Effects of organic, bio and chemical fertilizers on morphological and physiological chavacteristics of medicinal plant *Plantago psyllium*

Abstract

In order to investigate the effect of organic, biological and chemical fertilizers on quantitative and qualitative characteristics of the medicinal plant, *Plantago Psyllium*, the experiment was conducted in a complete randomized block design with 9 treatments and 3 replications at the University of Zabol in 2015-2016. Chemical fertilizer treatments included: 1) control (no application of chemical fertilizer) 2) chemical fertilizer(Nitrogen, Phosphorus and Potassium were 50, 30, 30 kg/ha^{-1} respectively) 3) manure (20 tons per hectare) + chemical fertilizer (Nitrogen, Phosphorus and Potassium were 50, 30, 30 kg/ ha^{-1} respectively) 4) Vermicompost (5 tons per hectare) + chemical fertilizer (Nitrogen, Phosphorus and Potassium were 50, 30, 30 kg / ha^{-1} respectively) 5) compost (20 tons per hectare) + chemical fertilizers (Nitrogen, Phosphorus and Potassium were 50, 30, 30 kg/ ha-1 respectively) 6) manure (20 tons per hectare) + Azotobacter (100 grams per hectare) 7) vermicompost (5 tons per hectare) + Azotobacter (100 grams per hectare) 8) Compost (20 tons per hectare) + Azotobacter (100 grams per hectare) 9) chemical fertilizer (Nitrogen, Phosphorus and Potassium were 50, 30, 30 kg/ ha^{-1} respectively) + Azotobacter (100 grams per hectare). After having harvested, the seeds were transferred to the laboratory and tested for seed yield (mucilage and swelling level) . The results showed that the effect of different chemical fertilizers on spike length, number of spike per plant, number of seeds per spike, plant yield, seed yield per hectare and fresh and dry weight of plant were highly significant on plant height, number of tillers per plant and 1000- weight seed. The result was significant, and the effect of organic fertilizers was higher than that of other chemical fertilizers. The effect of organic and biological fertilizers on the mucilage percentage, swelling factor, swelling, percentage of elements (nitrogen, phosphorus and potassium), protein, and soluble carbohydrates were higher than that of other fertilizers. The maximum shoot length, germination percentage and shoot dry weight were allocated to animal manure.

Keywords: Azotobacter, Chemical fertilizer, Quantitative and Qualitative Characteristics, Seed Yield.

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