Geophysical Research Abstracts
Vol. 15, EGU2013-6364, 2013
EGU General Assembly 2013

Spatial and temporal variability of grass cover in two olive grove catchments on contrasting soil types

Laura Aguilera (1), Encarnación V. Taguas (1), Enrique Gimeno (1), and José A. Gómez (2)

(1) University of Córdoba, Rural Engineering Department, Cordoba, Spain (evtaguas@uco.es), (2) Institute for Sustainable Agriculture (CSIC). Alameda del Obispo s/n, 14004, Córdoba, Spain (joseagomez@ias.csic.es)

Mediterranean climate conditions -characterized by the concentration of the precipitation in the seasons of autumn and spring, the low temperatures in winter and extremely warm and dry summers- determine that ground cover by adventitious (or cover crop) vegetation shows significant seasonal and annual variability. In addition, its spatial variability associates also, partially, to water availability among the landscape. This is especially relevant in olive orchards, an agricultural system under high erosion risk in the region where the establishment of herbaceous cover has proved to improve soil protection reducing erosion risk, as well as the improvement of soil properties (Gómez et al., 2009). All these benefits are based on small scale studies where full ground cover by the cover crop is relatively easy to obtain. However, few information is available about the actual ground cover achieved at farm scale, although preliminary observations suggests that this might be extremely variable (Gómez and Giráldez, 2009). This study presents the preliminary results evaluating the spatial and temporal evolution of ground cover by adventitious vegetation (the preferred option by farmers to achieve a cover crop) in two commercial olive farms during 2 hydrological years (2011-2012).

The study was conducted in two farms located in the province of Cordoba, Southern Spain. Both were olive orchards grown under deficit irrigation systems and present a gauge station where rainfall, runoff and sediment loads have been measured from the year 2005. The soil management in “La Conchuela” farm was based in the use of herbicide in the line of olive trees to keep the bare soil all year round, and the application of selective herbicide in the lane between the olive trees to promote the grown of graminaceae grasses . In addition, the grass is mechanically killed in June. In the another farm, “Arroyo Blanco”, the grass spontaneous cover is allowed until mid-spring in which is also mechanically killed by several tractor passes.

Ground cover was evaluated by a field surveys (4 per year) in which the same areas were measured at an approximate density of 4 samples/ha. In each point, over a 0.25 m2 area ground cover was measured using photographs, then point measurements were interpolated using method of Inverse Distance Weighting methods, to generate continuous distribution maps.

The spatial and temporal evolution of ground cover in both farms presented a notably different patterns in both farms. In “La Conchuela”, maximum values of cover can be reached in winter (61%, Dec-2011) while in “Arroyo Blanco”, the maximum values were observed during the spring (50% May-2011) and are dramatically lower in the seasons of summer and autumn. These differences are justified by the influence of the management, the precipitation regime and the soil qualities such as the depth. On the other hand, the large spatial variability of ground cover measurements in both catchments, with coefficients of variation between 41 and 167%, was mainly led by the topography. In both farms the highest values of ground cover were found in those areas with deeper soils located in also in converging areas where surface runoff is concentrated. In the highest and shallowest area, soil management operations might improve the establishment of the vegetation as well as to address the growing in the most erosive periods. Finally, the impact of grass cover on the hydrological and erosive responses in the catchment is also discussed.

References

Aguilera, L. 2012. Estudio de cubiertas vegetales para el control de la erosión en olivar. Evaluación espacio-temporal en dos fincas comerciales, y exploración de nuevas opciones de cubiertas. Master Thesis. University of Cordoba.

Gómez, J.A., Giráldez, J.V. Erosión y degradación de suelos. In: Sostenibilidad de la producción de olivar en

Andalucía. Gómez, J.A. (Editor). Junta de Andalucía. Sevilla, p. 45-86.
Gómez, J.A., Sobrinho, T.A., Giráldez, J.V., Fereres, E. 2009. Soil management effects on runoff, erosion and soil properties in an olive grove of Southern Spain. Soil and TillageResearch 102: 5 – 13.