Studies on Propagation of Grape Vine in Sri Lanka

H. M. E. HERATH* R. M. ARIYARATNE** AND M. E. R. PINTO*

Central Agricultural Research, Institute, Peradeniya.

ABSTRACT

Basal and subterminal hardwood cuttings of the variety Improved Issabella were successfully rooted in sand and in a medium of sand and top soil. The older the canes of this variety, the better was percentage rooting. In another investigation where some levels of I. A. A. and I. B. A. were used alone and in combination, on the variety Semillon, rooting was found to be better when treated with a 50 ppm solution of J. B. A. prior to planting.

INTRODUCTION

Grape vines established in Sri Lanka over 75 years ago by Christian Missionaries in the dry coastal areas of Puttalam and Jaffna, produce fruit yields of over 300 lb per vine per year even today. Some interest was taken on its cultivation by the Department of Agriculture in the mid-1940s but expansion of the area under this crop was very slow due to the availability of imported grapes. However with the banning of imports of table grapes in 1963, the interest in local cultivation was resumed. A planned programme of research and extension was then initiated. New varieties were introduced from abroad and their performance studied at a number of locations in the Island.

Voluminous research data on grapevines including that for vegetative propagation have been published, However, most of these refer to studies carried out in subtropical and temperate conditions and were not expected to give similar results under Sri Lanka conditions.

Since the dreaded pest phyloxera *Dactylasphaera vitifoliae* has not yet been recorded in this country, the use of robust rooted cuttings can be used for propagation.

Winkler (1962) defined a cutting as a piece of parent plant that will develop into a new plant when placed under conditions favourable for growth. He further stated that for grape cuttings, segments of canes are always used and that the most common and practical method of raising planting material is by rooted cuttings.

* Research Officers, Central Agricultural Research Institute, Gannoruwa-Peradeniya.
** Lecturer, Sri Lanka School of Agriculture, Kundasale.

In Sri Lanka pruning can be done twice a year and John (1970) has recommended early December and late May or early June pruning for Maha Illuppallama conditions in the dry zone. Usually, cuttings for propagation can be obtained from these prunings.

Investigations were carried out on the type of cuttings and rooting media, and further studies were made on age of cuttings and also on the use of growth regulators to increase percentage of rooting. These studies are dealt with separately in this paper.

Experiment No. 1 Type of cuttings and rooting media.

MATERIAL AND METHODS

This study was conducted in a greenhouse at the Agricultural Research Station, Rahangala, situated at an elevation of 4100 ft. above mean sea level. This station is in the hill-country dry zone. The variety Improved Issabella, a *Vitis labrusca* type was used.

One-year old canes were carefully removed and cuttings with 3 nodes from the basal, middle and apical portions of mature brown wood were taken. Green coloured stem was not used.

Lots of these groups were cured by placing the bundles upside down in a wooden box. The cuttings were covered with moist sand and were kept in shade for two weeks. Cured cuttings were then planted in wooden boxes with at least one node buried in the rooting media. Three types of rooting media were tested. These were six-inch thick layer of (a) sand only (b) saw dust (c) a mixture made up of equal parts of topsoil and sand.

Each treatment had 30 callused cuttings. All treatments were regularly and uniformly hand-watered with a fine rose. The study was concluded 45 days after planting.

RESULTS AND DISCUSSION

The curing for two weeks produced sufficient callus formation in more than 75% of cuttings. There were no observable differences in callus formation in the three groups of cuttings used. The rooting percentages are shown in table 1.

Table 1: Pecentage rooting of different cuttings in different rooting media

Type of Cutting	*Rooting Media*				
	Sand	*Sawdust*	*Topsoil*	*Total*	*Mean*
Terminal (apical)	30.5	22.0	33.0	85.0	28.3
Sub-terminal	65.2	50.5	63.0	168.7	56.2
Basal	69.0	43.0	82.2	194.2	64.8
Total	164.7	105.5	178.2	—	—
Mean	54.9	35.2	59.4	—	—

The percentage of rooting of sub terminal portions is nearly double that of terminal (apical) portions. There is no appreciable difference between subterminal and basal portion. This result is in agreement with that obtained by Calma and Ricky (1931).

With regard to rooting media, it is apparent from table 1, that either sand alone or a mixture of equal parts of top soil and sand, are much better rooting media than sawdust. The highest percentage of rooting is when basal portions are grown in a mixture of topsoil and sand.

Experiment No: 2. *Age of cuttings.*

MATERIAL AND METHODS

The study on age of cuttings was carried out at Rahangala using the identical variety as in experiment No. 1, Three maturity grades were used, namely one-season, two-season and three-season old wood. In the one-season old canes there were small canes, medium-long canes and bull canes. These were also investigated.

Using the experience gained from the previous experiment, only basal and sub terminal cuttings and a rooting medium having a mixture of sand and soil were used. The cuttings were cured, and 30 cuttings for each treatment planted and irrigated as in experiment 1. This study was also completed 45 days after planting.

