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EFFICACY OF POST-EMERGENCE HERBICIDES AGAINST *SOLANUM ELAEAGNIFOLIUM* CAV.: A MAJOR THREAT FOR SOYBEAN PRODUCTION

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Introduction

Silverleaf nightshade (*Solanum elaeagnifolium* Cav.) is a perennial invasive weed species that belongs to the Solanaceae family. It has been reported to cause significant yield losses in spring arable crops, such as maize and cotton (Brunel, 2011). Soybean is an important crop that may be significantly affected by the interference with the weed, especially in fields where silverleaf nightshade is naturalized and appears in high density. The field must be kept weed free after crop emergence to avoid potential yield loss (Hock et al., 2006). Specific morphological traits and prolific reproduction in sequential waves from spring until autumn via seeds and rhizomes make the management of silverleaf nightshade a real challenge for farmers (Uludag et al., 2016). Herbicides remain a valuable tool for the control of this species and could be applied before soybean sowing to reduce the weed pressure in the first growth stages. The aim of this study was the evaluation of the efficacy of post-emergence herbicides against silverleaf nightshade.

Matherials and methods

A pot experiment was conducted at the experimental farm of the Agricultural University of Athens in 2020 to evaluate the efficacy of post emergence herbicides against *S. elaeagnifolium* (SOLEL). The experiment was arranged in a randomized design with 10 treatments and 4 replications per treatment. The treatments included two ALS inhibitors (foramsulfuron at 63 g a.i. ha^{-1}, florasulam at 7.5 g a.i. ha^{-1}), two synthetic auxins (2,4-D at 900 g a.i. ha^{-1}, clopyralid at 125.28 g a.i. ha^{-1}), glufosinate at 750 g a.i. ha^{-1}, diquat at 1000 g a.i. ha^{-1}, bentazone at 1440 g a.i. ha^{-1}, propyzamide at 1875 g a.i. ha^{-1}, glyphosate at 2160 g a.i. ha^{-1} + pyraflufen-ethyl at 11 g a.i. ha^{-1} (GP), and control. Five root fragments of SOLEL with average length 3-4 cm were collected from the experimental field and were placed in 13-L pots at 4 cm depth. The herbicides were applied when the plants were at vegetative growth and prior to flowering. Control of stems (%), dry weight (g/stem) and vegetation values using Normalized Difference Vegetation Index (NDVI) were measured 7, 14, 21 and 28 days after treatment (DAT). Greenseeker handheld crop sensor (Trimble) was used for recording NDVI.

References

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Results and discussion

The application of glyphosate + pyraflufen-ethyl, glufosinate and 2,4-D resulted to 95-100% control 28 DAT, recording also the lowest NDVI values (0.11-0.14). The remaining herbicides showed limited efficacy (<42% control). Glyphosate mixture with pyraflufen-ethyl showed the highest reduction (84%) of dry weight per stem comparing to control. Sufficient silverleaf nightshade control was achieved through application of systemic herbicides, such as glyphosate and 2,4-D, and strong contact herbicides, such as glufosinate and pyraflufen-ethyl, prior to flowering and at early growth stage. Glyphosate and glufosinate have been reported as highly effective herbicides against silverleaf nightshade (Gitsopoulos et al., 2017), while the herbicides should be applied at early growth stage to achieve seedset control (Wu et al., 2016).

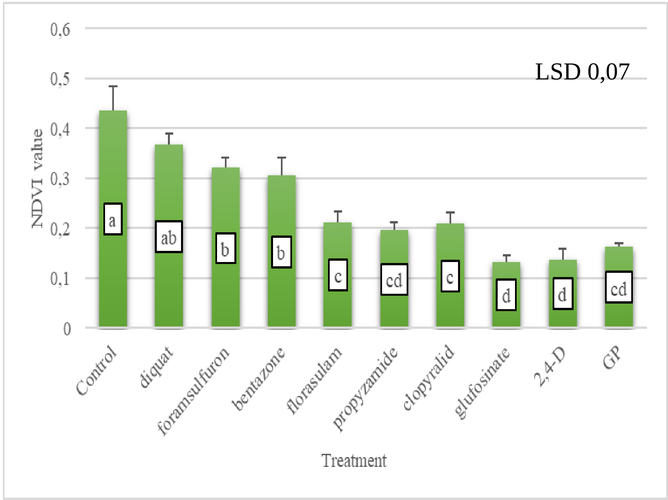

Figure 1. NDVI values 28 DAT

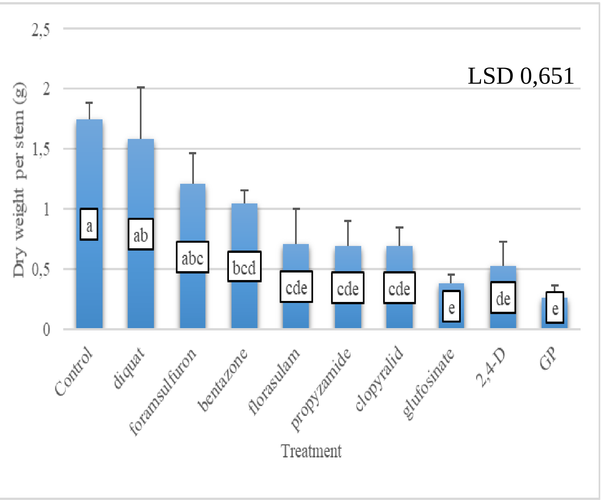

Figure 2. Dry weight per stem of SOLEL at 28 DAT

Conclusions

1. Effective control of SOLEL is crucial prior to crop establishment to avoid competition in the first growth stages.
2. Systemic herbicides remain the only option to avoid the new stem emergence and control efficiently SOLEL