Kerala (25%), Assam (20%), Tamilnadu, Meghalaya, West Bengal and Maharashtra to some extent. Weather plays an important role in determining the yield of Areca nut. As a perennial crop, the influence of weather on yield is cumulative since every bunch has to go through a long period of about 14 months of development from flower bud initiation to

maturity. The variations in weather parameters during this period have a significant effect on final nut yield. So far very few studies were conducted in this direction and none of them have indicated the critical periods of nut development during which weather factors play a critical role. In this study, an attempt was made to identify the important weather parameters during different stages of nut development from flowering to ripening.

A field experiment was conducted at Regional Agricultural Research Station (RARS), Ambalavayal, Wayanad, Kerala from 1991 to 2006 with an objective to find out the relationship between the yield and yield attributes of arecanut as influenced by weather parameters. The variety selected for the study was 'Mangala', which is grown under rain fed condition receiving recommended doses of fertilizers. The crop was planted in 1985. Data on various weather parameters available at RARS, Ambalavayal

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Table 1. Year wise yield, yield attributes and related weather parameters of Areca nut

Year	Yield (kg/ha)	Number of nuts per bunch	Number of nuts per palm	Weight of nuts (g)	Min. Temp (°C)	Max. Temp (°C)	RH 1 (%)	Annual Rainfall (cm)
1992	8843.1	206.0	80.0	3.4	13.9	25.9	79.2	231.82
1993	12401.2	289.2	84.8	4.4	13.3	26.1	77.4	213.32
1994	10358.9	213.2	115.3	4.7	15.1	26.8	89.3	269.08
1995	20320.1	431.0	126.7	6.0	13.4	26.9	85.6	231.76
1996	6950.1	389.7	143.5	6.3	10.7	25.6	80.1	198.24
1997	20028.4	420.9	160.4	7.6	15.8	26.5	89.6	215.14
1998	22906.8	473.3	173.0	7.6	16.2	25.9	88.5	172.85
1999	25409.2	543.0	203.4	9.0	15.4	26.7	90.8	155.88
2000	19961.5	438.4	174.7	7.4	16.6	26.7	91.2	174.38
2001	23032.8	468.4	183.8	8.7	16.1	26.9	89.6	144.61
2002	23474.7	500.3	187.5	8.4	15.4	27.4	94.1	110.85
2003	25329.6	561.7	174.5	7.8	15.8	27.2	91.0	152.06
2004	21450.2	463.9	174.8	7.7	14.7	26.8	93.9	189.98
2005	19144.7	417.1	176.1	7.7	14.8	25.6	94.5	216.82
2006	6005.1	119.4	106.0	4.8	14.7	25.4	87.6	346.05

were made use for finding out the relationship of weather parameters on yield and yield attributes. After establishing their relationship, those weather parameters which have shown significant effect on final yield (fresh nut weight) were selected and multiple regression analysis (stepwise) was done to quantify the influence of weather parameters on final yield.

The results of the experiment revealed that the final nut yield and the yield attributing parameters like number of nuts per palm, number of nuts per bunch and weight of nuts were significantly influenced by weather parameters. (Table 1).

Weather parameters like minimum temperature, relative humidity (both morning and evening) and rainfall during flowering i.e., January – February (Murthy, 1977) had a significant positive influence on nut yield and nut weight. It is interesting to notice that during the fruit setting period (1st fortnight of March) and fruit development period (May – November) rainfall had a strong negative correlation with yield and yield attributes. Vijayaraghavan *et al.* (1988) also reported similar observations in coconut as heavy rainfall hinders the pollination of the flowers. Even though increase in maximum temperature during

peak summer (April – May) had negative influence on yield and yield attributes, during rainy and winter season (June – December) it had significant positive effect. This is because increase in temperature during the rainy and winter seasons brings the temperature to the optimum limit for crop growth of areca nut. For most of the tropical palms, the ideal mean annual temperature is usually found to be at around 27°C, and the average diurnal variation between 5°C and 7°C. Lower temperature seemed to be more limiting than high temperature (Child, 1964). High morning relative humidity (above 90%) throughout the growing period enhanced the crop yield of arecanut. Marar and Pandalai (1957) reported similar results for coconut.

The highest yield recorded was during the year 1999 (25409 Kg/ha). This may be due the more rainfall (weekly rainfall >15 mm), high relative humidity (>80 %) and high temperature (> 15°C) experienced by the crop during the flowering stage. Low rainfall (less than 250 mm) during the nut development stage (May – June) may have also contributed to higher yield during the year 1999. Number of nuts per palm showed positive correlation with temperature under Wayanad conditions.

Multiple regression equations were developed to predict the nut yield (fresh weight) of areca nut using rainfall and minimum temperature as independent variables. The equation is as follows:

$$\text{Yield} = -756 \times 10^{-3} \text{RF} + 2.06 \text{Tmin (Jan)} \\ R^2 = 0.77 \quad \dots(1)$$

Yield = Fresh nut weight of areca nut in Kg per hectare.

RF = Annual Rainfall (cm).

Tmin (Jan) = Minimum temperature in the first fortnight of January.

From the study it can be concluded that annual rainfall above 2000 mm and temperature below 14.0°C is detrimental to arecanut yield. High amount of rainfall received during the nut

development stage is congenial for pest and disease development especially *Mahali* (Phytophthora fruit rot) in areca nut gardens thus reducing yield.

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