



Bulb Priming: A Pre-Planting Technique to Improve Growth and Flowering

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In the floriculture industry, bulbous ornamentals were highly cherished for their large, unique floret shapes. Many important ornamental crops such as Tulips, Gladiolus, Lilliums and Hyacinthus *etc.*, are commercially propagated through underground storage organs. The physiological condition and health of bulbs greatly influence sprouting, plant establishment, vegetative growth and flowering performance. To improve the establishment and productivity of bulbous crops, growers often adopt certain pre-planting treatments. Among these practices, bulb priming has emerged as a simple and effective technique that enhances sprouting, plant vigour and flowering by activating metabolic processes before planting.

Bulb priming refers to a controlled pre-planting treatment in which bulbs are soaked in water, nutrient solutions or plant growth regulator solutions for a limited period to initiate early physiological and biochemical activities without allowing visible sprouting (Bhusal *et al.*, 2023). During the priming process, bulbs absorb a moderate amount of moisture that activates several metabolic processes such as respiration, enzyme activation and mobilization of stored food reserves. This partial hydration prepares the bulbs physiologically so that when they are planted in soil, they show faster emergence, better root development and more uniform plant establishment compared with untreated bulbs. The concept of priming is closely related to seed priming, where controlled hydration stimulates early metabolic activity while preventing complete germination.

Hydro-priming

One of the most common approaches to bulb priming is hydro-priming, in which bulbs are soaked in clean water for a short duration before planting. This treatment allows the bulb tissues to absorb moisture and initiate metabolic activities such as the activation of hydrolytic enzymes including amylase and protease (Duga *et al.*, 2015). These enzymes help convert stored starch and proteins within the bulb into soluble sugars and amino acids that serve as energy sources for early growth. Hydro-priming is particularly useful in bulbs that have been stored for long periods and may have lost some moisture during storage. In many bulbous crops, soaking for two to four hours at moderate temperatures around 20–25 °C is sufficient to stimulate early metabolic processes without causing damage or premature sprouting.

Plant growth regulators

Another important form of priming involves the use of plant growth regulators, which influence cell division, cell elongation, and differentiation in plant tissues. Hormonal priming is often carried out using growth regulators such as Gibberellic acid, Indole-3-acetic acid, Indole-3-butyric acid, Kinetin and 6-Benzylaminopurine. These hormones regulate various physiological processes within the bulb (Devaraju *et al.*, 2011). For example, gibberellic acid promotes cell elongation and helps overcome dormancy in some bulbous plants, while auxins such as indole-3-acetic acid and indole-3-butyric acid stimulate root initiation and early root growth. Cytokinins like kinetin and benzylaminopurine enhance cell division and shoot

development, which can improve plant vigor and flowering performance. The use of plant growth regulators during priming therefore enhances the physiological readiness of bulbs for rapid establishment after planting.

Nutrient Priming

Bulbs may also undergo nutrient priming, where they are soaked in dilute solutions containing essential plant nutrients. Nutrient priming helps supply important macro- and micronutrients that support early plant growth and metabolic activity. For instance, nitrogen supplied through compounds such as urea or ammonium nitrate contributes to protein synthesis and vegetative growth, while phosphorus provided through mono-potassium phosphate supports energy transfer and root development. Potassium supplied through potassium nitrate helps regulate enzyme activity and water balance in plant tissues. Secondary nutrients such as calcium and magnesium may be supplied through calcium chloride and magnesium sulphate, respectively, which contribute to cell wall stability and chlorophyll formation (Moguee *et al.*, 2026). In some cases, micronutrients including zinc sulfate, boric acid, ferrous sulphate, and manganese sulphate are used in priming solutions to enhance enzyme function and metabolic efficiency during early plant development.

Chemical Priming

Chemical priming is another approach used in bulb treatment, where specific chemical compounds are applied to improve sprouting, break dormancy, or protect bulbs from pathogens. For example, potassium nitrate is often used to stimulate sprouting and improve early growth, while thiourea has been reported to help break dormancy in certain bulbous plants. Hydrogen peroxide may be used in dilute concentrations to improve oxygen availability and stimulate metabolic activity within bulb tissues. Surface sterilization using sodium hypochlorite solutions can help eliminate microbial contamination, especially when bulbs are stored or handled under humid conditions. In addition, fungicides such as carbendazim or captan may be used to protect bulbs from fungal infections during early stages of planting and establishment (Wan Rozita *et al.*, 2024).

The effectiveness of bulb priming is largely attributed to its influence on physiological and biochemical processes occurring within the bulb tissues. When bulbs absorb moisture during priming, the rate of respiration increases and stored carbohydrates are mobilized to support early growth. Enzymes responsible for starch breakdown become active, converting stored starch into soluble sugars that provide energy for root and shoot development. Hormonal signaling pathways are also activated, promoting cell division and elongation in meristematic tissues. These physiological changes prepare the bulb for rapid growth once it is placed in soil, resulting in quicker emergence and more vigorous plant development.

The benefits of bulb priming are particularly evident in ornamental crop production. Primed bulbs often exhibit faster and more uniform sprouting, which ensures synchronized plant growth and flowering. Improved root development enhances nutrient and water uptake, leading to stronger vegetative growth and increased plant vigour. Early establishment often results in earlier flowering and better flower quality, including larger blooms, improved colour intensity, and longer vase life. These advantages are especially valuable in commercial floriculture systems where uniformity and timing of flowering are critical for market demand.

Conclusion

Bulb priming represents a simple, economical, and effective pre-planting management practice that can significantly enhance the performance of bulbous ornamental plants. By stimulating early metabolic activity through controlled hydration and treatment with nutrients, plant growth regulators, or protective chemicals, priming prepares bulbs for rapid sprouting and vigorous growth. The adoption of bulb priming in horticultural production can therefore contribute to improved plant establishment, uniform crop growth, and enhanced

flowering quality, making it an important technique for both home gardeners and commercial floriculture growers.

References

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