Research Note

CHAYOTE, *Sechium edule* (SWARTZ.) PROPAGATION BY VINE CUTTING

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ABSTRACT

Two experiments were conducted to determine the suitable mother vine and month for producing cut-plants of chayote through vine cuttings. The survivals of young matured vine cuttings were greater (35-87%) than those of old basal vine cuttings (26.3-64.3%) in all planting dates. In October planting, 53-75% cuttings survived 16 days. In November planting, 93% of the cuttings with 500 ppm IBA survived, of which 63% produced roots, while only 28% cuttings rooted in control. The survival pecent of vine cuttings planted in October, December and January were 75-87 and 100, respectively but none of them produced roots. Hence, November with mild temperature and high humidity was the best month for the production of cut-plants in chayote through vine cuttings under Chitwan condition.

Key words: Chayote, vine cuttings, propagation, IBA

INTRODUCTION

Chayote, *Sechium edule* (Swartz.) a perennial rooted vine is the native of Mesoamerica (Newstrom, 1981). It is a popular perennial vegetable crop grown in the home gardens in the hilly region of Nepal (Sharma and Neupane, 1994). It is mainly cultivated for tender fruits, but young shoots and tuberous roots are also used as vegetable.

Chayote is a monoecious plant having both male and female flowers as nectar reservoir facilitating cross pollination and honeybees have been reported as the best pollinating agents (McGregor, 1976). Generally, the sprouted fruits are used for planting, but the entire fruit as a single seed is not an appropriate propagating material for commercial cultivation as it lacks uniformity in emergence, growth and development phases, fruit maturity and external fruit characteristics (Newstrom, 1990). Moreover, the mature fruits are available only in October-November, which is not the optimum time of planting and for which the selected landraces need to be purified and maintained by controlled pollination through bagging individual plant, which is not the convenient practice for the farmers. Some authors (Cook, 1901; Hartman *et al.*, 1975; Kolhe, 1962) have reported chayote propagation by vine cuttings. The use of sexual propagation for breeding purpose and vine cuttings for purity maintenance and commercial planting are considered to be the best ways for commercializing this crop. This study was conducted to determine the suitable part of mother vine for cuttings and optimum time of cut-plant production.

MATERIALS AND METHODS

Studies were made to assess the survival and rooting potential of the chayote vine cuttings. The first study was conducted during September to December, 1993 to determine the suitable part of vine for the production of cuttings at the Institute of Agriculture and Animal Science (IAAS), Rampur, Chitwan. Two types, i.e. old basal and young matured vine cuttings were planted on four planting dates (19th September, 1st October, 8th November and 1st December, 1993) in randomized complete block design (RCBD) with four replications. The old basal vine cuttings were made from the basal part of the vine, while the young matured vine cuttings from the middle part of the vine leaving 50 cm tip and leaves. All the cuttings were treated with Blitox-50 @ 2g/litre of water before planting. Cuttings were planted vertically keeping one upper node above the soil surface and the two lower nodes inside the soil at the spacing of 10 cm between the cuttings and 15 cm between the rows in thoroughly prepared nursery bed. A tunnel was constructed over the bed with gunny jute sheet and bamboo sticks in order to protect the cuttings from the sun light and to prevent moisture loss. The observations were made on the 7th day of planting on survival of cuttings and calculated in percent. The data were analyzed using MSTATC computer package.

Another study was to determine the optimum date of planting and the effect of leaf and IBA treatment on rooting. The study consisted of forty cuttings in each planting from January to December, 1995 at IAAS, Rampur, Chitwan. Young and healthy vines were selected and three apical and some basal nodes with old and diseased leaves were removed. Single node 5-10 cm long vine cutting with one leaf stalk having half to one third of lamina were included in the study. The wooden boxes filled with sub-soil were used for planting. The basal parts of cuttings were dipped in 500 ppm indole butyric acid (IBA) for 10 minutes before planting. Similarly, another set of cuttings were dipped in tap water for 10 minutes in control. In each planting date through January to December of 1995, 40 cuttings per treatment were planted horizontally in 3-5 cm deep drills and covered with the thin layer of soil, while the leaf stalk with one-half to one-fourth part of lamina kept exposed. The wooden boxes were kept in partial shade. Light irrigation was given regularly with watering cane. Observations were recorded on survival and rooting of cuttings once in 10-40 days after planting and number of survived and rooted cuttings was expressed in percent

RESULTS AND DISCUSSION

Highly significant differences occurred between young matured and old basal vine cuttings, among different dates of plantings and their interactions (Table 1). The second date of planting (1st October) was the best for higher survival for both young matured and old basal vine cuttings with declining responses to survival in each succeeding date. Some cuttings from tender vines produced callus formation at the base, however, the callus did not differentiated into roots due to their rapid drying under field condition. The survival percent of the tender vine cuttings from young matured vines was significantly higher than those from old basal vines at all planting dates. The second date of planting was significantly more favorable than others for both types of cuttings. Hence, the young matured vine cuttings had the highest survival percent in October planting.

