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Letters to the Editor

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EFFECT OF WEATHER VARIABLES ON ARECANUT PALMS (*ARECA CATECHU L.*)

1. Arecanut (*Areca catechu L.*) is a tropical palm and is grown in a variety of soils and climatic conditions within this region. It grows well from almost sea level up to an altitude of 1000 m with an adequate rainfall or under irrigation within a temperature range of 14° C to 36° C (Anonymous 1982). But as the altitude increases the lower temperatures affect badly on the kernel hardening which may result in poor quality of nuts (Murthy and Pillai 1973). As the palm is very sensitive to water stress, it requires frequent irrigation during summer months in the areas where distribution of rainfall is poor (Abdul Khader *et al.* 1982). Thus the weather variables play important role on the palm and its yield. The dependability of the palm on weather variables is studied and a functional relationship is established between them.

2. *Material and methods* — Weather data were collected from Central Plantation Crops Research Institute, Vittal for the period 1968-1979 and the variables except climatological normals, were computed. Potential evapotranspiration as defined by Doorenbos and Pruitt (1977) was computed by modified Penman method on weekly average basis for the above period. Moisture adequacy index, which is the ratio of actual evapotranspiration to potential evapotranspiration and soil moisture storage values were evaluated on monthly average basis by water balance computations for the region using Thornthwaite and Mathers revised book-keeping procedure. Considering uniformity in weather conditions in an year, four seasons were defined as : (1) December-February, (2) March-May, (3) June-August, & (4) September-November. Seasonal average values of weather variables were used for the analysis. The variables along with symbols are:

Total rainfall (mm) (TRF), Total rainy days (>2.5 mm/day) (NRD), Average daily maximum temperature (°C) (MXT), Average sunshine (hours/day) (SSH), Average evaporations (mm/day) (EVP), Mean daily relative humidity (%) (MRH), Total evapotranspiration (mm) (PET), Average monthly moisture adequacy index (%) (MAI) and Total soil moisture (mm) (TSM).

Data on annual yield (wet weight of ripe nuts) were collected from the gardens of Central Plantation Crops Research Institute, Vittal for the available period of eleven years (1969-79). Harvesting season for the palm starts by November and lasts till March with 3-4 harvests at an interval of 1-1½ months. One hundred areca palms of uniform age, cultural practice, manurial treatment and grown under identical conditions were selected for the study.

The method adopted here involves two steps. In the first step the variables were correlated with the yield and tested for significance (at 5% level). As the developmental process of nuts is of long term, variables of the year of harvest (zero lag) and previous year (one year lag) were correlated with the yield. The second step involves multiple regression analysis. Variables with significant correlation coefficients were selected for regression analysis. A software package developed by Statistics Division of Central Plantation Crops Research Institute, Vittal was used for the above purpose.

3. *Results and discussion* — The weather variables with significant (>60%) correlation coefficients in one or more seasons are given in Table 1.

Average evaporation during Dec-Feb showed positive correlation with the yield in the second year indicating palms' preference for dry weather. Sunshine hours during summer had negative correlation with following year's yield. Since majority of spadices initiate during this period (Bavappa and Annaji Rao 1970) any water stress may cause abortion of the spadix. Even sunshine hours and temperatures during Sep-Nov found detrimental on successive year's yield. As this is the period when inflorescences open and bloom, the palms may not favour hot climate. Humid climate during winter (Dec-Feb) is also not favoured by the palms. In the regression analysis only two variables were found to influence the yield significantly. The linear model developed showed 78% predictability.

$$Y = 6.46\ EVP_{11} - 2.85\ MXT_{14} + 65.47$$

where, Y is average annual yield/palm. Subscripts indicate lag year and season number respectively.

As the variables of previous year only involve in the model, the yield can be predicted in advance.

TABLE 1

Correlation coefficients of weather variables

Variables	Zero lag				First lag			
	Sep-Nov	Jun-Aug	Mar-May	Dec-Feb	Sep-Nov	Jun-Aug	Mar-May	Dec-Feb
EVP	0.54	0.04	0.32	0.22	—0.10	—0.10	0.49	0.77
SSH	0.04	0.06	—0.30	—0.29	—0.70	—0.12	—0.64	—0.14
MRH	—0.26	—0.12	—0.02	—0.64	—0.23	—0.13	—0.16	0.43
MXT	—0.11	—0.06	—0.50	—0.06	—0.64	—0.25	—0.4	0.32

4. *Conclusion* — Arecanut palms showed considerable dependency on weather variables maintaining other factors uniform and at satisfactory levels. The model developed to predict the yield was found sufficiently accurate to indicate the yield trend. The present work can be considered as an initiative towards developing a crop weather modelling.

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