

RAPID MULTIPLICATION OF BLACK PEPPER FOR COMMERCIAL PLANTING

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ABSTRACT

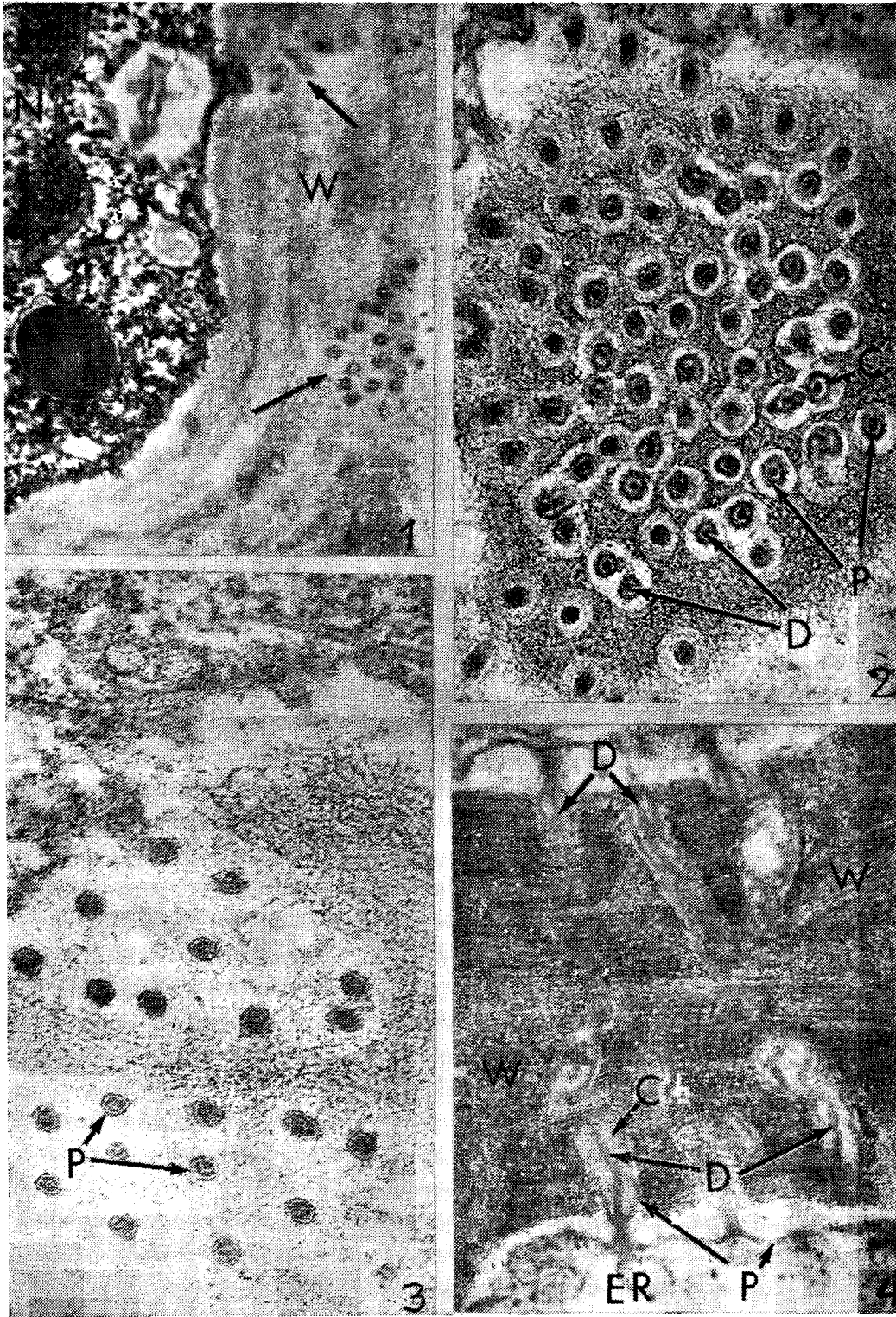
Large scale cultivation of improved cultivars of pepper is handicapped by the inadequate availability of planting materials. Trials have shown that cuttings from primary vines and runners have almost similar rooting ability. A multiplication technique using one node cuttings which can generate about 2.5 million rooted cuttings fit for field planting per hectare of nursery per year has been described and the various aspects influencing the rooting success discussed.

Availability of adequate quantities of planting material is still one of the most important constraints in the large scale cultivation of improved cultivars of pepper. Creech (1955) and Nambiar, Pillai, and Sasikumar (1977) have described methods of propagating pepper both for initial multiplication as well as for large scale planting. However, many of the more important practical aspects of large scale production of planting material such as an efficient technique to produce rooted cuttings in quick succession, the rate at which rooted cuttings fit for field planting can be generated from a unit area of nursery and a critical evaluation of such a technique with the existing methods have not so far been investigated. There is also wide variation in the source of planting material and size of cuttings used in different countries. In India, 2-3 node cuttings collected from the ground runners are generally used as planting material (Anonymous, 1976), while in Malaysia (Sarawak), cuttings with 5-7 nodes

taken from actively growing terminal vines (Chou, 1973) alone are used for raising cuttings. No information is available on the relative advantages of the different types of planting material as far as the out turn of rooted cuttings is concerned. Hence, the present studies were undertaken on these aspects.

