TERRAENVISION 2025
Vol. 5 TNV-3518
Granada, Spain, 8-11 July, 2025

Soil Erosion Control in Citrus Plantations. the Case of Cover Crops in the Montesa Experimental Station

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Abstract

Due to the fact that Soil erosion in citrus plantation is non-sustainable, the Soil Erosion and Degradation Research Group of the University of València research strategies to reduce the soil losses. Within the experimental station we are measuring the impact of geotextiles, catch crop, cover crops, mulches and also chipped pruned branches. We measure by means of rainfall simulation experiments the runoff and sediment yield in plots under cover of cover crops and bare soils.
We selected 25 plots covered with Cover Crops (C) and 25 plots in an area without (B). Both plots, Bare and Covered, used tillage to remove the weeds. A rainfall event of 55 mmh-1 over one hour was produced in each of the 50 plots and runoff was collected each minute and samples transported to the laboratory to determine the sediment concentration and later calculate the soil erosion. The results show that Ponding (Tp) and Runoff generation (Tr and Tro) were faster in the Bare plots (46', 59', and 124' for Tp, Tr, and Tro) than on the Cover treated plots (110', 294', and 472' for Tp, Tr and Tro, respectively). The mean runoff discharge was 52.52 % and 21.65 % for the Btand C plots. Mean soil erosion reached 8.6 Mg ha-1 h-1 and 0.91 Mg ha-1h-1, respectively. The results show a reduction in sediment concentration from 10.7 gl-1 to 2.98 gl-1. The use of chipped pruned branches is very positive to achieve a sustainable agriculture management in citrus plantations.

Keywords: Soil, Erosion, Spain, Sustainability, Cover crops

References

Chen, L., Rejesus, R. M., Aglasan, S., Hagen, S. C., & Salas, W. (2022). The impact of cover crops on soil erosion in the US Midwest. Journal of Environmental Management, 324, 116168.

Kaspar, T. C., & Singer, J. W. (2011). The use of cover crops to manage soil. Soil management: Building a stable base for agriculture, 321-337.

Langdale, G. W., Blevins, R. L., Karlen, D. L., McCool, D. K., Nearing, M. A., Skidmore, E. L., ... & Williams, J. R. (1991). Cover crop effects on soil erosion by wind and water. Cover crops for clean water, 15-22.

De Baets, S., Poesen, J., Meersmans, J., & Serlet, L. (2011). Cover crops and their erosion-reducing effects during concentrated flow erosion. Catena, 85(3), 237-244.

Malik, R. K., Green, T. H., Brown, G. F., & Mays, D. (2000). Use of cover crops in short rotation hardwood plantations to control erosion. Biomass and Bioenergy, 18(6), 479-487.

Haruna, S. I., Anderson, S. H., Udawatta, R. P., Gantzer, C. J., Phillips, N. C., Cui, S., & Gao, Y. (2020). Improving soil physical properties through the use of cover crops: A review. Agrosystems, Geosciences & Environment, 3(1), e2010

Koudahe, K., Allen, S. C., & Djaman, K. (2022). Critical review of the impact of cover crops on soil properties. International Soil and Water Conservation Research, 10(3), 343-354.

Sharma, P., Singh, A., Kahlon, C. S., Brar, A. S., Grover, K. K., Dia, M., & Steiner, R. L. (2018). The role of cover crops towards sustainable soil health and agriculture—A review paper. American Journal of Plant Sciences, 9(9), 1935-1951.

López-Vicente, M., Calvo-Seas, E., Álvarez, S., & Cerdà, A. (2020). Effectiveness of cover crops to reduce loss of soil organic matter in a rainfed vineyard. Land, 9(7), 230.

Novara, A., Gristina, L., Saladino, S. S., Santoro, A., & Cerdà, A. (2011). Soil erosion assessment on tillage and alternative soil managements in a Sicilian vineyard. Soil and Tillage Research, 117, 140-147.

Acknowledgments: This work has received funding from REACT4MED: Inclusive Outscaling of Agro-Ecosystem Restoration Actions for the Mediterranean. The REACT4MED Project (grant agreement 2122) is funded by PRIMA, a program supported by Horizon 2020. The “MANEJOS AGRÍCOLAS SOSTENIBLES PARA EL CONTROL DE LA EROSIÓN DEL SUELO EN PLANTACIONES DE CÍTRICOS (CONERO)” research project funded by Ministerio de ciencia e innovación PID2023-151431OB-I00 contributed to the field and laboratory work.