

Abstract

Common bean root rot a fungal disease is one of the economically important diseases of the crop products worldwide. Distribution and relative dominance of the disease was investigated in the farms of the major bean cultivating regions and clima of Lorestan province including Azna, Aligudarz, Selseleh, Doroud and Borujerd. Totally, 1164 isolates of the fungi causing the disease were obtained using general and selective culture. Pathogenicity of isolates evaluated and confirmed on Akhtar cultivar. The dominant pathogenic fungi were identified based on colony morphology and microscopic characteristics, and then was confirmed by molecular technique using *β-tubulin* and *TEF1-α* genes. Frequency of the fungal isolates and the pathogenicity tests showed that *Fusarium solani*, with 33.42 percent was the most important causal agent of the common bean root and crown rot in Lorestan province, and followed by *Fusarium oxysporum*, *Macrophomina phaseolina* and *Rhizoctonia solani* with 26.55, 15.55 and 7.73 percent, respectively. Frequency of roor rot pathogens distributed across bean farms of Selseleh, Borujerd, Azna, , Doroud and Aligudarz were 24.57, 18.64, 16.58, 15.20 and 8.25 percent, respectively. The frequency of the pathogen isolated from common bean plants at the early growth, flowering and podding stages was 20.70, 26.37 and 52.92 percent, respectively. Based on Climate zoning, the highest frequency of fungal agents was evaluated in the semi-humid temperate clima. Twenty night isolates of *Rhizobium* were obtained from the common bean rhizosphere. Molecular identification in the rhizobia was conducted by 16S rRNA gene and 27F and 1492R primers. After symbiotic effectiveness test and biochemical assays, Rb-162 and Rb-167 strains were selected as superior strains and used in greenhouse experiments for dominant fungal agents, *F. solani* and *F. oxysporum*. The effectiveness of the native *Rhizobium*, mycorrhiza and the chemical treatment in the greenhouse and field was investigated. The trial treatments exerted as follow, superior native *Rhizobium* isolate *Rhizobium etli* b.v. *phaseoli* (CCSM_B011401) (R), *Rhizophagus irregularis* (M2), *Rhizophagus irregularis* + *Funneliformis mosseae* (M1+M2), *R. irregularis* + *F. mosseae* + *R. etli* b.v. *phaseoli* (R+M1+M2), *R. irregularis* + *R. etli* b.v. *phaseoli* (R+M2), fungicide treatment and control group. *Rhizobium* powder was applied according to the formulation of perlite and mycorrhiza, it was added to the seedbed during the sowing of the seeds. The best result was achieved from co-noculation of arbuscular mycorrhiza fungi and indigenous rhizobium in greenhouse and field trials, which showed a significant increase in the number of seeds per pod, 100 seeds weight, grain yield and biomass yield as 34, 24.9, 51.6 and 38 percent compared to the control. Also the co-inoculation treatment reduced the incidence of the bean root rot disease up to 89 percent. According to these results, the synergism of indigenous rhizobia and arbuscular mycorrhiza is useful to manage the common bean root rot disease, reduce application of the pesticides and produce the crop in a sustainable and suitable condition.

Key words: climatic distribution , Symbiosis effectiveness, co-inoculation , synergism , biological control



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**Identification of red-bean fungal root
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indigenous rhizobium and arbuscular
mycorrhiza on dominant disease agents**

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