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HEREDITY AND THE ENVIRONMENT EFFECT ON PARENTING

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STIMULATION OF MUNGBEAN (*VIGNA RADIATA L.*) GROWTH BY RHIZOBIUM 3 AND RHIZOBIUM 9 PREPARATIONS

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Аннотация: Мақолада мош (*Vigna radiata L.*) ўсимлигининг ўсишига Rhizobium 3 ва Rhizobium 9 препаратларининг таъсири ўрганилган. Rhizobium 9 препарати назорат ва Rhizobium 3 препаратига нисбатан мош ўсимлигининг ўсишини ва тугунақлар сонини ошириши аниқланган.

Калит сўзлар: мош, микробиологик препаратлар, ўсимлик ўсиши, тугунақ.

Аннотация: В статье приведены данные влияние препаратов Rhizobium 3 и Rhizobium 9 на рост растений маша. Выявлено усиление роста и увеличение количество клубеньков при обработке семян препаратом Rhizobium 9 по сравнению препарата Rhizobium 3 и контрольного варианта.

Ключевые слова: маш, микробные препараты, рост растений, клубеньки.

Abstract: In the article, effect of Rhizobium 3 and Rhizobium 9 preparations on growth of mungbean (*Vigna radiata L.*) were studied. The increase of the



preparation Rhizobium 9 on number of nodules and growth of mungbean compared to Rhizobium 3 and control were determined.

Keywords: mungbean, microbial preparations, plant growth, nodules.

Introduction

Legumes the most important plant families in agriculture. Rhizobial inoculants improved plant growth, development, nodulation and yield of legumes. Rhizobial species Rhizobium, Bradyrhizobium, Sinorhizobium, and Mesorhizobium lead to symbiotic interactions with legumes and result in root nodule formation. However, root nodulation in legumes is dependent on numerous soil and environmental factors, and very often the introduced Rhizobium has to overcome intense competition from the native microorganisms [1, 2, 3].

Zhang et al. [4] reported that increased nodule number, nodule weight, shoot nitrogen yield, final nitrogen fixed and root system of soybean when inoculated with *B. japonicum* strains. Numerous studies have shown that rhizobial inoculants increased in nodulation, N_2 fixation and nitrogenase activity of nodulated legumes [5,6,7,8,9]. The inoculation with Rhizobium spp. had enhanced nodulation and nitrogen fixation, plant biomass and grain yield in various leguminous species including chickpea, bean and soybean [10,11,5,8,12].

Mungbean (*Vigna radiata* L.) is an important legume for human nutrition and a major protein [13]. Mungbean in symbiosis with effective Rhizobium and Bradyrhizobium spp. could fix 30-60 kg N per hectare depending on agricultural conditions [14].

The present work was conducted to evaluate if inoculation of mungbean with rhizobium 3 and rhizobium 9 could enhance nodulation and plant growth in soil conditions.

Material and Methods

The mungbean (*Vigna radiata* L.) seed cultivar Zilola was used for plant growth experiments. Rhizobium 3 and Rhizobium 9 preparations was obtained from the culture collection of the Department of Microbiology and Biotechnology,

National University of Uzbekistan. Seeds were sorted to eliminate broken, small and infected seeds and sterilized for 5 minutes with concentrated 5% sodium hypochlorite (NaOCl), followed by 70% ethanol for 3 min and rinsed five times with sterile, distilled water. Sterilized seeds were germinated in Petri dishes at 28 °C for 48 h. After germinated seeds were placed into Rhizobium 3 and Rhizobium 9 suspension for 30 minutes and were then cultivated into plastic pots of 20 diameter, containing 300 gr of soils. Soil samples were collected from Kibray district, Tashkent province. A pot experiment was conducted to study the effect of Rhizobium 3 and Rhizobium 9 on plant growth and nodulation of mungbean (*Vigna radiata* L.). The experiment were carried out in completely randomized with three replications a pot experiments at the Institute of Genetics and Plant Experimental Biology. Each pot watered every 3 days. Plants were grown during 30 days in a pot conditions. After 30 days, the length of roots and shoots, the fresh weight of roots and shoots were determined. Experimental data were analyzed with the StatView Software using ANOVA.

Results

An effect of inoculation of mungbean seedlings either with Rhizobium 3 and Rhizobium 3 preparations on plant growth and nodulation were pot experiment under soil conditions. The rhizobium 3 and rhizobium 9 showed better results compared to control. The results showed that inoculation with rhizobium 3 improved the length of root, the length of shoot, fresh weight of root and shoot of mungbean compared to control (Table 1).

