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Doubled Haploids in Flower Breeding: A Faster Way to Create New Varieties

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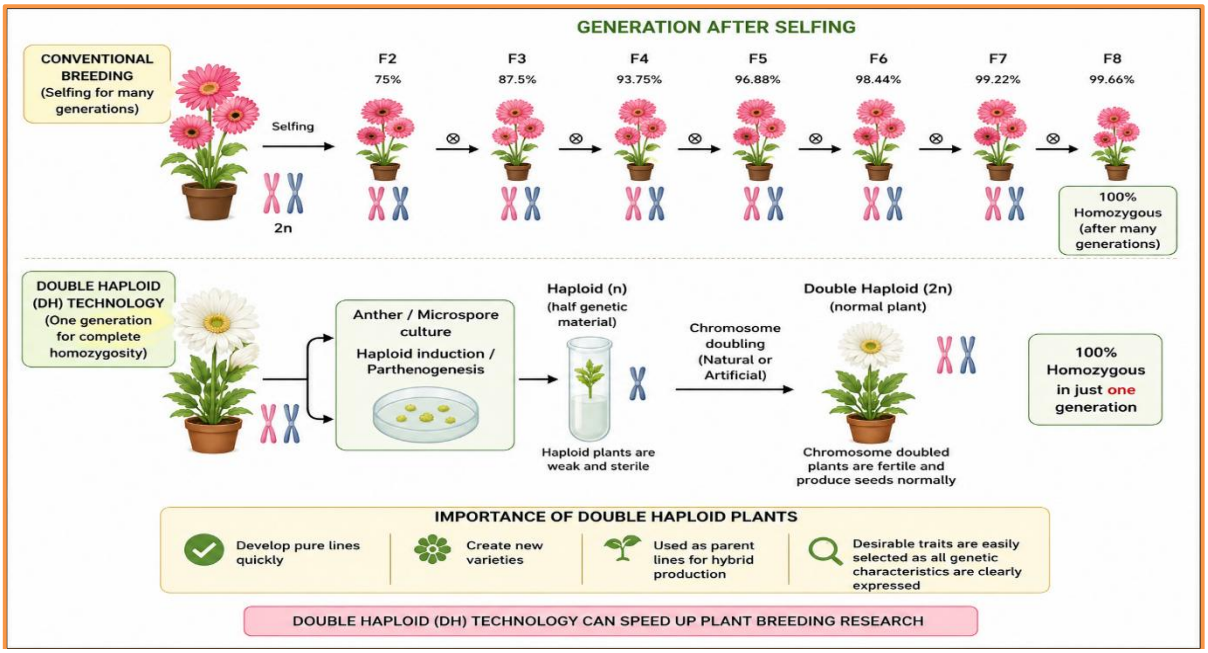
Flowers have always been an important part of our life, adds beauty to our surrounding and meaning to our celebrations. From a simple home garden to large scale floriculture industries, flowers are valued for their vibrant colours, attractive shapes and fragrance. Now-a-days, there is an increased demand for improved flower varieties, as people look for flowers that re more attractive, longer shelf life and suitable for different purposes. Hence, creating such improved varieties is a drawn-out process. Traditional breeding method is a long-term procedure that involves selecting the parent plant with desired characteristics and crossing them for several generations. This requires patience, careful observation, and many years of effort to create a desired stable and uniform variety. In many cases, the results are unpredictable which makes it even more complicated. To address this problem, scientists have developed modern techniques that can make breeding faster and more efficient. One such approach is "The Doubled Haploid" technique, which allows breeders to produce desired new variety with stability and uniformity in much shorter time when compared to conventional methods. This technique helps the breeder meet their expectation more effectively, taking an important step forward in the development of new flower varieties. By reducing the number of generations required to achieve stable traits, this technique has become an important tool in modern floriculture.