Table 1. Survival percent of leaf bud cuttings from young matured and old basal vines under Chitwan condition

Date of treatments	Tender vine cutting (%)	Basal vine cutting (%)	D-Mean	Difference
1. First date (19th September)	68.8 b	36.8 b	52.8	32.0 **
2. Second date (1st October)	87.0 a	64.3 a	75.6	22.8 **
3. Third date (8th November)	68.5 b	42.0 b	55.3	26.5 **
4. Fourth date (1st December)	35.0 c	26.3 c	30.6	8.8 *
Treatment Mean	64.8	42.3	53.6	

Values with same letter in a column are not significantly different (0.05) by LSD; *significant **highly significant; CV 10.1%

In the second study, the cuttings planted on 2nd January could survive about three weeks but none of them produced roots. The cuttings planted in August, September and early October died within 10-20 days of planting and also did not produce any roots (Table 2). In mid October planting, 75% and 53% cuttings survived in control and 500 ppm IBA treatments, while in mid November plantings, 93%, 93% and 100% cuttings survived and 28%, 63% and 0.0% cuttings rooted in control, 500 ppm IBA and cuttings without leaf, respectively. In mid December planting, both cuttings ones with single leaf and the next without leaf survived 100% but did not produce any roots. Hence, the higher percent (63%) of cuttings produced roots when the 500 ppm IBA treated cuttings with single leaf were planted in November than the cuttings without leaf treated with water and planted in December, January, August, September and October. The IBA treatment had no effect under unfavorable weather conditions but it promoted rooting under favorable conditions. The presence of leaf was also found as an essential condition for rooting. Therefore, the high percent of rooting in November planting could be associated with mild temperature, high relative humidity and foggy weather under Chitwan condition favoring survival and rooting of vine cuttings.

The results of both studies showed that the most favorable month for planting of the chayote vine cuttings was November. The weather records of Rampur, Chitwan showed that both maximum and minimum air temperatures attained maximum in May-June and then declined gradually and attained minimum in January. In November, the average monthly maximum and minimum temperatures ranged from 25˚C to 31˚C and 16˚C to 21˚C, respectively. Chayote requires mild temperatures of 20˚C to 25˚C (With limits of 12˚C to 28˚C), high humidity (80-85%) and short day conditions for optimum growth and yield (Bukashov, 1981; Casseres, 1980).

In this period, the length of the day remained near to 10 hours and the relative humidity was around 90%. Hence, the weather condition of November was the most favorable for survival and rooting of chayote vine cuttings. Mild temperature with high humidity induced rooting and also increased effectiveness of IBA for successful production of cuttings under Chitwan condition. The mild temperature and high relative humidity was favorable as suggested by Hartman and Kesten (1975).

Table 2. Survival and rooting behavior of chayote leaf bud cuttings on different planting dates at IAAS, Rampur, Chitwan

Cuttings / Treatments	Date of planting	Survival (%)	Rooting (%)	Date of observation
Leaf bud cuttings + tape water	2 January	95	0	25 January
Leaf bud cuttings + tape water	1 August	0	0	18 August
Leaf bud cuttings + 500 ppm IBA	18 August	0	0	1 September
Leaf bud cuttings + tape water	18 August	0	0	1 September
Leaf bud cuttings + tape water	1 September	0	0	21 September
Leaf bud cuttings + 500 ppm IBA	1 September	0	0	21 September
Leaf bud cuttings + tape water	21 September	0	0	6 October
Leaf bud cuttings + tape water	6 October	0	0	15 October
Leaf bud cuttings + tape water	15 October	75	0	31October
Leaf bud cuttings + 500 ppm IBA	15 October	53	0	31October
Leaf bud cuttings + tape water	15 November	93	28	10 December
Leaf bud cuttings + 500 ppm IBA	15 November	93	63	10 December
Bud cuttings without leaves + tape water	15 November	100	0	10 December
Leaf bud cuttings + tape water	16 December	100	0	12 January
Bud cuttings without leaves + tape water	16 December	100	0	12 January

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