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Management Effects on Different Sustainable Agricultural with Diverse Topography

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Abstract : Crop yields are influenced by many factors, including natural ones, such as soil and environmental characteristics of the agricultural land, as well as manmade ones, such as management applications. One of the factors that frequently affect crop yields in undulating Midwest landscapes is topography, which controls the movement of water and nutrients necessary for plant life. The main objective of this study is to examine how field topography influences performance of different management practices in undulated terrain of southwest Michigan. A total of 26 agricultural fields, ranging in size from 1.1 to 7.4 ha, from the Scale-Up at Kellogg Biological Station were included in the study. The two studied factors were crop species with three levels, i.e., corn (Zea mays L.) soybean (Glycine max L.), and wheat (Triticum aestivum L.), and management practice with three levels, i.e., conventional, low input, and organic managements. They were compared under three contrasting topographical settings, namely, summit (includes summits and shoulders), slope (includes backslopes), and depression (includes footslope and toeslope). Yield data of years 2007 through 2012 was processed, cleaned, and filtered, average yield then was calculated for each field, topographic setting, and year. Topography parameters, including terrain, slope, curvature, flow direction and wetness index were computed under ArcGIS environment for each topographic class of each field to seek their effects on yield. Results showed that topographical depressions produced greatest yields in most studied fields, while managements with chemical inputs, both low input and conventional, resulted in higher yields than the organic management.

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