EFFECT OF A WINTER COVER CROP ON MAIZE PRODUCTION AND MANAGEMENT OF THE INVASIVE WEED *Solanum elaeagnifolium* CAV.

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Introduction

Silverleaf nightshade (*Solanum elaeagnifolium* Cav.) is a perennial invasive weed species that belongs to the Solanaceae family. It is present in many countries worldwide causing significant yield losses in many arable spring crops, such as maize and cotton (Brunel, 2011). The integrated management of this noxious species is a major challenge for farmers due to specific morphological traits and the diurnal reproduction (with seeds and vegetatively through rhizomes) that results in sequential vegetation waves from spring until the end of summer (Uludag et al., 2016). Winter cover crops and have been reported to increase maize grain yield by moderating nitrogen level on soil, which though may result in increased weed pressure under reduced tillage (Wittwer, et al., 2020). The aim of this study was the evaluation of the impact of common vetch (*Vicia sativa* L.) in maize yield and silverleaf nightshade suppression.

Matherials and methods

A field experiment was conducted at the experimental farm of the Agricultural University of Athens in 2020 to assess the effect of common vetch as green manure for maize production and *S. elaeagnifolium* (SOLEL) management. The experiment was arranged in a randomized complete block design with common vetch green manure as the main plot. The treatments included SOLEL-free (WF), weedy (W), and a single hand-weeding at 4-5 maize leaves (T1) to record the yield loss caused by SOLEL with three replications. After the termination of the cover crop, the residues were either incorporated in the soil (GM) or were removed (NGM). Maize was sown in narrow 50-cm row spacing to ensure rapid canopy closure at 66.000 targeted plants ha^{-1}. Maize and SOLEL density and biomass were monitored 5 and 7 weeks after hand-weeding. Yield components were recorded at harvest 86 days after sowing (DAS).

References

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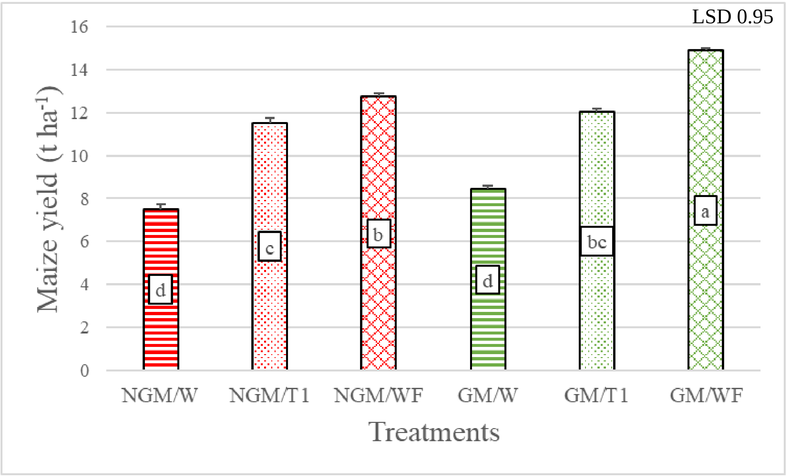
Results and discussion

Maize yield was recorded 14.9 t ha^{-1} in weed-free GM, a value 17% higher than weed-free NGM. The cover crop residues increased maize yield, which has been also reported by Wittwer et al. (2020). Silverleaf nightshade was the dominant weed in the research field resulting to high yield loss since 16 plants per m^2 resulted in 8.45 and 7.51 t ha^{-1} maize yield in weedy plots of GM and NGM, respectively. Hand-weeding at 4-5 maize leaves reduced significantly the weed biomass, indicating that silverleaf nightshade should be controlled early to reduce yield loss (24.2 and 10.6% in GM and NGM, respectively). The cultivation of maize after winter cover crops is a promising sustainable practice to ensure high maize yield and reduce the weed pressure due to the high vigor of the crop. Cover crops can be utilized for the integrated management of SOLEL (Viljoen and Wassermann, 2004).



Conclusions

1. Legume cover crops can reduce the fertilization input in maize by increasing yield
2. Integrated management of SOLEL in maize requires (1) the increase of crop competitiveness through the increase of nitrogen supply, (2) narrow-row spacing to reduce weed pressure, and (3) optimized control in the first growth stages of maize
3. SOLEL is not favored by nitrogen surplus on soil due to the high vegetation dynamics of maize
4. 16 SOLEL plants per m^2 caused significant yield loss in maize (76.2 % and 69.6% in GM and NGM, respectively)