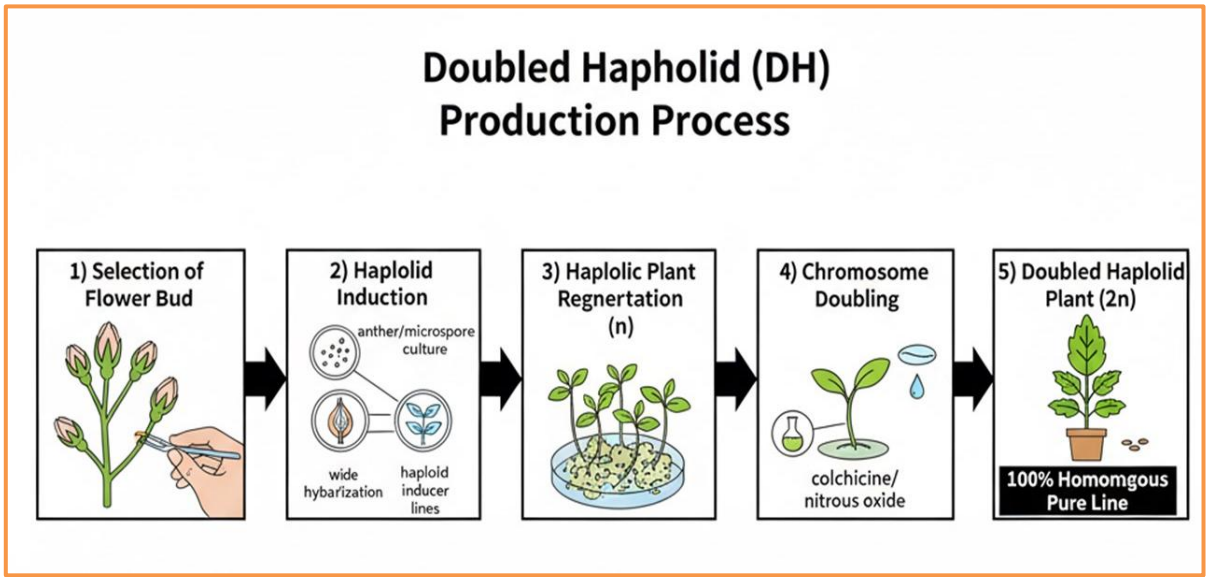
Double haploid

A double haploid is created by bringing the genetic material to half, that is haploid(n) condition and undergoes chromosome doubling to become a normal plant(2n). These plants are completely homozygous, meaning all their genes are identical, which makes them very stable and uniform. Normally, haploid plants are weak and sterile because their chromosome will not pair properly during reproduction. To make the them useful in breeding, their chromosomes are doubled either naturally or artificially. Once doubled, the plant becomes fertile and can produce seeds normally. In conventional breeding, pure homozygous line results only after selfing many generations. But with doubled haploids, complete homozygosity is achieved in just one generation. This is more efficient in crops that take long time to grow. Doubled haploid plants are very important in plant breeding. They are used to develop pure lines, create new varieties, and serve as parent lines for hybrid production. They also help in selecting desirable traits quickly because all genetic characteristics are clearly expressed (Karjee *et. al.*, 2020).



Steps in Doubled haploid

The doubled haploid technique works through a simple but carefully controlled process. First, scientists collect special plant cells like pollen grains or anthers, which naturally contain only half the genetic material. These cells are then grown in controlled laboratory conditions to develop into small plants, even though they originally have only one set of chromosomes. However, these plants are not stable or fully functional yet. To make them complete, their chromosomes are doubled using specific treatments. This step turns the plant from having half the genetic material into having a full set, making it genetically stable and able to grow and reproduce normally. Once this process is complete, the final plant obtained is completely uniform, with identical genetic makeup in all its cells. These pure plants can then be used directly in breeding programs or for developing new flower varieties more efficiently (Karjee *et. al.*, 2020).



Role of Doubled Haploids in Modern Floriculture

The doubled haploid technique is important in floriculture because it helps breeders develop new flower varieties much faster than traditional methods. Instead of taking many generations, this technique produces stable and pure plants in a short time, making the breeding process more efficient.

It also ensures uniformity in flowers, meaning plants produce consistent color, size, and shape, which is highly important for market quality. In addition, these plants often show improved traits such as better appearance and longer shelf life. These qualities make them more desirable in the flower market and beneficial for both breeders and farmers. Compared to conventional breeding, the doubled haploid method is faster, more accurate, and saves time and effort. It allows breeders to quickly select and develop high-quality varieties. Overall, this technique plays a key role in improving flower production and meeting the increasing demand for high-quality ornamental plants (Kusuma and Sivaswamy, 2025)

Advantages Over Traditional Breeding

- **Faster development of pure lines:** Complete homozygosity is achieved in a single generation, avoiding many cycles of self-pollination.
- **Saves time:** The breeding process becomes much quicker, especially for crops with long life cycles.
- **Genetically uniform plants:** Doubled haploids are completely homozygous, resulting in stable and uniform plants.
- **More accurate selection:** All traits are clearly expressed, making it easier for breeders to identify desirable characteristics.
- **Useful in difficult breeding situations:** Helps in species with self-incompatibility or inbreeding depression.
- **Efficient breeding tool:** Reduces effort and increases overall efficiency in developing new varieties.

Future scope

The doubled haploid technique is becoming an important part of modern plant breeding, especially with the development of advanced technologies such as tissue culture and genetic tools. It has the potential to make floriculture more efficient by helping breeders develop new and improved flower varieties in less time. As the demand for high-quality ornamental plants continues to grow, this technique can play a key role in shaping the future of floriculture (Zargar *et. al.*, 2022).

Conclusion

However, despite its advantages, the application of doubled haploid technology in many ornamental crops is still limited. More research is needed to improve its efficiency, develop reliable protocols for different flower species, and make the technique more accessible for large-scale use. This creates an opportunity for further studies to expand its use in floriculture and unlock its full potential.

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