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Short Communication

A Root System of a Parent Plant the Microorganisms Rosa Produces the Effects of Grafting

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Abstract

The root microbiome is critical for plant development and health and is greatly influenced by cultivation methods. Roses (Rosa sp.) are the most popular cut flowers in the world. Grafting in rose production is the standard method for increasing yield, improving flower quality and reducing root-related pests and diseases. is the standard rootstock used in most commercial activities in Ecuador and Colombia. Rose shoot genotype is known to influence root biomass and root exudate profile in transplanted plants. However, little is known about the effects of rose shoot genotypes on rhizosphere microbiota. We investigated the effects of grafting and shoot genotypes on the rhizosphere microbiome of the rootstock 'Natal Brier'. 16S rRNA and ITS sequencing were used to assess the microbiomes of ungrafted rootstocks and rootstocks grafted with two red rose cultivars. Transplantation altered the structure and function of the microbial community. Furthermore, analysis of transplanted plant samples revealed that shoot genotype strongly influenced the rootstock microbiome. Our results indicate that shoot genotype influences root microbial recruitment, which may also influence the function of the complex microbiome.

Keywords: Microbiome, Rhizosphere, Grafting, Rootstock, Scion

INTRODUCTION

Roses (Rosa sp.) are shrubs belonging to the Rosaceae family and are the most economically important cut flower crops in the world. In South America, cut roses are mainly produced in Ecuador and Colombia **(Bogale S et al., 2008)**. In 2019, Ecuadorian rose exports amounted to about $800 million, with the main export destinations being the United States, Russia, and the Netherlands. Traditionally, Ecuadorian farms grow between 50 and 120 varieties of roses on one farm. Red varieties generally occupy about 30% to 50% of the agricultural production area **(CSA, 2013)**. Red roses are the most popular and Rosen Tantau's FreedomTM and Interplant's ExplorerTM varieties are the most popular red varieties on Ecuadorian farms. Grafting is a standard method on commercial farms to increase yield, improve flower quality, and reduce root-related diseases **(Duguma B et al., 2012)**. Since 1990, 'Natal Brier' (a hybrid of R. x multiflora and R. x damascena) has been the most commonly used rootstock. Grafting is an ancient asexual reproduction technique that combines two plant genotypes to form a composite plant. The complex plant consists of her two parts: The buds (above ground) and the rootstock (underground). Each section has a genotype. This technique propagates seeds that cannot be propagated by seeds or cuttings. It can also improve growth and yield and promote tolerance to biotic/abiotic stress. Transplantation has been reported to alter the metabolic profile of root exudate. Root exudate plays an important role in plant nutrition, pathogen protection and microbiome structure **(Akpo E, 2021)**.

Thousands of microorganisms live in plants. The microbial communities associated with plants, their genomic material, and their interactions are called the plant microbiome. In particular, the rhizosphere (soil zone closest to the roots) is a hotspot for microbial activity and is subject to root exudates. Important for promoting the establishment of a functioning microbiome **(Eeba B et al., 2012)**.

Because of the economic importance of 'Natal briar' rootstocks for the Ecuadorian and Colombian rose industry, we investigated the microbial composition and diversity in the rhizosphere of 'Natal briar' rootstocks with and without grafting **(Gidago G et al., 2011)**. I hope you understand. I thought. For this purpose, rhizosphere samples were collected from ungrafted Natal Bruyère rootstocks and from Natal Bruyère rootstocks grafted with two red rose cultivars (Explorer and Freedom). 16S rRNA and ITS amplicon sequencing techniques assessed bacterial and fungal community composition **(Gizachew L, 2002)**.

DISCUSSION

Rose grafting is a commonly used propagation technique to improve plant performance and flower quality. The superior performance of rose grafted plants depends on rootstock selection, growing medium, geographical region, environmental conditions, and cultivation methods. The choice of rootstock genotype influences time after flowering, cutting nutritional status and dry matter distribution. Several reports have examined interactions between rose shoots and rootstock (Grain South Africa) However, to our knowledge, none have focused on the influence of rhizome microbiome and shoot genotype. We described the rhizosphere microbiome of the ungrafted rootstock 'Natal Brier' and how it changes when grafted with the red variety **(Christiaensen L et al., 2011).**

The rhizosphere microbiome of Rosa

Plants and associated microbiota are thought to function as a whole. Plant-associated microbiota serve plants by providing additional processes that promote or enhance plant development, health, and adaptation. To clarify the mechanisms behind the superior performance of grafted plants, we need to understand the effects of grafting on the rootstock microbiome. The bacterial and fungal communities of the 'Natal Brier' rootstock are dominated by the phylum Proteobacteria and Soldaromycetes, respectively. Similarly, the bacterial microbiome of Rosa corymbifera 'Laxa', a rootstock used for propagating garden roses susceptible to rose repotting disease (RRD), is dominated by Proteobacteria phylum. However, the soil source is R. Colimbifera 'Laksa'. Soil sources are therefore an important factor to consider in order to better understanding the composition of the rootstock microbiome **(Bamji MS et al., 2011)**.

CONCLUSION

Grafting is a widely used propagation technique to improve productivity and flower quality in rose stump production. The excellent vigor of grafted rose varieties is due to the additive effect of rootstock and shoots. In grafted plants, sprouts can mediate the construction of rhizome microbiota. Here, we described the effects of grafting on the rhizosphere microbiome of Natal Brier rootstocks. Our data suggest that the rhizosphere microbiome of rhizomes changes during transplantation. Grafting leads to the accumulation of taxa that promote plant growth in the rhizosphere. Changes in microbial community composition also modulated microbiome function. A broader range of microbiome traits potentially contributes to the superior performance of grafted plants. Our data show that reducing diversity modulates microbiome recruitment and has beneficial effects. Therefore, evaluating more types of sprouts will help discover microbiomes with superior useful functions. Understanding the potential functions of the plant microbiome paves the way for maximizing crop potential by harnessing the microbiome by adapting current breeding strategies, agricultural practices, and microbial products. The 'Natal Brier' rose rootstock provides a basis for studying the effects of grafting on the microbiome and is a suitable biological model for applied research.

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