

**THE EFFECT OF IRRIGATION FREQUENCY AND
RATES ON GREEN BEAN UNDER TRICKLE
IRRIGATION IN CLAY LOAM SOIL**

By

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B.Sc. Agric. Sci. (Agricultural Engineering), Fac. Agric., Cairo Univ., 2011

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APPROVAL SHEET

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DEDICATION

First of all, I would like to express my deepest thanks to ALLAH (God) for helping me to carry out and complete this work.

I dedicate this work to whom my heartfelt thanks, my husband for their patience and help, as well as to my parents and sisters for all the support they lovely offered along the period of my post graduation.

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ABSTRACT

This study was conducted over 2 years (2013 and 2014) to establish the optimal combinations between irrigation frequency and rate for trickle irrigated green bean using water production functions and water use-yield relationships. A field experiment was conducted using a randomized complete block design with three irrigation frequencies (F_1 , F_2 and F_3 , irrigation events once every 1, 2 and 3 days, respectively) and three trickle irrigation rates (I_1 : 1.00, I_2 : 0.80, and I_3 : 0.60 of the estimated crop evapotranspiration, ET_C). Our results showed that yield and WUE increased with increasing irrigation frequency. Seasonal crop ET_C of green bean varied from 163 mm in F_1I_3 to 327 mm in F_3I_1 treatments on 2013 and from 164 mm in F_1I_3 to 328.72 mm in F_3I_1 treatments on 2014. The maximum and minimum yield of 12030 and 4879 kg ha⁻¹ were obtained in F_1I_2 and F_3I_3 , respectively, in 2013, while in 2014, similar to the previous year, maximum and minimum yield were obtained from F_1I_2 and F_3I_3 as 12364 and 4678 kg ha⁻¹, respectively. WUE ranged from 5.65 kg m⁻³ in F_1I_2 to 2.38 kg m⁻³ in F_3I_3 . Seasonal yield response factors (k_y) were 0.845 and 0.856 in 2013 and 2014, respectively. Production functions of yield versus seasonal crop ET_C were power for all combinations of irrigation frequency and rate for both growing seasons. The relationship between WUE and yield was best represented by a power equation. In conclusion, F_1I_2 irrigation treatment is recommended for field grown green bean in order to achieve higher yield and WUE.

Key Words: Irrigation frequency, Irrigation rate, Trickle irrigation, Green bean yield, Water use efficiency.

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