Response of nitrogen, phosphorus and zinc efficiency of fenugreek (*Trigonella foenum- graecum*) to combination of chemical and biological fertilizers in greenhouse culture

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Abstract

In order to investigate the effect of combination of chemical and biological fertilizers on dry matter, uptake and efficiency of nitrogen (N), phosphorus (P) and zinc (Zn) by fenugreek (*Trigonella foenum- graecum*), an experiment was conducted as randomized complete blocks design with three replications in the Research Greenhouse of Shahrekord University. Eight fertilizer treatments consisted of control (no fertilizer), urea fertilizer (UF), UF+ zinc sulfate (ZS), UF+ *Azotobacter* (Az), UF+ mycorrhiza (My), UF+ ZS+ Az, UF+ ZS+ My and UF+ ZS+ Az+ My. Results indicated that there was significant difference ($P \leq 0.05$) among different fertilizer treatments for agronomic efficiency of N, P and Zn. The highest agronomic efficiency of N, P and Zn (60, 96 and 198 g/g, respectively) was achieved in UF+ZS+Az treatment. The highest P-uptake efficiency (18.7 %) was observed in UF+My treatment and it had significant ($P \leq 0.05$) difference with other treatments, except UF+ZS treatment. The highest Zn physiologic efficiency was obtained in UF+ZS, which had no significant difference with UF+ ZS+ Az and UF+ ZS+ Az+ My. Maximum dry matter (292 g/m^2) was produced in UF+ ZS+ Az treatment. In general, application of biofertilizers, especially *Azotobacter*, integrated with urea and zinc sulfate not only is effective in increasing dry matter, but also can increase productivity of fenugreek by increasing chemical fertilizers' efficiency in greenhouse culture.

Keywords: *Azotobacter*, Fertilizer efficiency, Zinc sulfate, Mycorrhiza.

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