Abstract

Weeds have been a major problem for agriculture and the environment, reducing crop yields and quality and destabilizing ecosystems. An herbicide-based approach has been the most effective means of controlling weeds, thereby increasing agricultural production. However, this approach can generate weed-resistant species, rendering herbicides ineffective. One way to counter this issue is to combine herbicides, which may produce a synergistic effect that enhances their effectiveness. These multiple herbicides have different modes of action, which helps reduce selection pressure on the weed population. In this study, clomazone-paraquat and imazapic-paraquat pairs were selected because an *in silico* analysis had previously indicated potential synergy. The testing started with determining the inhibitory concentration for each herbicide, ranging from 38.4 g/L halved down to 0.3 g/L. The results showed 38.4 g/L had the strongest inhibitory effect from ImageJ and biomass analysis, achieving a sickly appearance. The experiment was followed with sub-lethal dosage involving clomazone-paraquat and imazapic-paraquat with different concentration combinations. Results showed potential synergistic or additive effects. However, the combination treatment had higher ImageJ and biomass values compared to the individual control group. To determine whether the combinations were truly synergistic or additive, a chlorophyll extraction was performed. The results showed no evidence of a synergistic effect between the combinations, as determined by ImageJ, biomass, and chlorophyll extraction analyses. However, chlorophyll extraction may detect herbicide retention within the plant, resulting in higher chlorophyll content than in the negative control group. Thus, future investigations are required to obtain isobolom 50 without herbicide absorbance and conclude the synergistic, additive, or antagonistic effect.

Keywords: *Weeds, Herbicides, Synergism, Imazapic, Clomazone, Paraquat*