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Spatial and temporal variation of near surface soil moisture and soil temperature in integrated crop-livestock system

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Introduction Soil moisture and soil temperature acerbates and important role to soil function that affects seed germination, soil gases dynamics, soil nutrient dynamics, root development, and plant development. Soil management affects directly spatial variation of soil properties mainly in systems with employ animals in the production systems, and the variability might be higher in near soil surface. Spatial variations of soil moisture and soil temperature due to soil management are well known; however, temporal and spatial variations at near soil surface in integrated crop-livestock systems is not well studied and there is a gap of information that must filled out to improve the understanding of the impact of soil and crop management on soil moisture and soil temperature over time. The objective of this study were to evaluate the spatial and temporal distribution of near surface soil moisture and soil temperature over a growing season in soybean/corn and grass under integrated crop-livestock systems.

Material and Methods

Transects were established in January 2015 in two fields under integrated crop-livestock systems in Pedro Afonso, TO, Brazil since 2006. In field one, transect was established when soybean was at R1 stage (DOY 23). In the field two, transect was established in grass (*Urochloa* Syn. *Brachiaria*) right after animals were removed to another field (DOY 23). In field two, animals returned every 28 days and grazed for 3 days, and then animals were relocated to another part of the field. Positions of the sampling points were located along transects. Sampling points were positioned every 5 m for a total distance of 100 m along the slope. Soil moisture and soil temperature were sampled with POGO Hydra Probe II sensor (Stevens Water, Portland, OR). Data were collected at the same time in both fields from 08:00 to 10:00 AM. At each sampling point, soil samples were taken at depth of 0-5 and 5-10 cm and analyzed for pH, clay, silt, and sand content, soil organic carbon and soil bulk density. Data of soil moisture and soil temperature were analyzed considering different dates using regression analysis, correlation and T-test.

Results and Conclusions

Near soil temperature and soil moisture vary over time. The grazing cycles and soybean harvest affected the amount of soil moisture and soil temperature. Near surface soil temperature increased right after animals were removed, and increased during the corn planting. The reason of increased temperature in field one was probably due to the reduction in the amount of residue in the soil surface after soybean harvest and corn planting. In the field two the same tendency was observed that soil temperature increased after forage consumed by animals. Both soil temperature and soil moisture changed spatially; however, soil moisture showed more spatial variation compared to soil temperature

References cited

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