



Effect of Organic and Chemical Fertilizers on Yield and Essential Oil of Two Ecotypes of Savory (*Satureja hortensis* L.) under Normal and Drought Stress Conditions

O. Akrami nejad^{1*} - M. Saffari² - R. Abdolshahi³

Received: 17-07-2013

Accepted: 16-11-2014

Introduction

Savory (*Satureja hortensis* L.) is an annual and aromatic plant from Labiatae family, which has plenty of essential oil and is important in medicinal, food, health and beauty industries (6). In comparison with chemical fertilizers, organic fertilizers especially manure have lots of organic material sources, and can be used as nutrients, especially Nitrogen, Phosphor and Potassium. Organic fertilizers also keeps more water in the soil (14).

Water deficit is one of the most important boundaries of production in arid and semi-arid regions. Drought stress reduces water content, limits plant growth and changes some physiological and metabolic activities (31). This experiment was conducted as there is a global interest for production of medicinal plants with sustainable agriculture system, and with low input and shortage of information about Savory reaction to fertilization in drought stress condition. The objective of this research was to compare the effects of chemical fertilizers and different organic fertilizers on quantitative and qualitative characteristics of two ecotypes of savory under drought stress condition.

Materials and Methods

In order to study the effects of organic and mineral (N, P and K) fertilizers on quantitative and qualitative characteristics of savory in drought stress condition, two separate split plot designs with three replications were carried out in 2012-2013 year, at the research field of Shahid Bahonar University of Kerman, Iran. In each design fertilizers including cow manure (30 ton per hectare), poultry manure (10 ton per hectare), chemical fertilizers (used equally with macro elements existing in both poultry and cow manure) and control (no fertilizer) were used as main factor. Kerman and Khuzestan ecotypes were sub-factor. One of the experiments was irrigated to 100% and the other to 50% of field capacity. Two experiments were analyzed as a combined design. The important characteristics of Savory such as plant height, grain and biological yield, chlorophyll index, ionic leakage, relative water content, number of branches, essence percentage and essence amount were evaluated. Data were analyzed with SAS and MSTAT-C software and mean comparison was done using Duncan test at %5 level.

Results and Discussion

The results showed that drought stress reduced plant height, number of branches, oil yield, relative water content, SPAD index and increased ion leakage. Meanwhile, it had no significant effect on the percent of oil. Fertilizers increased plant height, number of branches, yield, chlorophyll index and oil yield, while it decreased ion leakage in contrast with control. Baher *et al* (2002) have reported that drought stress reduced plant height, grain yield, and branches number of Savory. As nutrients deficit is one of the main factors in control of plant height and yield, plant that were treated with control had the lowest growth. Organic fertilizers provide appropriate plant growth via gradual release of nutrients during growth season and saving water. Two ecotypes had significant differences for yield, number of branches and ionic leakage. Kerman ecotype showed better yield performance. The results showed that water stress reduced yield, number of branches and plant height of savory. Meanwhile fertilizers (especially cow and hen manure) could reduce the effects of drought.

1- MSc. Student, Department of Agronomy, College of Agriculture, Shahid Bahonar University of Kerman

2- Associate Professor, Department of Agronomy, College of Agriculture, Shahid Bahonar University of Kerman

3- Assistant Professor, Department of Agronomy, College of Agriculture, Shahid Bahonar University of Kerman

(* - Corresponding Author Email: omidakrami122@yahoo.com)

Conclusions

Generally, organic fertilizers, especially cow manure, produced higher yield and showed a better response to drought stress. It might be for higher moisture maintenance in contrast with chemical fertilizers. It seems that, using cow manure could be helpful to overcome the negative effects of drought stress.

Keywords: Drought stress, Essential oil, Fertilizer, Savory, Yield and yield components