
Potential of *Dracaena massangeana* for Open-Field Cultivation and Intercropping with Coffee - Black Pepper-Based Plantation Systems of the Shervaroy Hills

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ABSTRACT

Dracaena fragrans cv. *Massangeana* has evolved from a traditional indoor potted plant into a commercially important cut-foliage crop cultivated in open fields and shade-houses for the global floristry market. India has gained an export advantage due to low production costs, year-round leaf availability, and its value as a structural floral filler. In plantation ecosystems such as coffee and rubber, particularly in Kerala and Karnataka, *Massangeana* serves as a profitable intercrop and can provide significant additional income. The cool, humid microclimate of the Shevaroy Hills (1,200–1,600 m MSL) offers ideal conditions for cultivation, with moderate temperatures, suitable soil conditions, and reduced heat stress, enabling quality foliage production under partial to full sunlight. Successful cultivation depends on maintaining optimum shade levels, vegetative

propagation, proper planting, and efficient irrigation management. Major production challenges include leaf spot diseases and *Phytophthora*-associated root rot, which can be minimized through good drainage, field sanitation, and targeted irrigation practices. Mature plants produce a continuous supply of marketable leaves throughout the year, and effective post-harvest handling, cold-chain management, and proper packaging can extend vase life up to 4-8 weeks, supporting domestic and export markets. Thus, Massangeana represents a promising high-value intercrop and sustainable income source for hill plantation farmers.

INTRODUCTION

While consumers primarily recognize *Dracaena fragrans* cv. *Massangeana* as a potted "corn plant," commercial horticulture treats it as a high-value cut-foliage crop. Grown in open fields or shade-houses, it is harvested, bundled, and exported as floral greenery rather than sold as a container ornamental. In commercial trials, *Dracaena* species are evaluated side-by-side on agronomic metrics like leaf length, area, color retention, and vase life. Commonly cultivated cultivars include *Dracaena terminalis* ("Mahatma," "Red," "Green"), *D. deremensis* ("Limelight"), *D. surculosa* ("Gold Dust"), *D. marginata*, *D. reflexa*, and *D. sanderiana*. Massangeana has secured a dominant export niche from India due to its low production costs, year-round availability, and versatility as a filler and background material in structural floral designs.

DYNAMICS OF INTERCROPPING WITH COFFEE AND PEPPER

Massangeana is highly adaptable as a shade-tolerant intercrop in rubber, cocoa, and coffee plantations. Scaled extensively across Kerala, Karnataka, Kolkata and hilly regions of Tamil Nadu, it frequently generates higher early returns than the primary plantation crop, shifting its status from a secondary "filler" to the primary revenue driver during the establishment years.

THE SUN-SHADE TRANSITION ZONE

A common field misconception is that "shade-tolerant" implies thriving under total canopy occlusion. In reality, Massangeana suffers in deep, uninterrupted shade, which causes faded leaf coloration, reduced canopy density, and excessive internode elongation. Standard cultivation guidelines call for 70% shade coverage, not 100%. Field observations confirm that the crop thrives in sun-shade transition zones such as row edges and canopy gaps where sun and shade alternate. Plants located in permanent deep shade beneath mature coffee trees or pepper standards exhibit stunted growth and thin leaves. Consequently, row geometry and planting density must be strategically adjusted as the main crop's canopy matures over time. Intercropping is highly productive during the initial establishment phase, but yields will decline once the primary canopy fully closes.

ENVIRONMENTAL PROFILE OF THE SHEVAROY HILLS

- **Elevation & Topography:** Centered around Yercaud at 4,700 ft above mean sea level (MSL), the surrounding plateau ranges from 2,500 to 5,200 ft (1,200–1,600 m). This mid-elevation habitat contrasts with the traditional lowland cultivation zones of South India.
- **Temperature Regime:** The region features a moderate thermal band with a mean temperature of 22–25°C. Winter minimums occasionally drop below 7°C, while summer maximums can exceed 32°C.

- **Nocturnal Humidity:** Regional studies cite an average daytime relative humidity of 75%, but cultivation data at 1,500 m MSL indicates that high nighttime humidity is the primary driver of foliage quality. Prolonged, cool overnight moisture reduces transpiration stress, allowing the plant to recover from daytime water loss. This redirects metabolic resources toward intense pigmentation, pronounced variegation, and firmer tissue structure. Low overnight humidity results in dull, papery leaves.

SITE SELECTION AND OPEN-FIELD MANAGEMENT

At 1,500 m MSL, the regional soil features a favorable, mildly acidic pH of 6.1–6.3. Standard literature suggested Massangeana requires filtered shade to prevent solar scorching. However, in the Shevaroy Hills, open-field cultivation under full sunlight yields highly vigorous growth, deeper green coloration, and sharp variegation. The region's lower temperatures, frequent cloud cover, and high atmospheric humidity mitigate the heat stress that typically causes leaf scorch in hot, arid lowlands. This indicated that sunlight sensitivity is dependent on the compounding effects of high temperatures and low humidity, rather than light intensity alone.

