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Saudi Journal of Biological Sciences

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ORIGINAL ARTICLE

Characterization of spatial variability of soil physicochemical properties and its impact on Rhodes grass productivity



E. Tola^{a,*}, K.A. Al-Gaadi^{a,b}, R. Madugundu^a, A.M. Zeyada^a, A.G. Kayad^b,
C.M. Biradar^c

^a Precision Agriculture Research Chair, King Saud University, P.O. Box 2460, Riyadh 11451, Saudi Arabia

^b Department of Agricultural Engineering, College of Food and Agriculture Sciences, King Saud University, P.O. Box 2460, Riyadh 11451, Saudi Arabia

^c International Center for Agricultural Research in the Dry Areas (ICARDA), Bldg no. 15, Khalid Abu Dalbough St. Abdoun, P.O. Box 950764, Code No. 11195 Amman, Jordan

Received 3 February 2016; revised 31 March 2016; accepted 19 April 2016
Available online 27 April 2016

KEYWORDS

Precision agriculture;
Soil properties;
Geospatial analysis;
Productivity;
Rhodes grass

Abstract Characterization of soil properties is a key step in understanding the source of spatial variability in the productivity across agricultural fields. A study on a 16 ha field located in the eastern region of Saudi Arabia was undertaken to investigate the spatial variability of selected soil properties, such as soil compaction 'SC', electrical conductivity 'EC', pH (acidity or alkalinity of soil) and soil texture and its impact on the productivity of Rhodes grass (*Chloris gayana* L.). The productivity of Rhodes grass was investigated using the Cumulative Normalized Difference Vegetation Index (CNDVI), which was determined from Landsat-8 (OLI) images. The statistical analysis showed high spatial variability across the experimental field based on SC, clay and silt; indicated by values of the coefficient of variation (CV) of 22.08%, 21.89% and 21.02%, respectively. However, low to very low variability was observed for soil EC, sand and pH; with CV values of 13.94%, 7.20% and 0.53%, respectively. Results of the CNDVI of two successive harvests showed a relatively similar trend of Rhodes grass productivity across the experimental area ($r = 0.74$, $p = 0.0001$). Soil physicochemical layers of a considerable spatial variability (SC, clay, silt and EC) were utilized to delineate the experimental field into three management zones (MZ-1, MZ-2 and MZ-3); which covered 30.23%, 33.85% and 35.92% of the total area, respectively. The results of CNDVI indicated that the MZ-1 was the most productive zone, as its major

* Corresponding author: Mobile: +966 558759697, tel.: +966 11 4691904 (Office).

E-mail addresses: etola@ksu.edu.sa, elkamiltola@gmail.com (E. Tola), kgadi@ksu.edu.sa (K.A. Al-Gaadi), rmadugundu@ksu.edu.sa (R. Madugundu), azeida.c@ksu.edu.sa (A.M. Zeyada), akaiad@ksu.edu.sa (A.G. Kayad), c.biradar@cgjar.org (C.M. Biradar).

Peer review under responsibility of King Saud University.



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