

determined by a bio-assay test using *Bacillus cereus* var. *mycoides* as the test organism as employed by McCoy (1974 and 1976). Tissues of the palms treated with distilled water were maintained as control. Distinct inhibition zones could be detected when tissues of outer and middle whorls of leaves collected 24 hr after injection, were plated in agar media seeded with the bacterium. This indicated the general distribution of the chemical in the crown. Only traces of

antibiotic activity could be noticed in the tissues of the spear leaf.

The efficacy of this injector was tested against 130 diseased palms of different age groups. The overall distribution of the chemical in the foliage of the crown within 24 hr as indicated by bio-assay tests, suggests the effectiveness of the method. This method could be employed for injecting chemicals in other palms also.

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Variability in Black Pepper Cultivar 'Karimunda'

Among more than 70 pepper cultivars cultivated in Kerala, 'Karimunda' is the most popular one. The cultivar probably originated in the traditional pepper growing areas of erstwhile central Travancore region from where the settlers carried the material to the northern parts of Kerala. At present, this cultivar is grown throughout Kerala because of its prolific and regular bearing habit and capacity to yield

uniformly well under plain as well as submountainous regions. The cultivar is characterised by small or more or less oval and slightly ovate leaves short to medium size and closely set spikes. Comparatively short spike length is compensated by the high spike/node ratio resulting in high yield. The term 'Karimunda' has probably originated from the short dark green spikes.

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During the course of germplasm survey conducted by the Central Plantation Crops Research Institute, Regional Station, Calicut for the cultivated pepper types, it was observed that the term 'Karimunda' is loosely applied to a wide range of cultivars with a set of common characteristics. In order to meet the increasing demand for planting materials in this cultivar, even the seed farms were found to collect runner shoots from all the vines termed 'Karimunda' without giving attention to the uniformity to the materials. Thus a need was felt for selecting morphologically uniform high yielding 'Karimunda' and a programme for selection was initiated during 1981. A preliminary survey was undertaken in Kerala State during October–November 1981. In this survey, 115 vines selected randomly from 21 gardens representing different pepper growing ecological zones in Kottayam, Calicut and Wynad districts were selected for observation. Disease free gardens with uniform population of 'Karimunda' in the age group of 10–15 years only were considered. The results of observations are summarised in the Table I and represented in Figs. 1 and 2.

The number of laterals per 1 m band width around the vine ranged from 39 to 391 but this mainly depends on the number of cuttings originally planted and the number of primaries. Some farmers follow a practice of coiling the vine around the standard, and this often produced a large number of primaries, thereby increasing the number of laterals. Hence, considerable vine to vine variation exists in the number of laterals produced. Spike number per unit area also varied, the range being 35 to 472 spikes/1 m band width. The spike number is dependent mainly on the spiking intensity and the number of laterals per unit area. Spiking intensity (as estimated from the percentage of buds transforming into spikes or the ratio of spikes to nodes), appears to be a varietal character, differing much among the cultivars. 'Karimunda' has got a higher spiking intensity than most other cultivars. Within the cultivar 'Karimunda' itself, the number of spikes/100 nodes ranged from 37 to 92, the mean being 64. Mean flower number per spike ranged from 17–81, the mean being 44.58. This character in turn is dependent on the spike length, which ranged from 4–9.2 cm (mean 6.5 cm) in the vines observed.

Table I. *Variation in morphological characters in 'Karimunda'*

Character	Range	Mean	S. E.	C. V. (%)
Number of laterals in a band width of 1 metre	39–391	122.54	60.41	49.30
Number of spikes in a band width of 1 metre	35–472	281.81	151.71	53.83
Number of spikes per 100 nodes (spiking intensity)	37–92	63.97	10.07	15.75
Spike length (cm)	4.0–9.2	6.46	1.10	17.03
Number of flowers per spike	17–81	44.58	0.65	15.83
Leaf length (cm)	8.0–16.5	12.62	1.78	14.28
Leaf breadth (cm)	4.0–10.1	7.13	1.26	17.71

Fig. 1 gives the distribution of flower number and spike length among the samples studied. These characters were normally distributed within the population. Fig. 2 represents the distribution of filling percentage and spiking intensity. The filling percentage is influenced by ovule fertility, pollen fertility, pollination efficiency etc. and is showing a skewed distribution. The spike intensity shows a perfect normal distribution in the population.

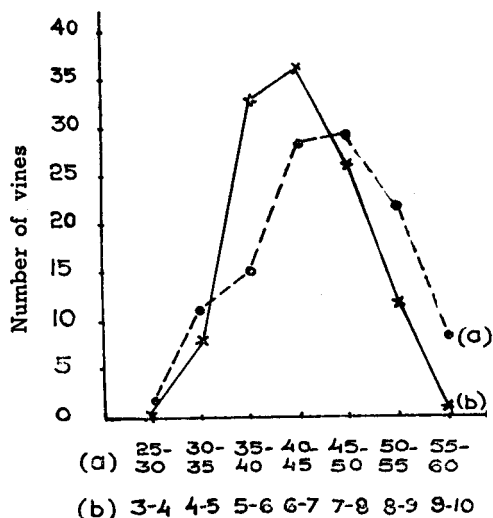


Fig. 1. Flower number per spike and spike length in the Karimunda vines

- (a) Number of flowers per spike,
(b) Spike length (in cm)

'Karimunda' is typically bisexual producing hermaphrodite flower. A sample estimation from one hundred spikes from ten vines showed that the percentage of bisexual flowers varied from 96-100, the remaining being female flowers. Male flowers alone were not noticed. Since little variation

is noticed for this character, the observation was not carried out for all the vines studied.

