

Green nanoemulsion-laden glyphosate isopropylamine formulation in suppressing creeping foxglove (*A. gangetica*), slender button weed (*D. ocimifolia*) and buffalo grass (*P. conjugatum*)

ABSTRACT

BACKGROUND: Pesticides are developed with carriers to improve their physicochemical properties and, accordingly, the bioefficacy of the applied formulation. For foliar-applied herbicide, generally less than 0.1% of the active ingredient reaching the target site could reduce pesticide performance. Recently, a carrier of nanoemulsion consisting of oil, surfactant and water, with a particle size of less than 200 nm, has been shown to enhance drug permeability for skin penetration in pharmaceutical delivery systems. In the present work, the aim was to formulate a water-soluble herbicide, glyphosate isopropylamine (IPA), using a green nanoemulsion system for a biological activity study against the weeds creeping foxglove, slender button weed and buffalo grass. **RESULTS:** The nanoemulsion formulations displayed a significantly lower spray deposition on creeping foxglove (2.9-3.5 ng cm⁽⁻²⁾), slender button weed (2.6-2.9 ng cm⁽⁻²⁾) and buffalo grass (1.8-2.4 ng cm⁽⁻²⁾) than Roundup(®) (3.7-5.1 ng cm⁽⁻²⁾). The visible injury rates of weeds treated with the nanoemulsion formulations were statistically equivalent to those relating to Roundup(®) at 14 days after treatment, with a control range of 86.67-96.67%. **CONCLUSION:** It was hypothesised that the significant difference in spray deposition with equal injury rates can be attributed to enhanced bioactivity of the nanoemulsion formulations. This initial discovery could be the platform for developing better penetration of agrochemical formulations in the future.

Keyword: Nanoemulsion; Glyphosate isopropylamine; Creeping foxglove; Slender button weed; Buffalo grass