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Intra-varietal variability in Komadan seedlings

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Abstract

A study on the association of various quantitative characters and the pattern of variability in Komadan seedlings showed that considerable amount of variation in eight morphological characters. The seedling S71 showed the maximum values for collar girth at nine months age, number of leaves at nine and twelve months age. The seedling S68 had maximum height and collar girth at nine months age and number of leaves at nine and twelve months age. The seedling S100 was found to have the highest collar girth at twelve months age, number of leaves at nine months and twelve months age. The maximum coefficient of variation was recorded for number of leaves at twelve months age. High significant correlation was noted among eight morphological characters. Number of days for germination was positively correlated with number of days for splitting of leaflets and height of seedlings was positively correlated with collar girth. Number of days for splitting was negatively correlated with collar girth and height of seedlings. Selection based on the above characters will be useful in crop improvement programmes using Komadan as the information recorded on this ecotype were scanty.

Keywords: Komadan, correlation, seedlings, quantitative characters, variability

1. Introduction

In Kerala, apart from the distinctive varieties of tall and dwarfs, different high yielding genetically superior palms of different ecotypes are available (Thampan, 1999) [17]. These ecotypes are especially of the tall variety. The local farmers value them for their high yielding potential and multiple uses. Many progressive farmers believe that nearly five percent of the high yielding palms are distinctly different from the rest of the palms in productivity, nut qualities and resistance to pest and diseases and hence, these ecotypes are considered as unique category or improved ecotypes and the farmers value them for their preferential characteristics. The ecotype is defined by a group of individuals from the same environment showing morphological similarities (Ohler, 1999) [12]. The ecotypes of Kerala include 'Komadan', 'Kuttiyadi Tall' and 'Jappanan'. (Thampan, 1999) [17]. Komadan which is very popular in the erstwhile Central Travancore region of Kerala for the last many decades.

Gopimony (1984) [4,9] reported mean values of morphological characters of 'Komadan' which showed the superiority for all the nine quantitative characters compared to WCT and also 'Komadan' type further exhibited superior seedling vigour, in terms of germination percentage, height, collar girth, mean number of total leaves and mean number of split leaves. Nandi and Sugata (2000) [11] observed that unusual early flowering was observed in Komadan.

The seedlings of Komadan were more vigorous with high seedling vigour index and they showed early splitting of leaves. About 71 to 82 percent of seedlings showed moderate brown colour (bronze) in the petiole. Seedling selection for this character is essential to maintain the purity of Komadan. Komadan types occupied an area mid-way between NCD and WCT with a clear progression through generations towards better weight of unhusked nut. This indicates the origin of Komadan from the natural cross between WCT and yellow dwarf and its stabilized genetic position in between NCD and WCT. Komadan has been treated as good as or even better than the WCT cultivar in productivity, kernel quality, toddy yield and fibre output.

Studies on seedling variability are useful to ascertain the important component characters on which selection can be made. Therefore, the present investigation was undertaken to find out the pattern of variability in quantitative characters as well as the correlations among various component characters.

Materials and Methods

The study conducted at College of Agriculture, Vellayani during 2015-2016 using 100 Komadan coconut seedlings raised in the coconut nursery of Instructional Farm, Vellayani. The patterns of variability and the correlation among the characters were analysed based on the quantitative characters such as number of days for germination, number of leaves at nine

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months age, collar girth at nine months age, height of seedling at nine months age, number of days for splitting of leaflets, number of leaves at 12 months age, collar girth at 12 months age and height of seedling at 12 months age.

Results and Discussion In the present study, the Komadan seedlings have shown remarkable amount of variation in number of days for germination and ranged between 97 days and 134 days. Similar observation was reported by Anilkumar and Pillai (1989) ^[1]. High copra content was found to have an advantage over seedling sprouting (Charles, 1968) ^[2]. Early germination of seed nuts in coconut was associated with early bearing and increased nut yield (Harries, 1960) ^[5].

The effectiveness of selection based on seedling characters for genetic improvement of coconut was reported by Fremod *et al.* (1966) ^[3], Silva and George (1970) ^[15] and Manju (1992) ^[6]. In present study, characters such as number of days for splitting of leaflets, height, number of leaves and collar girth were observed both at nine and twelve months old. The observations at nine months were done based on the reported efficiency of early selection by Satyabalan and Mathew (1977) ^[14].

The number of leaves at nine months age varied from 3 to 5 and twelve months age showed a range between 5 and 8 (Table 1). Mathes *et al.* (1989) ^[8] have reported the importance of total number of leaves as the character which determines the total biological productivity through photosynthesis. The collar girth at nine months age ranged from 11.23 cm to 13.32 cm and at twelve months age it varied between 12.27 cm and 14.3 cm. Maximum collar girth was obtained from over ripe nuts with large size (Silva and George, 1970) ^[15]. Menon and Pandalai (1958) ^[10] revealed that girth at collar was the most important character for selection. The height of seedling showed considerable variation at nine (102.2 cm to 129.6 cm) and twelve months age (110.4 cm to 139.1 cm). The number of days for splitting of leaflets of 100 seedlings ranged from 350 days to 429 days. Menon and Pandalai (1958) ^[10] reported that early splitting of leaves was a sign of precocity since the seedlings which commenced to produce leaves that tend to split into leaflets, when the seedlings had eight to ten leaves showed early flowering.

