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Standardization of growing media for survival and growth of Hardwood cuttings of Grape (*Vitis vinifera* L.)

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ABSTRACT

A field experiment was carried out to evaluate "Standardization of growing media for survival and growth of hardwood cuttings of Grape (*Vitis vinifera* L.) cv. Thompson Seedless" which was conducted at the Horticulture Research Farm, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Science, Prayagraj, U.P-211007 during the year 2022-2023. The experiment consists of 12 treatment of five different growing media i.e., Sugarcane bagasse, sawdust, coco peat, FYM and sand at different ratio and a rooting hormone IBA @200ppm for cutting treatment in a randomized block design in three replications. The main objective of the experiment was to evaluate the vegetative growth and root of grapes vine with their success and survival percentage. From the present investigation treatment T3 (Sand + Coco peat (2:1) + IBA @200 ppm) recorded significantly with maximum sprouting percentage (68.8%) and showed the best root growth parameters with maximum root length. It also showed best vegetative growth parameters i.e., highest shoot length, maximum number of leaves with higher plant height. However highest survival percentage 83.8% also recorded in T3.

Key words: Growing media, Growth and survival.

Introduction

The grape (*Vitis vinifera* L.) is a member of the Vitaceae family, which comprises roughly 60 wild *Vitis* species that are found in Asia, North America, and Europe in regions with subtropical, Mediterranean, and temperate continental climates. There are thousands of domesticated and untamed species in this family, which comprises of 14 active genera. The common fruit grapes are one of the most consumed and are beneficial to human health. The domestication of *Vitis vinifera*, usually referred to as European grapes, took place between the Black and Caspian Seas. According to historians, several explorers brought these grapes to Europe initially before spreading them to the other continents (Anony-

mous, 2008). Many people grow grapes so they can make wine, eat them fresh as table grapes, and make raisins. Numerous research suggested that eating grapes could lower the chance of developing cancer, heart attacks, blood pressure, various allergies, and constipation (Abebe, 2017). Additionally, grapes are a great source of many essential nutrients, such as boron, which supports the development of strong bones (Demir and Serinda, 2006). Grapes are a significant fruit in terms of global fruit output, accounting for roughly 16% of the overall production. About 68.9 million tonnes of grapes are produced globally each year. Italy, France, Turkey, Iran, South Africa, Spain, Portugal, the United States of America, and Chile are the top grape-producing nations. India produces 1.21 million tonnes of fresh grapes annu-

ally, ranking fifth among all fruit crops. A potting medium with the right drainage, water holding capacity, quantity of soil microorganisms, and porosity has been determined to be the ideal for growing healthy plants. Farmers and nursery workers frequently use soil as a potting medium for growing grapes by stem cutting. In general, soil lacks the necessary physical and chemical qualities and contains fewer essential nutrients, which leads to seedlings of lower quality. Therefore, it is essential to select a suitable potting media as it acts as a vital source of nutrients and develops the root system which allows plants to grow well.

Materials and Methods

The field experiment was conducted at the Horticulture research farm, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, (U.P.). It is situated at an elevation of 78 meters above sea level at 25.87° N latitude and 81.15°E longitude. Allahabad has a humid subtropical climate with moderate rainfall, hot summer prevailing and cold winter. The experiment consists of 12 treatment i.e., T1 (Sand + Sugarcane bagasse), T2 (Sand + Sawdust), T3 (Sand + Cocopeat), T4 (Sand+FYM), T5 (Sugarcane bagasse + Saw dust + FYM), T6 (Sugarcane bagasse + Coco peat + Saw dust), T7 (Sugarcane bagasse + Sawdust + Sand), T8 (Sugarcane bagasse + Saw dust + Sand + FYM) T9 (Coco peat + Sawdust + Sand + Sugarcane bagasse), T10 (Coco peat + Saw dust + Sand + FYM), T11 (Sand + Sugarcane bagasse + Saw dust +

Coco peat + FYM), T12 Sand (control) with common a rooting hormone IBA @ 200ppm in all the treatments. Grape cuttings were planted into polyethylene bags containing growing media and kept under the shade net for 2 months. The parameters were measured the number of days to emergence, sprouting percentage, mortality percentage, were noted after 30 days of planting and other cultural practices were followed as cuttings requirement. Then the grape cuttings were transferred from polyethylene bags to departmental field where, the survival percentage of the cuttings were determine after 30 days of transplanting.

Results and Discussion

Rooting Parameters

Days to emergence

Among all the different treatment combinations used on grapes cuttings show that the least days to emergence (6.3 days) in T11 whereas highest days to emergence (12.0 days) were recorded in T4. These results are in agreement with the findings of Antunes *et al.* (2001) and indicate that those cuttings which were planted in combination of all growing media are the first to emerge among other cuttings. This may be attributed to high porosity and higher availability of moisture and nutrients to the cutting, which enhances the physiological activity of grape cuttings and results in the early emergence of buds compared to other potting media (Jamil *et al.*, 2016).

Table 1. Data regarding all the parameters in different treatments.

