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CORRELATION STUDIES ON THE NUT AND COPRA CHARACTERS OF WEST COAST TALL COCONUTS HARVESTED DURING DIFFERENT MONTHS OF THE YEAR

K. SATYABALAN* and JACOB MATHEW
Central Plantation Crops Research Institute
Kasaragod 670 124, Kerala, India

ABSTRACT

Correlation studies were conducted on nut and copra characters of nuts, harvested during different months of the year from West Coast Tall (WCT) palms grown under rainfed conditions at CPCRI Kasaragod. There was significant correlations between 1) weight of fruit (unhusked nut) and weight of husked nut 2) the weight of fruit and weight of husk 3) weight of husked nut and wet weight of kernel 4) weight of husked nut and wet weight of shell 5) weight of husked nut and weight of copra 6) wet weight of kernel and weight of copra and 7) weight of shell and weight of copra in the nuts harvested during the different months of the year irrespective of seasonal effects on these characters. Slight differences in the magnitude of the association noticed in the different months can be attributed to the effect of season prevailing during development.

INTRODUCTION

In a regular bearing coconut palm, when once it begins to bear fruit every leaf axil will have an inflorescence and the production of inflorescences continues in successive leaf axils at intervals of about a month. The female flowers take about twelve months to develop into mature nuts. Thus from a regular bearing palm, one bunch of mature nuts is harvested every month. Nuts harvested during different months of an year (Patel, 1938) vary in their nut and copra characters. So far the relationship of nut and copra characters like the fruit weight, husked nut weight, kernel weight, copra weight and shell weight in WCT, harvested during the different months of an year, has not been studied. In this paper an attempt has been made to study the different nut and copra characters of matured nuts harvested during different months from the bearing palms of WCT and their inter-relationship.

MATERIALS AND METHODS

Ten bearing palms of the WCT variety of coconut grown under rainfed conditions at Kasaragod were selected and the dates of opening of the inflorescences produced in the successive leaf

* *Present address: Ananda Vilas, Opposite Parur Courts, North Parur 685 513, Kerala*

axils of the palms in the course of one year were noted. The bunches were harvested after twelve months and the nut and copra characters like weight of fruit, weight of husked nut, weight of husk, wet weight of kernel, weight of shell and weight of copra of each nut of individual bunch of each palm were recorded. The nuts studied were uniformly ripe and the copra was dried to constant weight. Coefficients of correlation between the different characters were worked out for the nuts harvested every month, out of which the following important ones are reported.

The weight of fruit and weight of husked nut; the weight of fruit and weight of husk; the weight of fruit and weight of kernel; the weight of fruit and weight of copra; the weight of husked nut and wet weight of kernel; the weight of husked nut and weight of shell; the weight of husked nut and weight of copra; the wet weight of kernel and weight of shell; the wet weight of kernel and weight of copra; the weight of shell and weight of copra.

The total number of nuts studied during the year was 708, the number varying from a minimum of 32 in November to a maximum of 80 in February and in each palm the total number of nuts studied varied from 54 to 86.

RESULTS AND DISCUSSION

Mean values of nut and copra characters of bunches harvested during the different months of the year and their coefficients of variation are presented in Table I. It is evident from

Table I. *Characteristics of nuts harvested during the different months*

Month	Wt. of fruit		Wt. of husked nut		Wt. of husk		Wt. of kernel		Wt. of shell		Wt. of copra	
	Mean	C. V(%)	Mean	C. V(%)	Mean	C. V(%)	Mean	C. V(%)	Mean	C. V(%)	Mean	C. V(%)
January	1410.27	6.90	543.08	7.61	867.19	8.67	297.87	7.38	150.63	6.80	168.69	6.87
February	1374.91	6.54	556.92	7.78	817.99	8.09	289.58	7.32	155.79	7.12	168.65	6.33
March	901.37	7.35	519.39	8.07	381.99	10.01	288.83	7.67	149.45	6.89	171.28	7.15
April	1140.32	7.59	619.01	6.86	521.81	10.82	309.71	6.56	161.95	6.90	188.92	6.70
May	1269.68	6.57	666.23	6.89	604.52	9.13	333.82	6.44	173.27	5.53	190.46	7.23
June	1512.87	10.64	627.40	9.02	885.48	14.51	319.32	7.78	159.76	8.59	181.16	9.10
July	1179.40	13.99	563.82	7.54	615.58	23.67	293.58	9.47	154.79	7.03	166.62	7.41
August	1272.82	7.39	548.84	8.53	723.99	8.51	276.08	8.35	149.51	7.12	154.57	8.89
September	1524.90	4.63	627.10	5.51	897.81	5.62	298.88	6.60	171.65	5.48	180.07	6.52
October	1301.67	6.02	588.46	6.66	713.21	7.20	297.40	8.07	165.79	6.34	177.27	7.86
November	1081.47	6.21	565.34	5.90	519.25	10.89	299.56	9.95	162.28	5.35	167.44	11.03
December	1261.37	11.45	587.85	5.99	673.51	21.26	299.49	3.96	168.05	6.25	178.88	5.11

the data that there is considerable variation for various characters of the nuts harvested during the different months of the year and this can only be attributed to seasonal effect during development of the nuts.

