

CONSTRUCTION OF A pSiM24 BASED PLANT EXPRESSION VECTOR FOR OVEREXPRESSION OF TRANSLATIONALLY CONTROLLED TUMOUR PROTEIN (TCTP) GENE IN *HEVEA BRASILIENSIS* TOWARDS STRESS TOLERANCE ENHANCEMENT

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Received: 20 August 2025

Accepted: 18 September 2025

Aswathy, A.R., Thomas, K.U., Parvathi, B., Ajith, R., Ben, A.S. and Jayashree, R. (2025). Construction of a pSiM24 based plant expression vector for overexpression of Translationally Controlled Tumour Protein (TCTP) gene in *Hevea brasiliensis* towards stress tolerance enhancement. *Rubber Science*, 38(2): 215-228.

Translationally Controlled Tumour Protein (TCTP) is a highly conserved, multifunctional protein found in plants and animals. It plays a crucial role in regulating cell growth, stress responses, programmed cell death (apoptosis) and in supporting immune functions. Given its vital functions, TCTP has emerged as a key focus in plant biotechnology for enhancing stress tolerance and promoting vegetative growth. The present study aims to develop a plant transformation vector for overexpressing TCTP gene in *Hevea brasiliensis*, towards enhancing its vegetative growth and tolerance to abiotic/biotic stresses. The construct prepared was based on the binary vector pSiM24, harbouring an expression module for GUS gene and was utilized as the backbone for the new construct. The source vector plasmid, extracted from the *E. coli* cells, was subjected to double digestion and the GUS reporter gene was released from the vector. The identity of putative TCTP gene, amplified from the *Hevea brasiliensis* clone RRIM 600, was confirmed by sequencing. The coding region of this fully characterised TCTP was cloned into the double digested and linearized pSiM24 vector *via* infusion cloning technique. Successful incorporation of the TCTP gene in the source vector was confirmed by sequencing, followed by its transfer to *Agrobacterium tumefaciens* strain AGL-1 for *Agrobacterium* mediated genetic transformation of *Hevea brasiliensis* callus. Putative transformed cell lines were obtained from the infected callus. The transgenic plants once developed are expected to have augmented growth and stress tolerance, making them ideal for planting in stress prone, non-traditional areas.

Keywords: *Agrobacterium* mediated transformation, Cloning, *Hevea brasiliensis*, pSiM24 vector, Sequencing, TCTP

INTRODUCTION

Hevea brasiliensis, commonly known as the Para rubber tree, is a perennial crop belonging to the family Euphorbiaceae. It serves as the primary commercial source of natural rubber, a material of immense

economic and industrial value. In India, rubber cultivation has traditionally been concentrated in the southern regions, particularly in Kerala and the Kanyakumari region, where favourable climatic conditions such as well distributed rainfall and