

# Enhancement of the Colonisation Process of a Bioherbicide in Chinese Elm (*Celtis sinensis*) through Co-Treatment

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**Summary** The dominant paradigm for woody weed management is currently the application of liquid or granular synthetic herbicides. Despite being highly efficacious, there is increasing evidence of collateral damage to non-target native vegetation through herbicidal drift, runoff or leaching thereby promoting significant developments in the field of biological control. However, the commercialisation of bioherbicides has had a chequered history often resulting in non-establishment or reduced control of the target species. To increase host susceptibility, a preliminary pilot trial investigated the effectiveness of a sub-lethal dose of glyphosate (0.05 g/capsule a.i.) on the colonisation of an encapsulated bioherbicide (*Macrophomina phaseolina*, *Lasioidiplodia pseudotheobromae*, *Neoscytalidium novaehollandiae*) in juvenile Chinese elm [*Celtis sinensis* Pers.] plants located near Grandchester, south-east Queensland. This study demonstrated enhanced fungal colonisation under co-treatment by serving as a source of systemic physiological distress. The interaction was further explored by assessing three proprietary inoculums sourced from distressed *Celtis sinensis* plants located at Kholo, south-east Queensland. A replicated trial (n = 72)

was established near Laidley, south-east Queensland, following a randomised complete block design (three blocks) whereby the eight treatments (three inoculums, three co-treatments, two controls) were assigned to a total of three plants per block. The treated plants were destructively sampled at four-week intervals and their internal stem lesions were measured. The addition of a sub-lethal dose of glyphosate (0.0497 g/capsule a.i.) resulted in a significantly ( $p < 0.05$ ) higher degree of inoculum colonisation. This was evidenced by increased internal stem lesion lengths relative to the independent inoculum treatments (i.e., without glyphosate). Other symptoms of physiological distress were also recorded, such as discolouration or splitting of the outer bark tissue, sap seepage and canopy browning or mortality. The full extent of this stress-fungus interaction could not be discerned given the greater than expected rate of colonisation, and limited scope (trial size and duration) of these trials. Further research under field conditions is needed.

**Keywords** Chinese elm, *Celtis sinensis*, woody weed, weed management, biocontrol, bioherbicide, stem implantation