Vol. 14(16), pp. 729-739, 18 April, 2019
DOI: 10.5897/AJAR2019.13961
Article Number: 56DA81560682
ISSN: 1991-637X

http://www.academicjournals.org/AJAR

African Journal of Agricultural Research

Full Length Research Paper

Physiological response of soybean [*Glycine max* (L) Merrill] to soil moisture stress

Louis Hortensius Mwamlima[1,2]*, Josephine Pamela Ouma[1] and Erick Kimutai Cheruiyot[1]

[1]Department of Crops, Horticulture and Soils, Egerton University, P. O. Box 536-20115, Njoro, Kenya.
[2]Mkondezi Research Station, P. O. Box 133, Nkhata Bay, Malawi.

Received 14 February, 2019; Accepted 22 March, 2019

This study was done to determine the effects of varying soil moisture regimes on CO_2 assimilation of soybean [*Glycine max* (L.) Merrill] in pots under greenhouse conditions during 2017 and 2018 cropping seasons. The experiment was conducted as a Randomized Complete Block Design (RCBD) in a 4 x 6 factorial treatment arrangement and replicated 3 times. Soil moisture regimes (80, 60, 40 and 20% of field capacity) and cultivars (Gazelle, Nyala, EAI 3600, DPSB 8, Hill and DPSB 19) were first and second factors, respectively. Collected data were subjected to Analysis of Variance (ANOVA) using Linear Mixed Model in GENSTAT. Significantly different treatment means were separated using Tukey's test at 0.05 significance level. Leaf relative water content, stomata conductance, photosynthesis rate and sub-stomatal CO_2 concentrations significantly ($P < 0.001$) declined with increasing soil moisture stress. Total leaf chlorophyll content increased ($P < 0.001$) with increased soil moisture stress. Cultivars DPSB 19 and DPSB 8 had relatively higher leaf relative water content and stomata conductance at reduced soil moisture regime at 20% moisture from field capacity indicating moisture stress tolerance potential of the cultivars.

Key words: Flowering stage, podding stage, seasons, soil moisture regimes, soybean cultivars**.**

INTRODUCTION

Soybean [*Glycine max* (L.) Merrill] is one of the most important legume crops with total production of 261.6 million metric tonnes worldwide (FAOSTAT, 2013). Soybean is a main source of protein, carbohydrates, vegetable oils, vitamins and minerals for human consumption and production of livestock feed. Soybean farming is also the most cost-effective ways resource-constrained smallholder farmers can use to maintain soil fertility of their lands as soybean helps to improve soil fertility through biological nitrogen fixation of soybean between 44 and 103 kg N ha^{-1} (Kananji et al., 2013; Ciampitti and Salvagiotti, 2018). The potential of soybean to significantly contribute to food and nutrition security and to generate substantial income for farmers is however constrained by low yields arising from soil moisture stress effects amongst other biotic and abiotic stresses. Soil moisture stress has become a recurring event due to unpredictable weather patterns arising from changes in climatic conditions occasioned by global warming (Abedinpour, 2012). Understanding the response of soybean to limited soil moisture stress, identification and use of moisture stress tolerant cultivars

*Corresponding author. E-mail: louismwamlima@gmail.com. Tel: +254 798 253993.