Table 1. Effect of microbiological on plant height, root length and plant weight of mungbean (*Vigna radiata* L.)

Treatments	Plant height (cm)	Root length (cm)	Shoot dry weight (g)	Root dry weight (g)
Control	32.20±2.43	13.80±1.44	3.92±0.60	0.35±0.01
PlantaStim	34.60±1.80	14.40±0.71	4.26±0.12	0.39±0.01*
Rhizobium 3	40.20±1.14*	20.00±1.64*	5.39±0.74*	0.46±0.03*

Rhizobium 9	37.40±1.18*	22.40±0.78*	4.90±0.34*	0.47±0.01*
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The rhizobium 3 increased significantly root length by 53%, shoot length by 43%, fresh weight of root by 50% and fresh weight of shoot by 65% than uninoculated control. Inoculated with Rhizobium 9 increased significantly the growth of mungbean. However, Rhizobium 9 rose significantly root length by 108%, shoot length by 57% and fresh weight of shoot by 74% compared to control (Table 1). The rhizobium 9 inoculation increased the number of nodules per plant by 45% compared to uninoculated rhizobium 3 (Figure 1).

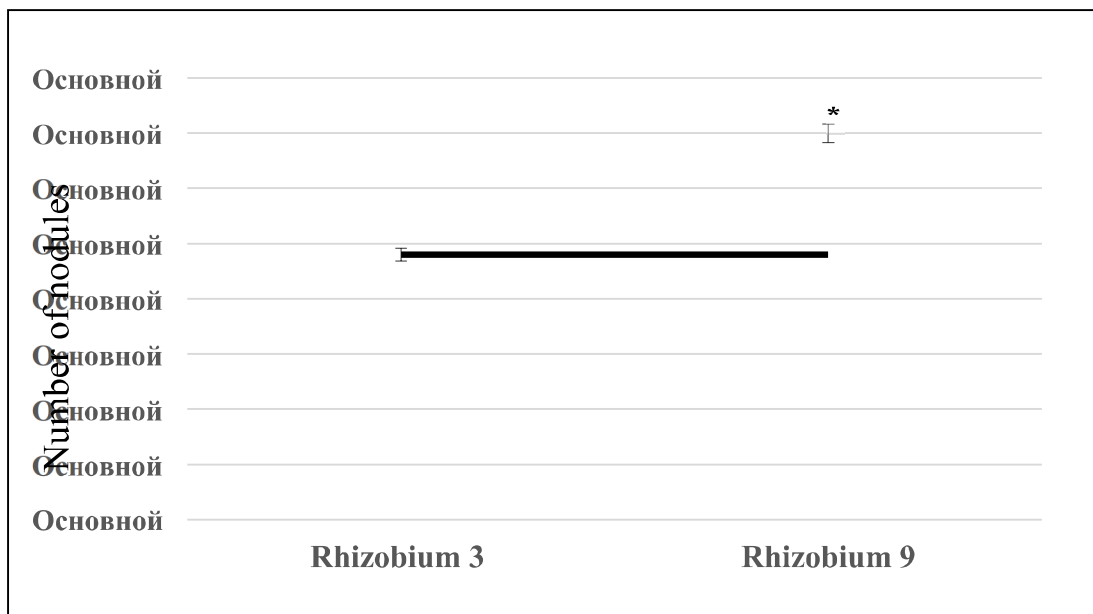


Figure 1. Effect of rhizobial inoculation on number of nodules of mungbean

Discussion

Preparations Rhizobium 3 and Rhizobium 9 used in this study have improved plant growth of mungbean under soil conditions. Rhizobium sp improved growth, nodulation and nitrogen fixation of several legumes such as, soybean (*Glycine max*) [2,8], mungbean (*Vigna radiata L.*) [15] and faba beans (*Vicia faba*) [7]. Our pot experiments demonstrated that mungbean was clearly improved when it was inoculated both treatments, Rhizobium 3 and Rhizobium 9 (Figure 1). Inoculation of legumes with rhizobia has been reported to increase the number of nodules compared to control [9,11,12].

Conclusion

Our work demonstrated that inoculation with Rhizobium 3 and Rhizobium 9 could enhance formation of nodules on legumes grown in soil conditions. In summary, a significant positive effect of inoculation with rhizobium 9 on growth of mungbean plants compared to control and rhizobium 3.

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