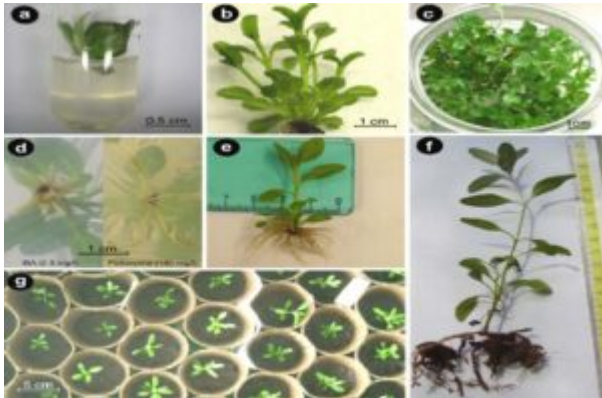


Micropropagation of *Teucrium fruticans* L.: Unlocking the Potential of a Medicinal and Ornamental Plant



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](#) ($24 \pm 1^\circ\text{C}$, 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 μ M 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](#).