

INFLUENCE OF PLANT DEVELOPMENT AND ADJUVANT ADDITION ON
GLYPHOSATE UPTAKE AND TRANSLOCATION IN PAMPAS GRASS

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Abstract. The emergence of pampas, *Cortaderia selloana* as a serious forest weed in New Zealand has led us to a major study on its biology and control. Glyphosate is a foliar-active herbicide which can be cost-effective in the treatment and control of large infestations of pampas grass prior to planting trees.

The importance of adjuvants for optimising field effectiveness of herbicides is well recognised and is particularly true for glyphosate. Furthermore, silica deposits build up on the leaf surface of pampas as it matures, and this presents an additional barrier to surface wetting and penetration by herbicides. This work aimed to determine the effect of a non-ionic surfactant (silicone polyalkyleneoxide copolymer) on the absorption and translocation of glyphosate by pampas. Previous work had shown that this adjuvant had superior wetting and spreading properties and enhanced the uptake of several herbicides by different plant species.

¹⁴C-glyphosate (formulated as Roundup^R) was applied alone (-S) and with additional surfactant (+S) to pampas at four growth stages, ranging from plants younger than one month to plants older than six months. Plants were harvested five days after treatment.

The absorption of glyphosate alone (-S) ranged from 32% in six month old plants to 88% for the youngest plants. The addition of surfactant significantly ($P = 0.05$) enhanced uptake at all growth stages, but the greatest increase (2x) occurred in the oldest plants.

In the youngest plants (less than one month old) the addition of surfactant reduced the translocation of glyphosate away from the treated zone (from 40 to 20% of applied ¹⁴C-glyphosate). As plant age increased, there was increased translocation of glyphosate (+S) away from the treated zone (from 20% of applied ¹⁴C-glyphosate in youngest plants to 60% in oldest). The addition of surfactant caused localised necrosis in the youngest plants, but this decreased with age and was not evident in the oldest plants. As tissue death at, or adjacent to, the site of absorption may reduce translocation, the necrosis caused by surfactant addition could be responsible for the reduced translocation of herbicide occurring in younger plants.

The potential interactions of adjuvants, herbicides and plants are frequently overlooked when selecting rates and timing of spray applications. Plant growth stage and the addition of adjuvants can alter the absorption and translocation of herbicides. Our results suggest that the addition of a surfactant to glyphosate may reduce its efficacy on young pampas plants, but is likely to increase its effectiveness on mature plants.