RESULTS AND DISCUSSION

There are differences between the different types of cuttings used. Percentage of rooting is shown in table II.

Table 11: Percentage of Rooting in Cuttings of different Age and Size

Type and Age of Cuttings			*% Rooting*
1. One-season old wood	(a)	Small canes	21.5
	(b)	Medium-long canes	58.0
	(c)	Bull canes	24.0
		Total	103.5
		Average	34.5
2. Two-season old wood			78.0
3. Three-season old wood			87.0

The above results clearly show that the more mature the cuttings, the better is the percentage rooting. This study also shows that in one-season old vines, the best planting material comes from medium-long canes and not from small canes and bull canes.

This result poses a problem in that the better type of material, namely two or three-season old canes are not usually available from forward prunings.

Experiment No: 111 *Use of Growth Regulators for Rooting of Cuttings.*

MATERIAL AND METHODS

This study was conducted at Maha Illuppallama in a lathhouse which allowed about 50% light flow. Medium long canes from 4-year old Semillon vines were selected. Eight inches long brown-wood cuttings from the basal and sub terminal portions were collected separately.

The bases of these different cuttings were kept in different growth-regulator solutions for a period of 24 hours before curing. Freshly prepared solutions of Indole acetic acid (IAA), Indole butyric acid (IBA) and a combination consisting of equal parts of IAA and IBA were tested. Each had concentrations of 25, 50, 100, 250, 500 and 1000. ppm. A control treatment where the cuttings were kept in the normal way but in water was included as additional treatment. Each treatment had 10 cuttings selected at random. These treatments were replicated twice.

Cuttings treated in the manner described above were allowed to callus for a period of 2 weeks and were then planted in wooden boxes. The rooting media was a six-inch layer of a mixture of equal parts of topsoil and sand. Irrigations were supplied once in two days. The experiment was concluded 45 days after planting in the boxes.

RESULTS AND DISCUSSION

Although Weaver (1956) reported that cuttings treated with growth regulators had given no higher percentage of rooting in the nursery than untreated cuttings, the present study shows a different result (Table III). IBA is definitely superior to IAA alone. However the mixture of the two growth regulators shows better results than IAA alone.

This table also shows that 50 ppm concentration is the best. However higher levels, especially those of 500 ppm and 1000 ppm were lethal. In fact the control is even better than the 1000 ppm concentration. There is a general reduction of rooting at higher concentration than 50 ppm.

Table 111: The effects of growth regulators on rooting of cuttings Maha '68. Calculated on percentage data transformed to arc-sine with 0=0.25

		Growth Regulators			
Levels		*IAA*	*IBA*	*IBA-IAA*	*Mean of 12 values*
25 ppm	...	156.31	280.18	255.50	57.67
50 ppm	...	184.66	298.03	281.70	63.70
100 ppm	...	176.56	199.12	206.33	48.50
250 ppm	...	158.78	125.42	137.02	35.35
500 ppm	...	90.56	98.55	95.23	23.73
1000 ppm	...	11.48	60.99	30.20	8.55
Mean of 24 values	...	32.43	44.40	41.92	
Water	...	...	—	—	— 21.93

L.S.D. for Means of Levels p=0.01=0.15
L.S.D. for Means of Hormones p=0.01=0.24
C.V.=2.94%

Table IV shows that in this study the better response to growth regulators is by basal cuttings rather than sub terminal ones.

Table IV: The Effects of Growth Regulators on Rooting of different types of Cuttings.

	Growth Regulators			
Type of Cuttings	*IAA*	*IBA*	*IBA-IAA*	*Mean of 36 values*
Sub terminal	325.32	456.75	449.34	34.21
Basal	453.03	608.94	556.64	44.96 **
Mean of 24 values	32.43	44.40	41.92	

** Highly Superior.

CONCLUSION

Experiment I showed that Improved Issabella basal and sub terminal brown-wood cuttings were suitable for production of rooted cuttings in either sand or a sand and top soil medium.

Experiment 2 showed that the more aged the-canes of Improved Issabella were, the better these were as planting material In one-season old canes, the medium-long canes were to be preferred to small canes and bull canes.

Experiment 3 showed that IBA at 50 ppm is suitable as a root-promoting substance in Semillon.

REFERENCES

CALMA, V. C. AND H. W. RICKEY (1931) Growth of Concord grape cuttings in relation to vigor, chemical composition and relative position on the cane. *Proc. Amer. Soc. Hort. Sci.* 28: 131–136

JOHN, C. (1970) Grape growing in the Dry Zone *Dept. Ag. Cey. Bul*:-1–11

WEAVER, R. J. (1956). Plant regulators in grape production. *Calif. Agr. Exp. Sta. Bul* 752: 1–26

WINKLER, A. J. (1962) General Viticulture, Berkley, *Univ. Calif. Press. XVII,* 633 *p.*