Efficiency of Herbicides Dose in Mixture with Cytogate for Weed Management in Alfalfa 
(Medicago sativa L.) in Hamedan

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Abstract
Weed control is often accomplished by using herbicides in alfalfa fields. Six herbicides are recommended for using in alfalfa. Effective use of herbicides is related to several factors, such as time of application, dosage, environmental conditions, method of use, desired plant, frequency of use, etc. Among the techniques to improve the performance of herbicides, use of mixed herbicides, use of integrated methods, none continuous use of one or more herbicides with the same mode of action, use of herbicides with the standard dosage at the right time, and use of additives to improve the performance of herbicides could be named. This study aimed to evaluate the impact of surfactant on herbicide efficiency in Medicago sativa L. fields. To this end, a randomized complete block design with 10 treatments and 4 replications was used in three and four-year alfalfa fields, infested with different weeds. The treatments included the standard dose and a 20% reduced dose, a combined treatment and a control sample (weeding and no weed control). Combination of the treatments was applied along with cytogate, and included mixtures of imazethapyr and bentazon, bentazon and pyridate, and imazethapyr and pyridate, with 50% reduced dose of each herbicide. Generally, herbicides applied along with the cytogate surfactant were more efficient for weed control, as well as for an increase of the product yields, as imazethapyr herbicide along with cytogate surfactant managed to control weeds for a rate of 87.43% and increase the product yields to 93.54%. Results showed that combination of herbicides can also be useful in controlling weeds in alfalfa fields and increasing product yields. Results also revealed that combination of bentazon and imazethapyr increased product yields to 94.47% and controlled weeds for a rate of 90.19%. In addition, this method can be proposed as a means to prevent or delay probable resistance to herbicides.

Keywords: imazethapyr, bentazon, pyridate, reduced dose, surfactant