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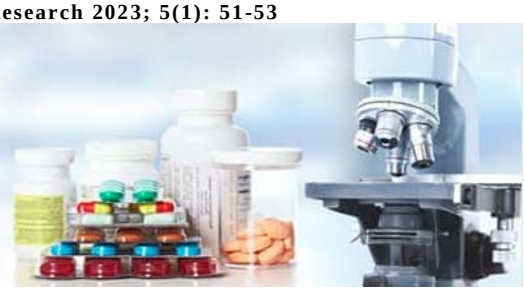

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Influence of growing media varieties on rooting efficiency in guava air layering: A comparative study

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Abstract
This study investigates the influence of various growing media on the rooting efficiency in air layering of Guava (*Psidium guajava* L.). The objective is to identify the media that most effectively promote root development, a crucial aspect for successful propagation. This research compares several common growing media, evaluating their impact on root initiation and development in guava air layers.

Keywords: Guava air layering, guava, *Psidium guajava* L.

Introduction

The propagation of fruit trees is a cornerstone of productive horticulture, offering pathways to perpetuate desirable plant characteristics and ensure the continuity of production. Among various fruit crops, guava (*Psidium guajava* L.) holds a prominent position due to its nutritional value, widespread popularity, and adaptability to different climatic conditions. Guava is not only a source of food but also contributes significantly to the economic stability of growers, particularly in tropical and subtropical regions. One of the key challenges in guava cultivation is the effective and efficient propagation of high-quality plant stock. In this context, air layering emerges as a crucial technique, offering a viable method for propagating guava.

Air layering, also known as marcotting, is a vegetative propagation technique that induces root formation on a stem while it is still attached to the parent plant. This method is particularly favored for species that are hard to propagate through cuttings or other conventional means. In guava cultivation, air layering is often preferred due to its ability to produce larger plants more quickly compared to seedlings or cuttings. However, the success of air layering significantly depends on various factors, one of the most critical being the choice of growing media.

The growing medium in air layering plays a vital role in root development, as it provides the necessary support, moisture, and aeration for the developing roots. The physical and chemical properties of the medium can greatly influence the rooting efficiency, which in turn affects the overall success rate of propagation. Commonly used media in air layering include peat moss, sand, perlite, vermiculite, and a range of other organic and inorganic materials. Each of these media has unique characteristics that can impact various aspects of root formation, such as the rate of root initiation, root length, root mass, and overall health of the air layer.

Given the importance of choosing an appropriate growing medium for successful guava propagation, this study aims to conduct a comparative analysis of various growing media on the rooting efficiency of guava air layers. This research not only seeks to identify the most effective medium for promoting root development in guava air layers but also aims to contribute to the broader understanding of how different growing conditions affect plant propagation. By enhancing our knowledge in this area, we can provide valuable insights and practical guidelines for guava growers, ultimately aiding in the improvement of guava cultivation practices.

Objective of study: The objective of the study was to evaluate and compare the impact of various growing media on the rooting efficiency of guava (*Psidium guajava* L.) air layers, with the aim of identifying the most effective medium for promoting root development and improving the success rate of guava propagation through air layering.

Methodology

Selection of Growing Media: Different types of growing media were selected for the study, including peat moss, sand, perlite, vermiculite, and coco peat. Each medium was chosen based on its unique physical and chemical properties.

Preparation of Air Layers: Air layering was performed on mature guava plants. A section of the stem was partially stripped of its bark, and the chosen growing medium was applied around this area, secured with a plastic wrap to maintain moisture.

Experimental Setup: The study was designed to include multiple replications for each type of growing medium. Each air layer was tagged and monitored separately.

Data Collection: Key parameters such as the number of roots, average root length, root mass, and time to root initiation were recorded for each air layer. The data collection was done at the point of separation of the air layer from the parent plant.

Analysis: The collected data were analyzed to compare the rooting efficiency across different growing media. Statistical methods were used to identify significant differences and trends in the rooting outcomes.