Analysis of variance carried out for these characters, reveals that the values obtained for the months of January, February, June and September were on par for weight of fruit and weight of husk and for the remaining eight months also the values were more or less similar. In the case of weight of husked nut and weight of copra comparable values were recorded during the months of April May, June and September. The values obtained for the remaining eight months for the above two characters were also similar.

The constituents of the nuts harvested during January to December and their contribution were studied in detail. The main constituents of the fruit are the nut and husk and constituents of the husked nut are the wet kernel which becomes the copra on drying, the shell and the nut water. Mean values and the range of weight of husked nut as percentage of fruit weight and of weight of wet kernel, weight of shell as percentages of husked nut and weight of copra as percentage of kernel weight are presented in Table II. The data indicate that the husk content in the fruit was less than 50 per cent of the weight of fruit during March, April, May and November while it varied between 52.2–61.5 per cent during the rest of the months. In the husked nut, the kernel content varied from 53.0 to 55.6 per cent during November, January and March while it was less than 50 per cent during the remaining months. The shell content in the husked nut was 28 per cent and above during February, March, October, November and December while it was less than 28 per cent during the remaining months. The recovery of copra from the wet kernel was 58–60 per cent during February, March, April, September, October and December indicating that the moisture content in

Table II. *Composition of the nut (mean of all the nuts harvested from ten trees)*

Month	Wt. of husked nut as % wt. of fruit	Wt. of kernel as % wt. of husked nut	Wt. of shell as % wt. of husked nut	Wt. of copra as % wt. of kernel
January	38.5 (30.6–50.4)	54.9 (50.0–59.0)	27.7 (25.5–29.8)	56.6 (53.6–60.7)
February	40.5 (31.2–49.2)	52.0 (46.3–58.9)	28.0 (25.5–30.2)	58.2 (53.7–66.0)
March	57.6 (48.0–63.3)	55.6 (52.9–61.0)	28.8 (26.8–30.6)	59.3 (55.1–64.3)
April	54.3 (41.2–60.1)	50.0 (47.9–53.9)	26.2 (23.9–28.7)	61.0 (57.6–63.9)
May	52.5 (42.4–63.4)	50.1 (46.4–54.1)	26.0 (22.8–29.0)	57.1 (53.8–59.9)
June	41.5 (37.7–47.9)	50.9 (44.4–55.1)	25.5 (21.6–28.7)	56.7 (53.5–60.7)
July	47.8 (39.0–59.4)	52.1 (45.9–56.1)	27.5 (24.6–29.5)	56.6 (54.2–61.4)
August	43.1 (34.3–50.4)	50.3 (47.4–53.9)	27.2 (23.1–29.9)	55.9 (50.1–60.2)
September	41.1 (31.6–49.9)	47.7 (43.8–52.4)	27.4 (24.2–30.0)	60.3 (57.3–62.1)
October	45.2 (31.4–55.8)	50.5 (44.9–60.6)	28.2 (24.1–33.0)	59.6 (54.7–63.5)
November	52.3 (37.6–56.8)	53.0 (46.5–58.0)	28.7 (25.5–32.3)	55.3 (50.7–60.9)
December	46.9 (36.1–61.6)	50.9 (46.1–58.0)	28.4 (25.2–30.9)	59.1 (54.6–63.1)

wet kernel was low when compared to other months when it was less than 58 per cent which indicated that the moisture content in the wet kernel was high during these months.

Coefficients of correlation between the weights of different nut and copra characters are presented in Table III. Among the different correlations worked out between the nut and copra characters of nuts harvested each month, highly significant correlations were obtained between 1) weight of fruit and weight of husk 2) weight of fruit and husked nut weight 3) weight of husked nut and weight of kernel 4) weight of husked nut and weight of copra 5) weight of husked nut and weight of shell 6) weight of kernel and weight of copra and 7) weight of shell and weight of copra in the nuts harvested in all the months. The data indicated that any increase or decrease in the weight of fruit is mainly due to increase or decrease in husk content. Similarly any increase or decrease in weight of husked nut is attributable to increase or decrease in kernel, copra or shell weight. In spite of the seasonal effects which affect the nut characters these relationship hold good for nuts harvested during all the months of the year. Cooke (1933) reported a remarkably close correlation between the weight of husked nut and the meat content in Malaya and Ceylon respectively. Harland (1957) observed that varieties with heavy husked nuts had a higher weight of copra per nut and considered the correlation between the weight of nut and weight of copra per nut as the most important. In the case of inter relationship between weight of

