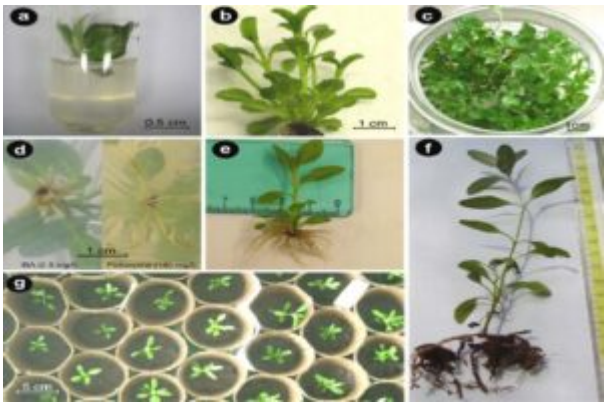
Micropropagation of Teucrium fruticans L.: Unlocking the Potential of a Medicinal and Ornamental Plant



Introduction Teucrium fruticans L., commonly known as bush germander, is a stunning Mediterranean shrub prized for its vibrant blue flowers and silver-green foliage. Beyond its ornamental appeal, this plant holds medicinal significance, traditionally used as a depurative and diuretic. Recent studies highlight its bioactive compounds, including neo-clerodane diterpenoids with insect-repelling properties, flavonoids with antioxidant benefits, and essential oils valued in the fragrance industry.

Despite its many uses, the propagation of T. fruticans via seeds and cuttings is inefficient due to poor germination and seasonal growth limitations. This article presents an advanced micropropagation protocol that enhances shoot multiplication and root development, ensuring a reliable supply of high-quality plants for horticultural and pharmaceutical applications.

Materials and Methods

Explant Collection and Sterilization

Healthy shoot tips (1.5–2.0 cm) were collected from botanical garden specimens at Università della Tuscia, Italy. The explants underwent sterilization using a sodium hypochlorite solution with Tween-80, followed by thorough rinsing with sterile distilled water to eliminate contaminants.

Shoot Initiation

Nodal segments were cultivated in test tubes containing Murashige and Skoog (MS) medium enriched with benzylaminopurine (BAP), α-naphthaleneacetic acid (NAA), and sucrose. Cultures were maintained under controlled conditions (24± 1°C, 16-hour photoperiod) to encourage new shoot formation.

Shoot Multiplication

The most effective multiplication medium consisted of MS supplemented with 6.6 µM BAP. This formula yielded an average of 2.8 shoots per explant and 6.8 nodes per shoot, significantly surpassing other treatments. This optimized protocol maximizes shoot proliferation while maintaining healthy growth.

Root Induction and Acclimatization

For optimal root development, shoots were transferred to MS media containing indole-3-butyric acid (IBA) at various concentrations. The best rooting response (94% success rate) was achieved with 2.5 µM IBA, producing an average of 7.9 roots per shoot. The rooted plantlets were gradually acclimatized in jiffy pots under greenhouse conditions, achieving a 100% survival rate.

Results and Discussion

Efficient Shoot Multiplication

The study demonstrated that T. fruticans can tolerate higher cytokinin concentrations, enhancing shoot production without

compromising height or vigor. Compared to previous studies, this protocol resulted in a superior multiplication factor (MF) of 19 nodes per explant, indicating a more efficient system for mass propagation.

Enhanced Rooting Performance
IBA at 2.5 µM promoted the highest number of roots and overall rooting success. Unlike other studies that used putrescine to improve root quality, this protocol found no significant advantage in its application, streamlining the process with a single growth regulator.

Successful Acclimatization
Rooted plantlets transferred to greenhouse conditions exhibited normal morphological characteristics, mirroring those of naturally grown plants. This confirms the commercial viability of the micropropagation method, ensuring high survival rates and uniform plant quality.

Conclusion This micropropagation protocol presents a breakthrough for T. fruticans cultivation, offering a reliable and scalable method to produce high-quality plants. The enhanced shoot multiplication and root induction techniques pave the way for commercial propagation, benefiting both the ornamental horticulture and pharmaceutical industries. By utilizing this approach, researchers and growers can unlock the full potential of this remarkable plant.