

Effects of manure on growth medical plant in dragonhead (*Dracocephalum moldavica*)

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ABSTRACT

A filed experiment was conduct to assay the effect of Manure on growth, development of dragonhead (*Dracocephalum moldavica*) in semi-arid conditions of jiroft. The experiment was done at on randomized complete design with three replications in which factor included five levels of Manure (0, 10, 20, 30 and 40 t/ha). The results showed that the effect of increase in manure rate, plant body yield and fresh and dry weight was increased. The highest vegetative body yield of *Dracocephalum* as 22575kg/ha which was 18335 kg/ha higher than 42420kg/ha obtained in lack of manure application was achieved by increasing manure rate from no-manure to the third level (20 ton/ha) showing significant increase in vegetative body fresh weight. The same trend was observed in dry weight of vegetative part in relation to application of manure; the highest vegetative body dry weight as 5719kg/ha was obtained by application of 40 ton rotted cow manure per hectare which was or non significantly different from 20 and 30 ton/ha manure treatments.

Keywords: Dragonhead, Manure, Leaf Fresh Weight, Plant Height.

INTRODUCTION

Medicinal herbs have been extensively studied in this century mainly because chemical medicines have proved to have side effects and humans tend to use natural products as much as possible [1]. Dragonhead or dragon'shead (*Dracocephalum moldavica*) is herb from mint family [13]. The effective substances of its body are sedative and appetizing. Its essence is antibacterial and is used in curing stomachache and flatulence as well as in food industries, soda manufacturing and health and make-up industries [22].

Decline in soil nutrient is one of the major constraints of crop production in Nigeria. In the past years, inorganic fertilizer was advocated for crop production to ameliorate low inherent fertility of soils in the tropics [2]. However, high cost and scarcity of inorganic fertilizer as well as possible cause of soil acidity and nutrient imbalance pose a constraint to use of inorganic fertilizer [21, 3]. Nutrient imbalance and soil physical degradation hinder sustainable use of inorganic fertilizers in the tropics [8]. In order to sustain soil fertility over a long period of time the use of organic manure is been advocated. This is because the nutrients contained in organic manures are released more slowly and are stored for a longer time in the soil, thereby ensuring a long residual effect [26]. [5], also reported that manures provide a source of all necessary macro- and micro-nutrients in available forms, thereby improving the physical and biological properties of the soil. Although the effects of drought stress on crops have been

extensively studied, the researches on the behavior of medicinal and aromatic herbs under water deficit have not been so extensive [16]. Nowadays water deficit is known as an important limiting factor of yield increase in arid and semiarid regions and growth decrease is much greater under water deficit than that under other environmental stresses [24]. It is more important in regions which experience the problem due to climate change but have not been paid attention [6] because global environment change programs show the growth of water deficit in future and the recurrence of much more severe events in most parts of the world. Environmental stresses bring about a wide range of responses in plants from genetic changes to the changes in growth speed and yield [23]. Therefore, in order to understand the conditions for the survival of medicinal herbs in arid regions, their responses to water deficit need to be evaluated and their appropriate growing conditions should be determined [17].

MATERIALS AND METHODS

To study the effects of manure application on dragon head and to evaluate to study cell water relations and the physiology of drought resistance in the crop, experiment was carried out based on a randomized complete block design with three replications as a pot experiment in the greenhouse of Islamic Azad University, Jiroft branch, Iran in 2009. In this study, manure application in five levels of 0, 10, 20, 30 and 40 t/ha constituted the horizontal factor.

Firstly, the soil was sampled and its physical and chemical parameters were measured (Table 1). The pots were 23 cm high with the diameter of 30 cm. Each one was filled with about 10 kg soil on average. Ten pots received enough water to become saturated. They were covered by plastic sheet and after 24 hours when the redundant water leaked from the bottom hole due to gravity, their soils were sampled and dried in oven for 24 hours at 105°C. Then, the field capacity of the pots was determined. Manure application level was determined according to pot level. After weighing, cattle manure was used in fertilizer treatments. After preparing the pots, the seeds were planted with the rate of 15 seeds/pot at the depth of 0.5-1 cm. After emergence, the plants were thinned twice a month. Finally, four plants were left in each pot.

Table 1. Results of the analysis of soil used in experimental pots

Depth (cm)	PH	EC (ds.m ⁻¹)	SP (%)	Total N (%)	AWP (%)	AWK (%)	Texture
0-30	8.1	0.89	25	0.03	12	220	Loamy sand

RESULTS AND DISCUSSION

Soil analysis showed that it was loam-sandy, alkaline and had no limitation from salinity and minerals viewpoint. It was poor in nitrogen and good in absorbable phosphorous and potassium (Table 1).

