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DIOSPYRUS EBENUM KOENIG AN IDEAL SHADE TREE FOR CARDAMOM*

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ABSTRACT

Pooled analysis of yield data from an experiment conducted at CPCRI Research Centre, Appangala, Karnataka to evaluate shade trees for cardamom for four years revealed that cardamom grown under *karimaram (Diospyrus ebenum)* yielded 40-50 per cent more (121 g) than under elangi *(Mimusops elangi)*, nandi *(Legerstremia lanceolata)* and jack *(Artocarpus integrifolia)* (79-89 g). Plants grown under *karimaram* produced more and larger panicles than by those under other shade trees. Observations on general characters of shade trees also confirmed that the *karimaram* is superior to other shade trees for growing cardamom.

INTRODUCTION

Cardamom *(Elettaria cardamomum)* is a perennial plant grown under the warm, humid conditions of the tropics with a temperature range of 10-35°C, under the canopy of lofty evergreen forests of Western Ghats (Kololgi, 1976; Cherian, 1977). It is highly sensitive to wind and exposure to sunlight. Although cardamom is a shade loving plant, it is equally true that excess of shade is detrimental to the growth and yield of the plant (Anonymous, 1976; Kololgi, 1976). Since the intensity of light varies during different seasons in an year, the shade requirement also varies during these seasons (Anonymous, 1977).

Cardamom is generally cultivated in forest land and all kinds of trees that are grown in the forests are maintained as shade trees. The heterogeneity in the species and their characteristics as shade trees are the main obstacles to conducting any sensitive scientific experiments. According to Rai (1978), *balanchi* or red cedar (*Acrocarus fraxinifolius* Wight & Arn), jack (*Artocarpus heterophyllus* Lamk.) *hebbalasu* or *aini* (*Artocarpus hirsutus* Lamk.), *nili* or Java cedar (*Bischofia javanica* Blume), *karadi* or white cedar *Chukrasia tabularis* A. Juss. var Velutious King), and red cedar (*Cedrela toona* Roxb. ex Rottl. & willd. syn. *Toona ciliata* M. J. Roem.) are used as shade trees in coffee and cardamom plantations. Abraham (1957) is of the opinion that *karana (Vernonia monocis* C. B. Clarke) is an excellent shade tree for cardamom.

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Hence the study was conducted for evaluating the existing shade trees and identifying the most suitable one for cardamom.

MATERIALS AND METHODS

A preliminary study was conducted at CPCRI Research Centre, Appangala, Karnataka during the four year period from 1975–'76 to 1978–'79. Among the available and existing shade trees, twenty trees each from four important species of shade trees *viz., karimaram* or ebony (*Diospyrus ebenum* Koenig), *elangi* or spanish cherry *(Mimusops elangi), nandi* or *benteak (Lagerstroemia lanceolata* Wall) and jack *(Artocarpus heterophyllus* Lamk.) were selected. General observations such as height of trees, spread of canopy and branching (using Hega altimetre) etc. were collected for the final year 1978–'79. Sixteen cardamom plants beneath each shade tree (four plants each from four directions; North, West, South and East) were selected and marked for taking observations. The yield data for each year were recorded for each of the plants.

RESULTS AND DISCUSSION

Analysis of growth characters of cardamom plants grown under different shade trees (Table I) revealed that cardamom plants grown under *karimaram (D. ebenum)* produced significantly more number of panicles than those grown under other shade trees. No significant difference was observed with regard to the other characters studied, *viz.*, number of tillers produced, height of the plants and size of the leaves in plants cultivated under different shade trees. However, the plants grown under *karimaram* were found to be taller with bigger leaves and longer panicles than the plants grown under other species of shade trees (Table I). Pooled analysis of yield data of cardamom for the four year period showed significant difference between treatments (Table II). *Karimaram* was found to be the best shade tree for increasing yield (121g) of cardamom which worked out to be 40 to 50 per cent more than the average yield (79 to 89g) from the plants grown under other species of shade trees.

An ideal shade tree in cardamom plantation is expected to have the following characteristics: (1) wide canopy so that number of shade trees in unit area is minimum (2) minimum side branching to provide diffused light to cardamom plants (3) no shedding of leaves during the flowering phase of cardamom so that pollination is not affected by the leaves falling on the panicle and (4) shedding of leaves during monsoon and production of flush or new growth before the commencement of dry season. It is rather difficult to get trees which have all the desirable characteristics in a cardamom plantation. *Nandi,* with no branching upto the height of 15m was found to provide nearly ideal growth conditions to cardamom on account of wider canopy (138 m^2) and height (28.4 m) but it sheds leaves during March – April exposing the cardamom plants beneath it to direct sunlight, which is detrimental to the plants.

Karimaram has reasonably good height (26 m) and spread of canopy (106 m^2). Branches are seen at a height of about 13.4m from the ground with an average canopy height of 12 m.

Table I. *Growth characters of cardamom plants grown under different shade trees for the year 1978–'79 (Mean per plant)*

Shade trees	Growth characters of cardamom					
	Number of tillers	Height (cm)	Length of leaf (cm)	Breadth of leaf (cm)	Number of panicles	Length of panicles (cm)
Karimaram	15.0	181.3	52.2	8.4	26.2	45.5
Elangi	13.0	162.9	50.3	7.7	14.7	36.5
Jack	16.8	163.6	50.1	7.9	20.5	36.7
Nandi	15.0	170.8	50.1	8.0	20.4	37.9
G. Mean	15.0	1 9.6	50.7	8.0	20.5	39.2
C.V.%	38.6	20.8	11.6	14.9	44.3	23.5
C.D.(P=0.05)	-	-	-	-	5.6	5.8

Table II. *Mean yield of cardamom per plant (g) under different shade trees*

Shade trees	year				
	1975–76	1976–77	1977–78	1978–79	Mean
Karimaram	112	81	81	207	121
Elangi	82	62	46	126	79
Jack	66	65	52	135	79
Nandi	109	65	42	135	89
Mean	92	68	55	151	92

S. E. for species =57.5 C.D.(P=0.05)=18
S. E. for years =49.4 C.D.(P=0.05)=15
C. D. for any two years for any species=31
C. D. for any two species for any year=32

Besides, *karimaram* does not shed leaves during a particular season and thus has an edge over *nandi*. *Elangi* is also a good shade tree with an average height of 23 m, branching at a height of 12 m, and a wider canopy (126 m^2). The disadvantages of this shade tree are its thick canopy which blocks a good deal of sunlight, and its flowering and shedding of flowers during the flowering phase of cardamom which needs further investigation. Though jack tree also has almost all the characteristics of good shade trees, its ripe fruits, which are heavy and large, fall down damaging the cardamom plants. Ripened fruits, in addition, attract squirrels, rodents and insects which cause direct or indirect damage to cardamom.

From the foregoing discussion it is seen that *karimaram* has almost all the desirable qualities of an ideal shade tree and the plants grown under it have better growth and produce more cardamom than those grown under other shade trees evaluated.

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