Table III. *Coefficients of correlation between the weights of different nut and copra characters*

Month	Fruit and husked nut	Fruit and husk	Fruit and kernel	Fruit and copra	Husked nut and kernel	Husked nut and shell	Husked nut and copra	Kernel and shell	Kernel and copra	Shell and copra
January	0.6881**	0.9169**	0.6442**	0.5870**	0.9286**	0.8517**	0.8644**	0.7495**	0.3592**	0.7519**
February	0.7168**	0.7693**	0.4560**	0.6435**	0.6253**	0.7724**	0.7934**	0.3770**	0.6253**	0.6140**
March	0.8431**	0.8076**	0.6617**	0.7108**	0.7281**	0.7498**	0.8271**	0.4619**	0.7191**	0.6574**
April	0.8327**	0.9076**	0.7497**	0.6946**	0.7928**	0.8646**	0.7696**	0.6754**	0.7168**	0.7052**
May	0.7719**	0.8301**	0.6735**	0.5777**	0.8839**	0.8627**	0.7511**	0.7039**	0.7977**	0.5008**
June	0.6912**	0.9480**	0.6734**	0.3825**	0.9176**	0.9273**	0.6558**	0.8461**	0.7061**	0.5939**
July	0.5569**	0.9701**	0.3222*	0.4139**	0.7865**	0.7369**	0.8546**	0.4311**	0.7291**	0.6208**
August	0.6238**	0.9204**	0.7429**	0.8711**	0.8844**	0.8659**	0.8307**	0.6926**	0.8165**	0.7744**
September	0.7453**	0.8898**	0.6281**	0.6478**	0.6454**	0.8336**	0.7518**	0.4807**	0.7147**	0.5623**
October	0.8206**	0.8999**	0.7538**	0.7754**	0.7471**	0.6022**	0.8242**	0.1336**	0.8313**	0.4344**
November	0.6052**	0.8743**	0.4454*	0.5601**	0.8795**	0·7435**	0.7305**	0.5766**	0.7400**	0.5049**
December	0.4247**	0.9700**	0.2696	0.1390	0.8153**	0.8674**	0.7889**	0.7323**	0.8514**	0.6843**

* Significant at P=0.05 ** Significant at P=0.01

fruit and weight of kernel, weight of fruit and weight of copra and weight of kernel and weight of shell, the correlations are significant except during December for the first two combinations and October for the third. Slight differences in the magnitude of association noticed in the different months can be attributed to the effect of the season prevailing during development.

This investigation revealed that nut and copra characters of the nuts harvested during the different months of the year vary considerably. The climatic parameters (mean of 20 years) at Kasaragod (Table IV) on the West Coast of India where the study was conducted are reduced to the following four quarters of the year which generally indicates the four different seasons: 1. Hot weather season: March, April and May 2. South West Monsoon: June, July and August 3. North East Monsoon: September, October and November and 4. Cold weather season: December, January and February.

Table IV. *Climatic parameters at Kasaragod*

Period	Rain fall		Temperature (°C)		Relative humidity	Sunshine (hr/day)
	Total quantity (m m)	No. of rainy days	Max.	Min.		
March–May	328.6	12.4	32.7	23.8	85	8.7
June–August	2708.1	71.9	28.9	23.0	97	3.4
September–November	589.9	26.3	30.5	22.5	91	6.9
December–February	20.1	1.7	32.1	20.8	95	9.1

The variation in the nut and copra characters noticed can be attributed mainly to the effect of climatic factors prevailing at the time of development of the nuts. According to Abeywardena (1955) every bunch of coconut comes under the impact of a full twelve months weather cycle and the final yield as also the quality of the nuts will bear the imprint of the cumulative effect of this impact. Although each bunch is influenced by a 12 month weather cycle, the actual conditions encountered by the different bunches at similar stages of their development will be quite different. The weather changes during the 12 months do not also affect the bunch to the same degree. Vijayalakshmi, Pillai and Marar (1962) also obtained indications to show that the effect of season is not operating to the same extent on the different characters. Coomans (1975) reported the action of available water, temperature and sunshine intervene at various moments in the development of the inflorescence and the fruit. The relationship among the different characters of nuts harvested during different months of the year also indicate that the effect of season is not operating in the same way or to the same extent on the different characters studied here.

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