MULTIPLICATION TECHNIQUE

Trenches of 0.30 m width and depth and of convenient length are dug in the east-west direction at 0.60 m distance and filled with a mixture of well rotten cattle manure, top soil, coir dust, and sand in equal proportion. Concentrated superphosphate at 1% by weight of the mixture is added and thoroughly mixed. Bamboos of 8-10 cm diameter and 1.5 length are split lengthwise into two equal halves without removing the septa, and such splits are arranged at an angle of about 45° to the ground on a well stretched



wire to provide support to both pepper and rooting medium. Bamboo splits from two adjoining trenches can be arranged alternating each other (Fig. 1). It will be advantageous to treat the bamboo with any wood preservative to reduce rotting and insect damage. Rooted pepper cuttings are then planted at the rate of one cutting per bamboo, shaded, and watered daily. Once in 15 days, the cuttings are supplied with NPKMg mixture (urea 1 kg, concentrated superphosphate 0.75 kg, muriate of potash 0.5 kg, and kieserite 0.25 kg, in 250.1 water) at the rate of 0.25 l per vine. When the vines start growing, the bamboo splits are filled with a mixture of cattle manure and coir dust in the proportion of 3:1, and each vine is tied carefully to the bamboo ensuring that every node is in contact with the rooting mixture. Initially planted cuttings take about four months to reach the full height of the support (Fig. 2). When the vines reach the top of the support, the growing point is nipped off and the vines crushed at the base three nodes above the ground level. Buds in most of the leaf axils will get activated within about 15 days of this. Each vine is then cut at the crushed point and removed with as much of the rooting mixture, sticking to the large number of roots produced at each node (Fig. 3). Single node cuttings are then prepared (horizontal cut at the top and slanting at the bottom) and each cutting planted in a polythene bag of 20 cm × 12 cm filled with potting mixture of the same composition as used for the trenches ensuring that the leaf axil is above the potting mixture. The cuttings are drenched with 0.1% Ceresan wet and placed in a humid chamber which gets about 40-50% filtered light. The polythene bags are arranged in such a way that the leaves do not overlap. After about three weeks, the polythene cover is gradually removed. In about 40-45 days, the cuttings are moved out of the chamber for hardening.

EXPERIMENTAL

The percentage success in rooting of one, two, and three node cuttings from primary vines, ground runners, and laterals was tested in two large scale trials. Planting materials obtained from the field were directly planted in polythene bags for rooting following the same method as adopted for the rapid multiplication. The results are given in Table I.

Table I. *Percentage success in rooting of different types of pepper cuttings (Local variety)*

Source of the cutting	No. of nodes/cutting			Mean
	1	2	3	
Ground runner	8.7	27.0	24.9	20.2
Primary vine	13.1	28.8	30.7	24.2
Lateral branches	10.0	13.1	16.3	13.1
Mean	10.6	22.9	23.9	

In order to evaluate the merits of the rapid multiplication technique against the existing practice of taking the cuttings directly from the field a large scale observation trial was laid out with the local cultivar. Since economy in planting material can enhance the multiplication rate in a vegetatively propagated crop like pepper, only one node cuttings were used in the trial. Single node cuttings from the bamboo were compared with similar cuttings taken from primary vines from the field (control). Since about 15% of the cuttings from the bamboo had not rooted (may be due to defective and untimely tying of the vines) they were observed separately. All the cuttings were grown under the same conditions as described earlier. Observations on rooting success, rate of growth, shoot and root systems, and weight of cuttings recorded are given in Table II.

Table II. Mean rooting and growth of single node pepper cuttings one month after planting (Local variety)

Characters studied	From bamboo		From field (Control)
	Pre-rooted	Non-rooted	
Rooting success (%)	91	73	12
Length of shoot (cm)	17	12	8
Number of leaves in the shoot	2.2	1.2	1.1
No. of roots at the cut end	1.0	1.0	0.6
No. of roots at the node	20.1	20.3	0.8
Total length of roots at the cut end (cm)	8	7	3
Total length of roots at the node (cm)	129	700	4
Dry weight of the cutting (gm)	9.0	6.9	5.3

RESULTS AND DISCUSSION

As far as rooting success is concerned, there is no wide difference between cuttings from primary vines and runners (Table I). Two and three node cuttings showed similar rooting performance while one node cuttings showed the lowest.

