Evaluation of alternative herbicides and the double knock down technique for control of multiple herbicide-resistant hairy fleabane (*Conyza bonariensis*)

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Weed management in perennial cropping systems of the San Joaquin Valley (SJV) relies on a few array of herbicides for postemergence treatments resulting in a continuous use of the same herbicides. Glyphosate and paraquat are among such herbicides, and due to their repeated use a glyphosate-resistant population of hairy fleabane was documented in 2007. Later in 2009, a glyphosate-paraquat multiple-resistant population of hairy fleabane was reported in SJV as well. This multiple-resistant biotype showed an 8- to 16-fold resistance to glyphosate, paraquat, or both herbicides when treated at the 5- to 8-leaf stage. To avoid rapid spread of this biotype, alternative herbicides were tested for control. A greenhouse study was conducted to evaluate the efficacy of glufosinate (69 fl.oz/ac), 2,4-D (2 pints/ac), carfentrazone (1 fl.oz/ac), saflufenacil (1 oz/ac), and double knock-down with glyphosate (27.6 fl.oz/ac) followed 10 days later by paraquat (4 pints/ac) as postemergence treatments. Rimsulfuron, penoxsulam, and flumioxazin were tested as preemergence applications. It was found that glufosinate, saflufenacil-alone or in any combination with glyphosate, and 2,4-D as postemergence treatments and all three preemergence herbicides provided satisfactory control (greater than 90%) of the multiple-resistant biotype. The double knock-down method did not control the multiple-resistant biotype but controlled the susceptible biotype. Among the preemergence treatments, all tested herbicides provided more than 90% control for over 60 days. Penoxsulam and flumioxazin were significantly better (95% control or more) than rimsulfuron (90% control). Therefore, all pre- and postemergence treatments tested in this study can be used as alternate herbicides to glyphosate and paraquat for control of the multiple-resistant biotype of hairy fleabane in the SJV.