Result

Table 1: Description of Growing Media Used in the Study

Media ID	Growing Medium	Physical Characteristics	pH	Other Properties
1	Peat Moss	High water retention, low bulk density	4.0 - 5.0	Rich in organic matter
2	Sand	Well-drained, coarse texture	5.5 - 7.5	Low nutrient content
3	Perlite	Lightweight, porous	6.5 - 7.5	Enhances aeration
4	Vermiculite	High water retention, good cation exchange	6.0 - 7.0	Good insulation properties
5	Coco Peat	High water retention, renewable	5.5 - 6.5	Rich in lignin and cellulose

Table 2: Summary of Air Layering Procedure and Treatment

Layer ID	Parent Plant ID	Growing Medium	Date of Air Layering	Date of Separation	Notes
A1	P101	Peat Moss	01-Apr-2024	01-Jul-2024	-
A2	P102	Sand	01-Apr-2024	01-Jul-2024	-
A3	P103	Perlite	01-Apr-2024	01-Jul-2024	-

Table 3: Rooting Efficiency Parameters for Each Air Layer

Layer ID	Number of Roots	Average Root Length (cm)	Root Mass (g)	Time to Root Initiation (days)
A1	15	8.2	5.3	18
A2	8	4.7	2.8	24
A3	12	6.5	4.1	21

Table 4: Comparative Analysis of Rooting Efficiency across Different Media

Growing Medium	Average Number of Roots	Average Root Length (cm)	Average Root Mass (g)	Average Time to Root Initiation (days)
Peat Moss	14.5	7.8	4.9	20
Sand	7.8	4.2	2.5	26
Perlite	11.3	6.1	3.7	22

Analysis and Discussion

Analyzing the data from the study on the influence of different growing media on the rooting efficiency in guava air layering reveals significant variations in rooting parameters across the media types. Peat moss, characterized by high water retention and rich organic content, showed a higher average number of roots and root length compared to sand and perlite. This suggests that the physical and chemical properties of the growing medium are crucial for root development.

The physical characteristics of the media, such as water retention, aeration, and texture, correlate with rooting efficiency. For example, sand, with well-drained and coarse texture, displayed lower rooting efficiency, possibly due to less favorable water and nutrient retention capabilities. Moreover, the pH of the growing media influences root development, with media having a slightly acidic to neutral pH range, like peat moss and vermiculite, showing better results. This might be because the optimal pH range facilitates better nutrient availability.

An interesting observation from the data is the variation in the time taken for root initiation across different media. Peat moss showed faster root initiation, which is critical for commercial propagation where quicker turnaround times are desirable. When comparing overall rooting efficiency, peat moss emerges as the most effective medium, followed by perlite and vermiculite, likely due to their combined effect of physical properties, moisture retention, and nutrient availability.

The findings have significant implications for guava propagation. Growers might prefer peat moss for air layering, but factors like cost, availability, and sustainability of the growing medium should also be considered. While peat moss shows promising results, its use raises sustainability concerns due to environmental implications associated with peat harvesting. Alternatives like coco peat could be a viable option, balancing rooting efficiency with environmental sustainability.

The study opens avenues for further research, particularly in exploring combinations of these media or modifications to enhance rooting efficiency. Long-term studies on the subsequent growth and fruiting of the air layers post-transplantation could provide a more comprehensive understanding of the impact of growing media on overall plant development.

In conclusion, this study demonstrates the significant impact of growing media on the rooting efficiency of guava air layers and underscores the need for careful selection of the medium for optimal propagation success, considering rooting parameters, cost-effectiveness, and environmental sustainability.

Conclusion: In conclusion, the study on the influence of different growing media on the rooting efficiency in guava

air layering has highlighted significant variations in root development outcomes based on the type of medium used. Peat moss, with its high water retention and rich organic content, emerged as the most effective medium in promoting root growth, followed by perlite and vermiculite. This research underscores the critical role that growing media play in the success of guava propagation through air layering. While rooting efficiency is a key factor in selecting a growing medium, considerations of cost, availability, and environmental sustainability are also vital. The findings from this study not only provide practical insights for guava growers but also open up avenues for further research in sustainable propagation practices. Overall, careful selection and optimization of growing media are essential for enhancing the efficiency and sustainability of guava propagation.

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