The percentage success of rooted and unrooted cuttings from the bamboo splits was 91% and 73%, respectively, while those from the field (control) give only 12% (Table II), the rooted cuttings from bamboo grew to double the height and number of leaves compared to the control. The mean number of roots at the node was over 20 times more in the cuttings from bamboo. The total length of roots and dry weight of whole cuttings were also higher in those rooted on bamboo.

Genetically, cuttings both from the ground

runners and the primary vines (orthotropic) of the same vine cannot be expected to show any difference. Lateral branches (plageotropic) are not useful for propagation since they grow as bushy plants producing only very limited canopy for spike production. As the rooting success of cuttings from both primary vines and the ground runners is almost equal, both could be used for propagation depending upon availability.

The existing practice in India and Malaysia is to use cuttings with 2-6 nodes for nursery and field plantings. This practice will highly limit the rapid spread of any improved variety due to the wastage of vines. In the present study, the very low success (11 and 12%) of single node cuttings taken directly from the field was increased to 91%, when similar cuttings rooted on bamboo were used. This indicates the clear advantage of the technique over the existing practice. Cuttings not rooted on bamboo also have given much higher success (73%) as compared to control. Due to the fast rate of growth, cuttings become ready for field planting within a period of about two months of their planting in the polythene bags. An initially well-established root system permits nutrient uptake almost from the time of transplanting into polythene bags, and this may account for the faster growth.

Observations on the rate of production of cuttings have shown that on an average one vine on the bamboo can produce 50 cuttings per year. A 1 hectare nursery can thus produce 2.5 million cuttings annually.

ACKNOWLEDGEMENT

We thank Dr VJ Jacob, Senior Adviser, and Dr WS Alles, Project Director, for their keen interest in the study and Mr Ivor Pereira for support in the early stages of the work.

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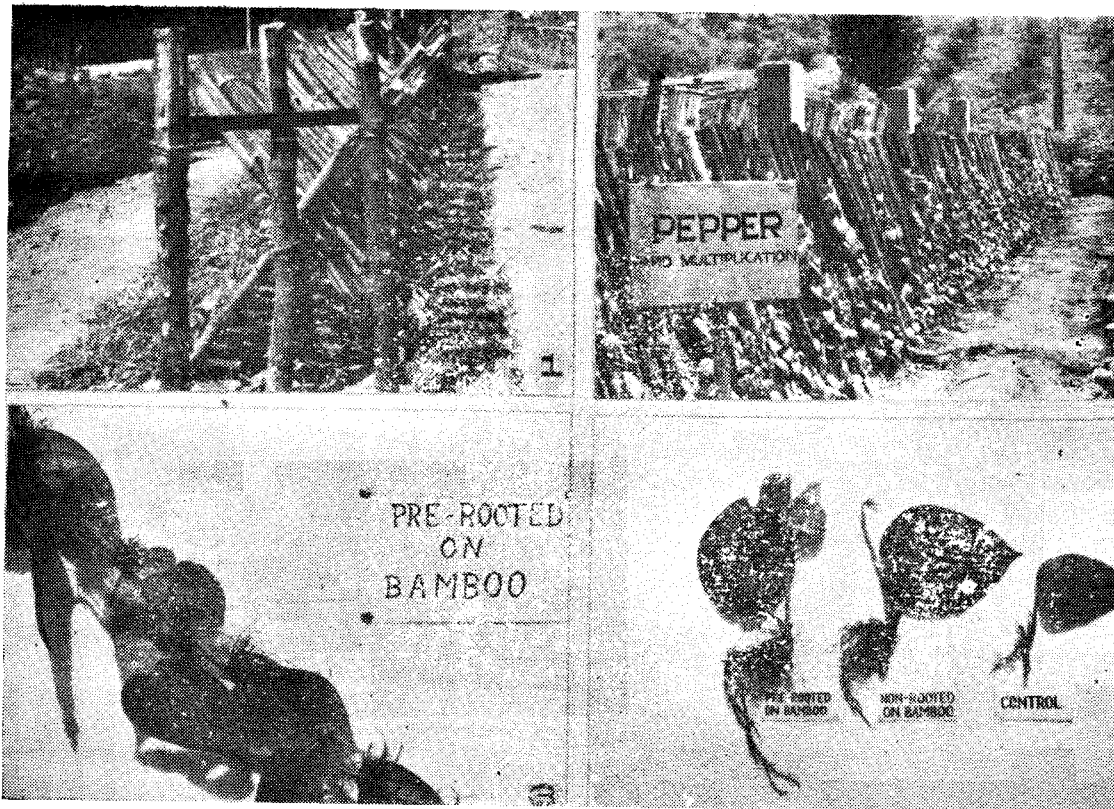


Fig. 1. Bamboo splits from adjoining trenches arranged alternately

Fig. 2. Pepper vines growing on the bamboo splits

Fig. 3. Vine from the bamboo rooted at each node

Fig. 4. Growth of single node cuttings one month after planting