According to Table (2), by increase in manure rate, plant body yield and fresh and dry weight was increased. The highest vegetative body yield of *Dracocephalum* as 22575kg/ha which was 18335 kg/ha higher than 42420kg/ha obtained in lack of manure application was achieved by increasing manure rate from no-manure to the third level (20 ton/ha) showing significant increase in vegetative body fresh weight. Increasing the concentration of animal manure have been [12]. Above this level increase in manure amount didn't result in significant increase in vegetative body yield. The same trend was observed in dry weight of vegetative part in relation to application of manure; the highest vegetative body dry weight as 5719kg/ha was obtained by application of 40 ton rotted cow manure per hectare which was or non significantly different from 20 and 30 ton/ha manure treatments. These results are in agreement with results Mohamadipoor et al. [19] on *Spathyphyllum illusion* on all of the measured growth characteristics was significant ($p < 0.05$).

By increase in manure rate, the number of stem was increased from 9 to 12.44 in treatment of 40 ton/ha but there was no significant difference between 20 and 40 ton/ha. Generally, application of manure showed significant difference to no-manure. Though plant height was enhanced by increase in manure rate, there was no significant difference among the treatments. Internode length and stem diameter were enhanced by increase in manure rate. Leaf dry weight was increased from 365.1 in control (no manure) to 988 kg in treatment of 20ton/ha, the increase over this rate was not significant. It seems that the combination of soil, municipal soil waste compost, Azolla compost (each on of volume) are suitable substrates for growth of English daisy plant that along with soil

fertilization caused to increase the growth of plant [7]. A different trend was observed for stem dry weight so that stem dry weight was increased by increase in cow manure but the highest dry weight yield of stem as 3021.3 was obtained by 40 ton/ha which was superior to other manure treatments.

Table 2- Effect of Manure on Growth Yield of *Dracocephalum moldavica* plant

Manure Cow	Inter node Length (cm)	Plant Height (cm)	Stem Diameter (cm)	No. shoot	leaf fresh weight (g)	leaf dry weight (g)	Shoot fresh weight (g)	Shoot dry weight (g)
0	3.70ab	31.61b	3.94b	9c	731.3d	365.1c	4240c	1424c
10	4.38a	41.77a	3.94b	12b	1799.1c	689.5bc	10998bc	3081bc
20	3.61ab	42.33a	4.11b	12.22ab	2269.9b	988ab	17617ab	4591ab
30	3.66ab	44.33a	4.22b	13.88ab	2584.3b	1066.9a	19558a	4918a
40	3.38b	46.55a	5a	12.44ab	3021.7a	12223.3a	22575a	5719a
LSD	5%=0.81	5%=6.55	5%=0.64	5%=1.62	5%=435.1	5%=337.5	1%=7.24	1%=17.18

By possessing nutrients and retaining soil moisture, manure increases fresh and dry body yield; the increase was due to 2% pure nitrogen, 1.5% phosphorus and 2% potassium [20]. For example, 30 tons of (rotten) manure is equal to 130kg/ha nitrogen, 90kg/ha phosphorus and 160 kg/ha and these are the factors that increase dry and fresh vegetative body yield. The manure also enhances absorption of nutrients from soil. Hussein et al [13] investigated effect of manure on *Dracocephalum* and reported that fresh weight of vegetative body of the plant in control group was 238.28kg/ha and dry weight of vegetative body was 49.48kg/ha which were increased to 376.70kg and 79.01kg in treatment with 39.6 ton/ha of compost manure which is in agreement with the results obtained in our study. The author reported that stem number was increased from 11.67 in control to 11.67 in 39.6ton/ha treatment and plant height was also increased from 54.67cm to 66.3cm which is in accordance to our results. Application of different rates of cow dung to Okra led to significant increase in growth and yield over the control treatment. Use of cow dung at the rate of 15 to 20 t ha⁻¹ will significantly improve the performance of Okra comparable to use of inorganic fertilizer [10].

Jahan et al [14] investigated effect of manure on *Cucurbita pepo* and reported that in the first year of the experiment, by increase in manure level from 10 to 20 ton/ha seed yield was increased but was not influenced in 20 and 25 ton/ha; this observation agrees with our result on fresh and dry vegetative body. Increased yield of medicinal plants by application of manure has also been reported in anisun and fenugreek [18], green zira [4], plantago [15]. In our experiment, application of different levels of manure had no significant effect on *Dracocephalum* which is in accordance to results reported Lotfi et al [15].

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