The usefulness of selecting seedlings based on height, leaf number, collar girth and early splitting of leaves for the genetic upgrading of coconuts has been emphasised by many workers like Menon and Pandalai (1958) ^[10], Marar (1960) ^[7], Srinivasa and Ramu (1971), Mathew *et al.* (1984) ^[9] and Manju (1992) ^[6]. The Komadan mother palms which produce a minimum of 65 percent quality seedlings are prepotent ones. In the present study of Komadan seedlings, the coefficient of variation was the lowest for height, collar girth and number of days for splitting of leaflets. Similar findings were reported by Manju (1992) ^[6] and it was revealed that heritability and

genetic advance were high for number of days for germination indicating the predominance of additive genes, while number of days for splitting of leaflets in Komadan seedling to have the low heritability and high genetic advance. This shows that the effect of environment is comparatively less on number of days for germination and that selection on the basis of this character in Komadan will result in seedling with better height, girth and number of leaves.

Correlation among the character (Table 2) showed that number of days for germination had significant negative correlation at phenotypic level with most of the seedling characters in 100 Komadan seedlings indicating that early germinating seed nuts produced taller seedlings with more number of leaves and increased girth at collar. This is in conformity with the findings of Valsala and Kannan (1990) ^[18]. The nuts which germinated early produced seedlings where splitting of leaflets occurred earlier. Hence, number of days for germination had significant and positive correlation with number of days for splitting of leaflets. Similar correlations were observed by Srinivasa and Ramu (1971).

The height of seedlings (nine and twelve months age), number of leaves (nine and twelve months age), collar girth (nine and twelve months age) were found to be significantly and positively correlated among themselves. Similar correlation was reported by Pankajakshan and George (1961) ^[13], Sreerangasamy and Sridharan (1991) ^[16] and Manju (1992) ^[6]. Collar girth (nine and twelve months age) which is an important criterion in seedling selection was found to be positively correlated with all other characters indicating its relevance in seedling selection. This is in conformity with the results of Valsala and Kannan (1990) ^[18] and Manju (1992) ^[6]. Satyabalan and Mathew (1977) ^[14] revealed that it was possible to identify palms of superior genetic value based on collar girth and leaf production of progenies from the fifth month after germination.

In the present research programme, seedling characters maintained their identity in the recovery of quality seedlings which in turn reflects on the prepotent nature of the mother palm. This fact very important from the farmer's point of view, since quality seedlings are being recommended for cultivation to increase productivity in Komadan coconut. However, regarding Komadan palms, the yield related economically important parameters like weight of nuts per year, number of nuts per palm per year, weight of husked nuts per year, number of nuts per bunch, number of leaves per year, number of spadices per year, weight of nuts, endosperm thickness, weight of copra per year, number of spadices per year, and copra content per nut were expressed towards intra-varietal variability in Komadan palms. This variation will provide opportunities to the breeder for utilization, conservation and further genetic improvement by selection of palms with promising yield related characters.

Table 1: Patterns of variability of 100 Komadan coconut seedling characters

characters	Mean	SD	Minimum	Maximum	Range	CV
Number of days for germination	112.7	11.30	97	134	37	10
Number of leaves at 9 months age	4.1	0.70	3	5	2	17.3
Collar girth at 9 months age(cm)	12.3	0.47	11.23	13.32	2.09	3.8
Height of seedling at 9 months age(cm)	119.4	5.92	102.2	129.6	27.4	4.96
Number of days for splitting of leaflets	383.6	13.44	350	429	89	3.50
Number of leaves at 12 months age	6.8	0.73	5	8	3	10.7
Collar girth at 12 months age(cm)	13.4	0.43	12.27	14.3	2.03	3.18
Height of seedling at 12 months age(cm)	126.9	5.83	110.4	139.1	28.7	4.6

SD-Standard Deviation: CV-Coefficient of Variation

Table 2: Correlation studies on Komadan seedling characters

Characters	X1	X2	X3	X4	X5	X6	X7	X8
Number of days for germination (X1)	1.000							
Number of leaves at 9 months age (X2)	-0.767**	1.000						
Collar girth at 9 months age (X3)	-0.606**	0.668**	1.000					
Height of seedling at 9 months age (X4)	-0.565**	0.761**	0.737**	1.000				
Number of days for splitting of leaflets (X5)	0.871**	-0.600**	-0.480**	-0.418**	1.000			
Number of leaves at 12 months age (X6)	-0.633**	0.777**	0.802**	0.891**	-0.492**	1.000		
Collar girth at 12 months age (X7)	-0.618**	0.682**	0.916**	0.799**	-0.478**	0.882**	1.000	
Height of seedling at 12 months age (X8)	-0.597**	0.767**	0.743**	0.961**	-0.442**	0.930**	0.829**	1.000

* Significant at 5% level ** Significant at 1% level

Conclusion

The seedling S71 showed maximum values for collar girth at nine months age, number of leaves at nine months age and twelve months after sowing. The seedling S68 was found to have maximum height and collar girth at nine months age and number of leaves at nine and twelve months age. The seedling S100 was observed to have the highest collar girth at twelve months age, number of leaves at nine months and twelve months age. The maximum coefficient of variation was recorded for number of leaves at twelve months age. Highly significant correlation was noticed among the eight morphological characters. Number of days for germination was positively correlated with number of days for splitting of leaflets and height of seedlings was positively correlated with collar girth. Number of days for splitting was negatively correlated with collar girth, number of leaves and height of seedlings. The number of leaves was positively correlated with height of seedlings and collar girth. In the present research programme, the yield related phenotypic variation of Komadan palms provides opportunities to the breeder for utilization, conservation and future genetic improvement by selection of palms with promising yield related characters.

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