PROPAGATION AND FIELD ESTABLISHMENT

True-to-type variegation is maintained strictly via vegetative cane or tip cuttings. Woody stem sections are rooted in nursery containers, forcing multiple new heads to emerge from the apex. Root initiation begins within 30–35 days under warm conditions (20–23°C), with a fully rooted, transplant-ready cutting developing in 6 weeks. The Shevaroy Hills feature a bimodal monsoon pattern (southwest and northeast) delivering an annual rainfall of 1,150–1,500 mm. This provides two distinct, favorable transplanting windows per year. Aligning field planting with the onset of either monsoon secures continuous natural soil moisture, minimizes transplant shock, and drastically reduces early labor and irrigation costs.

SEASONAL IRRIGATION PROTOCOLS

During dry months, a baseline schedule of twice-weekly irrigation is maintained, guided strictly by visible surface soil drying rather than a rigid calendar. Supplemental irrigation drops to zero during the monsoons, as natural rainfall completely satisfies the crop's water requirements. This front-loaded, seasonal irrigation structure restricts water and labor costs to a few specific months, lowering overall production costs.

PATHOLOGICAL CONSTRAINTS AND MANAGEMENT

Leaf Spot Disease

Leaf spot presents as small, circular or irregular brown/black lesions frequently surrounded by a yellow halo. It is a catch-all term for several fungal and bacterial pathogens, primarily *Phoma draconis* (formerly *Phyllosticta draconis*), as well as *Fusarium* and *Colletotrichum*.

In open-field hill systems, the lack of canopy control exposes foliage to persistent overnight dew, mist, and rain. This extended leaf wetness creates an ideal microclimate for fungal spore germination. Direct irrigation entirely to the soil base rather than overhead to minimize foliar wetness and suppress *Fusarium* outbreaks. Overwatering, which induces waterlogged soils should also be avoided. Periodical stripping and destruction of infected leaves, and clear dead debris from the soil surface to break the fungal life cycle are very important to mitigate the disease incidence.

SHARED ROOT ROT RISKS IN PEPPER INTERCROPS

Phytophthora foot rot (fast wilt), caused by the soil-borne water mold *Phytophthora capsici*, is the most destructive disease affecting black pepper in India. Because black pepper vines often support resident populations of this pathogen, intercropped *Dracaena* share an immediate risk zone. *Dracaena* root rot is caused by this same broad complex of water molds and fungi (*Phytophthora*, *Pythium*, *Rhizoctonia*, and *Fusarium*). Symptoms of foot rot are foliar wilting or curling that persists overnight, lower leaf chlorosis (yellowing), stunted growth, and soft, dark, mushy roots (the only definitive diagnostic indicator).

MANAGEMENT PRIORITY

- Establishing robust drainage channels, especially around pepper bases. Saturated soils accelerate *Phytophthora* damage; dry root zones protect both crops simultaneously.
- Avoiding planting of *Dracaena* near pepper vines displaying active foot rot or collar rot, as the local soil pathogen load will be high.
- Removal and destruction of infected plant material from both crops immediately, treating the intercrop field as a single epidemiological unit.

HARVESTING AND POST-HARVEST ECONOMICS

Leaves are harvested once they reach a marketable length of 75–85 cm. Under proper management, harvesting continues year-round, yielding 1–2 premium leaves per plant weekly (52–104 leaves per plant annually). Without specialized preservation, the baseline vase life of *Dracaena* foliage is 5–14 days. Harvested leaves are graded by length, color uniformity, and freedom from blemishes, fetching up to ₹2 per leaf in the domestic market depending on seasonal demand. Post-harvest protocols dictate washing leaves with clean water, air-drying, bundling, and packing them into ventilated corrugated fiberboard (CFB) boxes lined with paper or polyethylene sleeves. For long-distance domestic transport or export, keeping the cold chain at 10–13°C with 90–95% relative humidity extends the ornamental vase life to 4–8 weeks.

CONCLUSION

Open-field cultivation of *Dracaena fragrans* cv. *Massangeana* in the Shervaroy Hills offers considerable potential for commercial cut-foliage production. The region's favourable climate, characterized by moderate temperatures, high humidity, adequate rainfall, and mildly acidic soils, supports vigorous plant growth and the production of premium-quality foliage. Integration of *D. massangeana* as an intercrop in coffee–black pepper plantations enables efficient utilization of plantation space while providing farmers with a reliable, year-round supplementary source of income. Adoption of appropriate site selection, drainage management, irrigation, sanitation, and post-harvest handling practices can further enhance productivity and market value. Overall, *D. massangeana* represents a profitable and sustainable diversification option for plantation farmers in the Shervaroy Hills, with significant potential to strengthen both domestic and export-oriented floriculture industries.