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Progress in Using Gene Editing and Genetic Engineering to Improve Floral Features in Ornamental Plants: A Recap

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Introduction

The realm of genetic engineering and gene editing has seen significant progress in recent years, particularly concerning ornamental plants. The ability to manipulate the genetic makeup of these plants offers the potential to enhance various floral features, including color, fragrance, shape, and longevity. This article aims to recap the advancements made in using gene editing and genetic engineering techniques to improve floral traits in ornamental plants, exploring the impact on the horticultural industry and the future prospects of this technology. Gene editing and genetic engineering involve precise manipulation of an organism's genetic material to introduce, remove, or modify specific genes. In horticulture, these techniques enable the alteration of plant traits to achieve desirable characteristics, such as improved aesthetics, disease resistance, and stress tolerance.

Description

Gene editing allows for modifications in the expression of genes responsible for pigment production, enabling the creation of vibrant, novel color variations in flowers. Manipulation of genes related to scent production facilitates the enhancement or alteration of floral fragrances, providing opportunities to create new olfactory experiences in ornamental plants. Genetic modifications can extend the lifespan of flowers or regulate the timing of blooming, prolonging the visual appeal of ornamental plants. Genetic engineering techniques can influence the shape, size, and structure of flowers, allowing for the creation of diverse and unique floral forms. The CRISPR-Cas9 system has revolutionized gene editing, offering precise and efficient manipulation of specific genes. This technique has been applied to modify floral traits in ornamental plants, providing a more straightforward and targeted approach. RNAi technology suppresses gene expression, enabling the alteration of floral characteristics by silencing specific genes responsible for undesirable traits or enhancing desired ones. Introducing foreign genes into ornamental plants has been achieved through transgenic methods, allowing for the incorporation of genes associated with desired floral traits. Researchers have successfully altered the expression of genes involved in pigment biosynthesis to produce new flower colors in plants such as roses, petunias, and chrysanthemums. Genetic modifications have been applied to adjust the production of fragrance compounds, enhancing or diversifying scents in flowers like carnations and roses. Manipulating genes associated with senescence has resulted in extending the vase life of cut flowers, enhancing their commercial value. Genetic engineering has been utilized to modify floral structures, creating variations in shapes, sizes, and patterns in blooms.

Conclusion

In conclusion, gene editing and genetic engineering have opened new horizons in horticulture, offering opportunities to transform floral features in ornamental plants. While facing regulatory, ethical, and societal challenges, these technologies hold the potential to revolutionize the ornamental plant industry, providing aesthetically enhanced and sustainable floral varieties for future generations. Efforts to balance innovation with responsible practices and transparent communication will be pivotal in realizing the full potential of genetically modified ornamental plants in the years to come. Continued advancements in gene editing techniques and tools will further refine precision, efficiency, and specificity in modifying floral traits. Genetic modifications will lead to the creation of a diverse array of ornamental plant varieties, catering to diverse consumer preferences. Genetically modified ornamental plants with enhanced traits like disease resistance and extended vase life contribute to sustainable and resource-efficient horticultural practices. Education and communication efforts are essential to inform the public about the benefits, safety, and ethical considerations of genetically modified ornamental plants.

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