Treatment	Days to emergence	Sprouting %	Mortality %	Root length (cm)	No. of roots	Shoot length (cm) 45 DAP	Shoot length (cm) 120 DAP	No. of leaves 45 DAP	No. of leaves 120 DAP	Plant height (cm)	Survival %
T1	7.6	48.8	41.1	16.2	34.6	3.92	10.5	3.0	8.0	22.1	58.9
T2	10.0	59.1	30.7	20.5	38.6	3.8	9.2	3.3	8.3	28.2	50.4
T3	7.0	68.8	21.1	25.4	48.6	4.7	13.2	4.6	12.0	34.1	83.8
T4	12.0	46.9	43.0	8.1	15.6	3.4	7.9	2.6	6.1	16.3	46.9
T5	9.3	41.0	48.9	12.4	25.3	4.4	8.7	3.4	7.3	18.8	48.8
T6	9.0	44.9	44.9	18.2	38.0	4.6	8.6	3.7	8.5	27.3	58.9
T7	8.6	49.2	40.7	15.2	28.3	4.1	8.9	3.7	9.0	23.5	54.7
T8	10.0	46.9	42.9	9.9	25.3	3.9	8.1	3.0	7.6	16.7	48.8
T9	10.6	42.9	46.9	19.3	40.0	5.1	12.9	4.2	10.8	30.5	66.1
T10	7.6	48.8	41.1	18.6	37.3	4.4	9.8	3.8	10.3	29.4	61.1
T11	6.3	55.0	34.9	19.6	34.3	4.4	8.0	3.5	9.0	20.1	54.7
T12	8.0	48.9	41.0	7.0	11.6	3.4	5.7	3.0	6.0	16.4	50.8

Sprouting Percentage

Results related to the sprouting percentage showed that the highest sprouting % recorded in T3 (68.8%) whereas least sprouting percentage (41.0%) were recorded in T5. Potted seedlings having good media combination, highest survival rate and sprouting growth was observed by Duryea and Brown (1984). In the present study, same has been observed that reason for highest survival percentage was directly connected to good growing media composition, mainly for good development of a root system as reported by Gulcu *et al.* (2010).

Mortality percentage

Results related to the mortality percentage showed that the least mortality percentage recorded in T3(30.7%) whereas highest mortality % (48.9) were recorded in T5. These findings partially correspond with those of Farooq *et al.* (2018). The results are in comparison with Bernstein (1975), who stated that electrical conductivity of the media combination showed significant results for plant growth and development, while media with high level of EC showed poor growth of plants.

Root length

The root length in all growing media is reported that highest root length in T3 whereas lowest root length (7.0cm) recorded in T12. Similar result was finding that the combination of FYM and coco peat has been initiated long roots and increasing rooting percentage in rough lemon (Qureshi *et al.*, 2014). The length of roots depends upon their ability to penetrate in growing media, which in turn depends upon the porosity of the media; the more significant the porosity, the greater the penetration, and the greater the length of the root which were also reported by Mehmood *et al.* (2013) in Floral Shower (*Antirrhinum majus* L.).

Number of Roots

The highest number of roots recorded (48.6) in T3 whereas lowest number of roots (16.6) were recorded in T12. These results are in accordance with those of Singh and Nair (2003) for grapes and by Irshad *et al.* (2014) in kiwi fruit. The present study confirmed that Coco peat + sand had increased the number of roots in grape cuttings due to these media's improved physical, chemical, and biological properties (Arancon *et al.*, 2005). The enhanced

number of roots in Coco peat + sand is related to improved gaseous exchanges, admirable drainage, and good water holding capacity.

Vegetative Growth parameters

No. of leaves per cuttings

The number of leaves in different growing media show that the highest number of leaves (12.0) were found in T3 whereas least number of leaves were found (6.0) in T12. Similar findings were reported by Muhammad *et al.* (2018) observed maximum number of leaves per stem cutting from the stem cuttings planted in the potting medium contained coco peat and Sugarcane bagasse.

Shoot length

Results of shoot length show that the highest shoot length in T3 (13.2 cm) whereas lowest shoot length (5.7cm) recorded in T12 (Sand). Moreover, influence the absorption of nutrients by the plants which eventually produced long shoot (Riaz *et al.*, 2008). However, the shoot length in Sand control progressively delivered cuttings with shorter shoot length. This may be attributed to better media combinations, higher nutrient and water retention capacities, good aeration, porosity and drainage than other growing media mixtures, which helped in forming better root system and hence, better shoot development. Similar study was conducted by Sudarjat *et al.* (2018).

Plant height (cm)

The influence of growing media on cuttings for plant height was highly significant. The plant height was measured after transplanting of cuttings in which it gave different results on different treatments. Plant height after transplanting were recorded highest in T3 (34.1cm) whereas lowest plant height recorded (16.3 cm) in T4.

Survival percentage

The result of Survival percentage in all growing media shows that the T3 has highest (83.8%) whereas lowest survival percentage were reported (46.9%) in T4. Similarly results shows in Dhatrika (2018) experiment observed that survival percentage of rooted cuttings was higher in coco peat media. In the present study, same has been observed that reason for highest survival percentage was directly connected to good growing media composition, mainly

for good development of a root system as reported by Gulcu *et al.* (2010).

Conclusion

On the basis of present investigation it is concluded that among all the treatments, T3 [Sand + Coco peat (2:1) + IBA 200 ppm] had significantly increased all the parameters. The highest establishment percentage also found in T3 [Sand + Coco peat (2:1) + IBA 200 ppm]

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