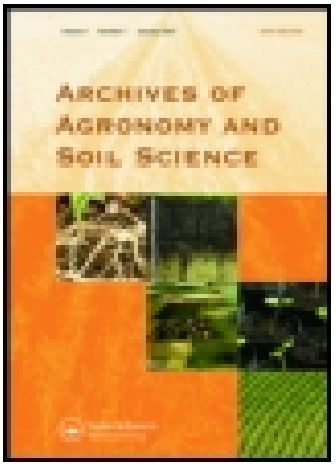

Archives of Agronomy and Soil Science
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/gags20

A model to predict the dry matter and yield of rapeseed under salinity and deficit irrigation

Ali Shabani[a], Ali Reza Sepaskhah[a] & Ali Akbar Kamgar-Haghighi[a]
[a] College of Agriculture, Shiraz University, Shiraz, Iran
Accepted author version posted online: 25 Jun 2014.Published online: 15 Aug 2014.

To cite this article: Ali Shabani, Ali Reza Sepaskhah & Ali Akbar Kamgar-Haghighi (2014): A model to predict the dry matter and yield of rapeseed under salinity and deficit irrigation, Archives of Agronomy and Soil Science, DOI: 10.1080/03650340.2014.938645

To link to this article: http://dx.doi.org/10.1080/03650340.2014.938645

Archives of Agronomy and Soil Science, 2014
http://dx.doi.org/10.1080/03650340.2014.938645

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A model to predict the dry matter and yield of rapeseed under salinity and deficit irrigation

Ali Shabani*, Ali Reza Sepaskhah and Ali Akbar Kamgar-Haghighi

College of Agriculture, Shiraz University, Shiraz, Iran

(*Received 28 February 2014; accepted 20 June 2014*)

In this investigation, a model was developed to predict dry matter, seed yield and other crop parameters of rapeseed under deficit irrigation and salinity by using soil water and salt budget and other simple plant physiological relationships. Two-year experimental data were used. In calibration and validation of the presented model, results indicated that the model was able to estimate evapotranspiration, soil water content, leaf area index, evaporation, crop transpiration, dry matter and seed yield of rapeseed properly. The advantage of this model is its simplicity and easy calibration in other areas and climate conditions and it can be used to estimate yield and other crop parameters with common measurable data in the field. Prediction of crop yield by this model can be used for better management of agronomic systems to reduce administrative costs and in different environmental conditions. Finally, under scarce data, arid and semi-arid environments, this model is proposed to be used by irrigation managers and agricultural advisors.

Keywords: evapotranspiration partitioning; deficit irrigation; rapeseed modelling; salinity

Introduction

Because of high water use efficiency and moderate tolerance to saline soil conditions, rapeseed (*Brassica napus* L.) is perfect to grow in salt-affected areas and deficit irrigation conditions in arid and semi-arid regions worldwide, particularly in Iran (Ahmadi & Niazi-Ardekani 2006; Shabani et al. 2013a). In saline condition, irrigation management impact is much effective on yield and growth of rapeseed. Deficit irrigation and salinity resulted in reduction in matric and osmotic head of soil, and these factors reduced root water uptake (Kramer & Boyer 1995). There were two assumptions about interaction of osmotic and matric potentials on root water uptake reduction. First, the effect of salt and water stress on reduction of root water uptake is additive (Van Genuchten 1987). Second, the effect is multiplicative as proposed by Van Genuchten (1987), Dirksen et al. (1993), Homaee et al. (2002), Mass and Hoffman (1977) and Homaee and Feddes (1999). The investigation results of Sepaskhah and Yarami (2010) and Sepaskhah and Beirouti (2009) indicated that the additive and multiplicative functions for root water uptake presented by Van Genuchten (1987) and Dirksen et al. (1993) were not suitable for the prediction of root water uptake coefficient of saffron and madder, respectively. In the studies of these investigators, the Mass and Hoffman (1977), and Homaee and Feddes (1999) multiplicative equations resulted in acceptable estimation of the root water uptake coefficient of saffron and madder.

*Corresponding author. Email: shabani8ali@gmail.com