Apart from the spike characters, leaf characters, especially leaf size were found to vary considerably. The leaf length ranged from 8-16.5 cm and the leaf width from 4.0-10.1 cm. The leaves from the lateral shoots were considered, because leaf size was found to vary much in the orthotropic and runner shoots.

Variability has also been noted in quality characters such as dryage, contents of oleoresin, piperine and essential oil (Table II). 'Karimunda' is considered as a medium to good quality cultivar, giving about 33 to 40% dryage. One sample has given 42.7% dryage. The contents of oleoresin, piperine and essential oil also were found to vary in different collections. Results of analysis of five samples of 'Karimunda' collection are given in Table II.

Table II. Quality composition of some 'Karimunda' collections

Sample	Dryage %	Oleoresin %	Piperine %	Essential oil %
1	39.0	11.00	4.4	4.0
2	33.0	12.17	6.2	4.5
3	42.7	13.10	4.9	3.3
4	33.4	12.80	4.6	5.2
5	37.3	7.10	4.7	3.1

Based on the preliminary observations, a selection standard was fixed for identifying high yielding mother vines. The following four characteristics only were taken into account for this:

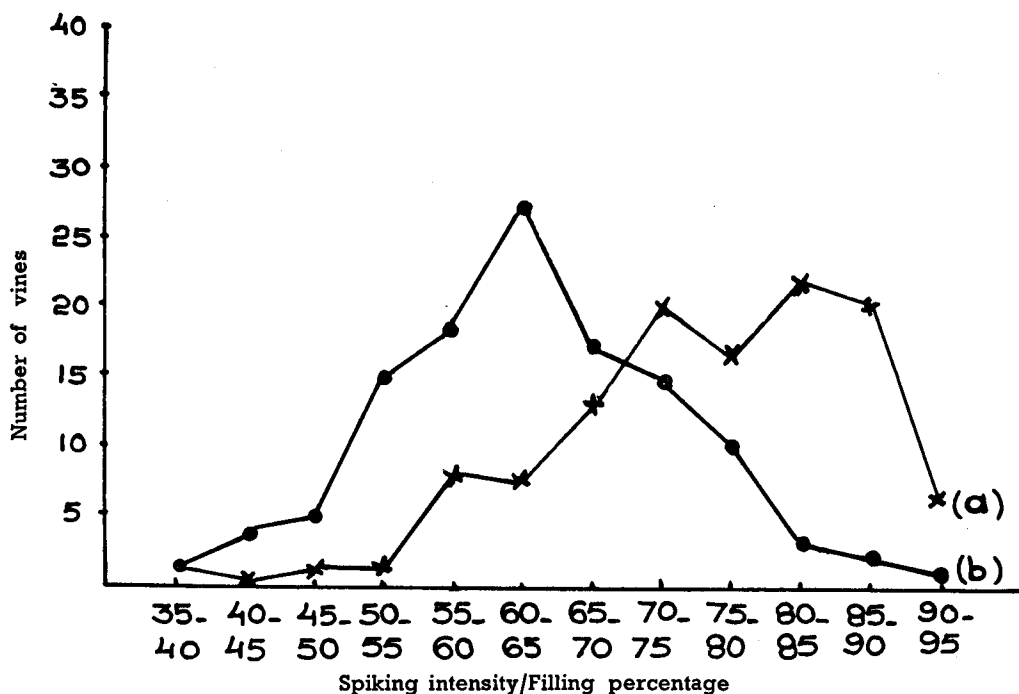


Fig. 2. Spiking intensity and filling percentage in the 'Karimunda' vines (a) Filling percentage (b) spiking intensity

1. Estimated yield : 8.0 kg of green berries and above.
2. Spiking intensity : 75 spikes/100 nodes.
3. Spike length : 7.5 cm/spike.
4. Filling percentage: High percentage (visual).

Only morphologically uniform vines with small oval or slightly ovate leaves, short to medium spikes and typical pinkish black tinge on the growing shoots were considered for selection. A second survey was undertaken covering the pepper growing regions of Calicut, Wynad, Idukki and Kottayam districts and based on the selection criteria, 216 mother vines were

identified and the planting materials collected and put for the rapid multiplication in the CPCRI Farm at Peruvanamuzhi. During the year 1983, 100 selections were planted in a Completely Randomised Block Design with 8 vines/selection and bulk 'Karimunda' and Panniyur-1 as standards. The remaining selections were planted in the year 1984-85. Simultaneously all these selections are being clonally propagated under the rapid multiplication programme and supplied to seed gardens and District Agricultural Farms after maintaining their identity. The yield data from these experiments is expected to help in identifying typical 'Karimunda' with high yield potential and the same

is proposed to be released for cultivation in the near future.

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