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THE EFFECTS OF NITROGEN AND PHOSPHOROUS BIOLOGICAL FERTILIZERS ON THE GROWTH INDICES OF BLACK CUMIN (NIGELLA SATIVA L.)

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Application of biological fertilizers, especially plant growth promoting rhizobacteria (PGPR) compared to chemical fertilizers is one of the most important strategies for plant nutrition especially in sustainable management of agroecosystems. In order to investigate the effect of *Azotobacter* and *Azospirillum* bacteria and *Mycorrhiza* fungus on the growth indices of black cumin (*Nigella sativa* L.), a field experiment was conducted at Agricultural Research Station of Ferdowsi University of Mashhad during the growing season of 2007. A randomized completed block design with three replications was used. Treatments included: (A) *Azotobacter paspali*, (B) *Azospirillum brasilense*, (C) the fungus of *Glomus intraradaices*, (D) C+A, (E) C+B, (F) A+B, (G) A+B+C, and (H) control without using bio-fertilizers. The *Azospirillum* and *Azospirillum* inoculations were applied as liquid and the *Mycorrhiza* inoculation was applied in solid form on the treated seeds with Arabic resin immediately before planting. The Arabic resin applied to increase the adherence of *Mycorrhiza* to seeds. In all treatments except control, the amounts of 15 mg of each bio-fertilizer were applied for 110 g of crop seeds. The results indicated that the inoculation of black cumin seeds with biological fertilizers significantly ($P \leq 0.01$) increased plant height, dry matter (DM) accumulation and crop growth rate (CGR) compare to control. The maximum plant height was observed in the E treatment at 68 days after emerging. The fast period of vegetative growth and DM accumulation were observed at 40-89 days after emerging with a small decline afterwards until maturity. The maximum and minimum amounts of DM accumulation were recorded in the E treatment with 83.6 gm^{-2}, and H treatment with 19.9 gm^{-2}, respectively. CGR reached to its maximum in 82 days after emergence followed by a decreasing trend afterwards. The highest and lowest CGR were observed in the E treatment with 2.5 $gm^{-2}d^{-1}$, and H treatment with 0.19 $gm^{-2}d^{-1}$, respectively. Further, investigations on quantity and quality of medicinal plants including black cumin in association with biological fertilizers effects will provide additional information.