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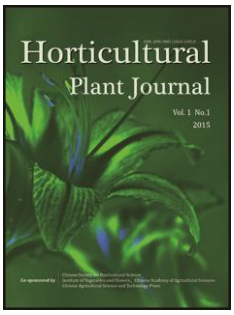

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Foliar Micromorphology of *In vitro*-cultured Shoots and Field-grown Plants of *Passiflora foetida*

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Abstract

The present report describes the development of quantitative and qualitative foliar micromorphological and architectural features in the field environment which elucidated the adaptation of micropropagated plants of *Passiflora foetida* L. in the natural soil conditions. The field environment (high light intensity in comparison to *in vitro* culture conditions) promotes the autotrophy through decrease in stomatal index (from 23.2 ± 0.15 to 21.0 ± 0.19), increased vein-islets (from 10.0 ± 0.14 to 15.6 ± 0.24 per square millimeters) and veinlet terminations (from 1.6 ± 0.14 to 5.0 ± 0.20 per square millimeters), and trichome density in *P. foetida* plantlets. The *in vitro* and field grown leaves mostly possessed anomocytic and anisocytic types of stomata. Two types of trichomes were observed on the surface of leaves of *in vitro* as well as field transferred plants of *P. foetida*; the unicellular hairy trichomes (non-glandular), and the multicellular (glandular) trichomes. The trichomes density was less under *in vitro* conditions as compared to the *in vivo* environments. The new leaves formed during the *ex vitro* rooting stage (in greenhouse) and after transplantation of plantlets to the field exhibited the development of adaptive micromorphological features in micropropagated plants, which enabled them to survive under field conditions.

Keywords: *Passiflora foetida*; micromorphology; micropropagation; stomata; trichomes

1. Introduction

In vitro culture technology has wide applications in the conservation and mass production of rare, endangered and threatened plants, cloning of medicinal plants for secondary metabolites, production of disease free horticultural varieties etc. The survival rate of true-to-type regenerants produced through micropropagation determines the success rate of any tissue culture protocol (Sahay and Verma, 2000).

Passiflora foetida L. (stinking passion flower**)** belongs to the family Passifloraceae and is extensively used in the folk medicines (Adjanohoun and Aké-Assi, 1970). It has antispasmodic, sedative, anxiolytic, antiparasitic, antibacterial, antifungal, antioxidant activities, and exhibited hepatoprotective, antidepressant, anticarcinogenic, analgesic and anti-inflammatory properties (Dhawan et al. 2001; Abascal and Yarnell, 2004). This plant could have some estrogenic and/or antiestrogenic properties; therefore the use of this plant as a new natural source of estrogens is investigated and encouraged recently (Beral, 2003). *Passiflora foetida* has been exploited by the drug manufacturers and pharmaceutical industries in India due to its important medicinal properties which lead to decrease in natural population of this plant in the wild. Therefore, micropropagation methods were developed for rapid and mass propagation of *P. foetida* but the survival rate of *in vitro* raised plantlets under field conditions was limited (Shekhawat et al., 2015). Many tissue culture raised plants are showing alarming rate of mortality while shifting these from *in vitro* to the field environment. This makes the micropropagation technology non-viable for large scale propagation of important plants (Shekhawat et al., 2016).