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Human Nutrition and Health Benefits of Legumes

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Description

Root rot diseases are a major limiting factor in legume production. The diseases depress seedling germination and cause post emergence damping off, resulting in poor crop stand and low yields. Several root rot casing pathogen such as *Rhizoctonia bataticola*, *Rhizoctonia solani* and *Fusarium solani* on chickpea, *Rhizoctonia bataticola* and *Rhizoctonia solani* on lentil and *Rhizoctonia bataticola*, *Rhizoctonia solani* and *Fusarium solani* on faba bean have been reported in Ethiopia. They can cause yield loss up to 45% and 50% in faba bean and chickpea if properly not manage. Based on this information review was made to review some available root rot management methods of legume crops and to make some suggestions on the methods which are not practice yet. Several chemicals, cultural practice and bio-gent used to control this disease. Among bio-agent mostly used to control this disease are *Trichoderma viride* and *Bacillus megaterium* take a great share. In the future particularly in our country full exploitation of the potential of biological control of this disease has to be done. In general techniques which are based on the molecular techniques like marker assisted selection to deploy resistance has to be applied in the processes of creating resistant variety development.

Legume Crops

The leguminosae (pea or bean family) are composed of some 690 genera and 18,000 species. It is the second largest family of seed plants (following the Gramineae). Within the leguminosae, there are 18-20 species that are cultivated widely for their edible seeds which are high in protein. The seed of legumes are second only to cereals as the most important source of food for humans and animals. The term food legume generally is given to species of leguminosae, the seeds, pods and/or leaves of which are eaten by humans. The word pulse is used in some countries colonized by Great Britain, like India and Pakistan, to denote the dry, mature seeds which are consumed by humans.

Legumes, which occupy approximately 13 percent of cultivated land and account for approximately 10 percent of the agricultural value addition, are critical to smallholder livelihoods in Ethiopia. These legume crops have adverse roles top play in the country. They contribute to smallholder income, as a higher-value crop than cereals and to diet, as a cost effective source of protein that accounts for approximately 15 percent of protein intake and they correct important amino acid deficiencies in cereals. Moreover, pulses offer natural soil maintenance benefits through nitrogen-fixing, which improves yields of cereals through crop rotation and can also result in savings for smallholder farmers from less fertilizer use. Pulses also contribute significantly to Ethiopia's balance of payments. They are the third largest export crop after coffee and sesame, contributing USD 90 million to export earnings in 2007/08. The major constraints to the production of these crops are diseases, insect pest attack, poor agronomic practices and lack of improved cultivars and crop protection technologies. In addition, poor popularization of the recommended crop protection technologies following participatory approach is one of the main socio-economic reasons for low productivity of these crops. Root rot diseases are a major limiting factor in legume production. The diseases depress seedling germination and cause post emergence damping off, resulting in poor crop stand and low yields. The disease causal agents are seed borne but most farmers often use seeds saved from previous harvest, a practice that negates the

principle of sanitary practices. The aim of this work was to review some available root rot management methods of legume crops and to make some suggestions on the methods which are not practice yet.

After the seedling has emerged, continued cool wet weather often results in root rot. Symptoms will include stunted, yellow plants and may be mistaken for nitrogen. When the plant is dug up, the roots will be much thinner than a healthy plant or there may be no secondary roots at all. Roots will be discolored and the color and pattern of discoloration depends on the pathogen infecting the roots. There are four main types: Pythium root rot, *Rhizoctonia* root rot (bare patch), Fusarium root rot and Aphanomyces root rot. These fungal diseases affect a very broad host range, so crop rotation is of limited efficacy. It is caused by the fungus *Rhizoctonia solani.* It is first diagnosed by poor or declining stands. Root development is poor and roots are generally black and soft. *Rhizoctonia* root rot will damage peas at relatively low soil temperatures (65°F or 18°C) but is most aggressive under warmer conditions (76°F to 86°F or 24°C to 30°C). *Rhizoctonia* infection and disease development can occur over a wide range of soil moistures.

Seed Treatment

Effective control strategies against root rot fungal pathogens have not been fully developed. Sanitation and use of clean planting material is the primary way of preventing root rot and other root diseases. Chemical seed treatment is a common practice before planting to prevent seed and seedling rots, damping off and other fungal diseases. However, problems arise when the chemical seed treatments are to be used in conjunction with rhizobia inoculants. In some cases the applied seed fungicide may fail to protect against the intended pathogen or suppresses the effectiveness of the rhizobia bacteria. Finally their result revealed that seed treatment with fungicide (Copper oxychloride)+soil application of potential fungal (*Trichoderma isolate*) and bacterial bio-control agent was found to be superior as it recorded the highest germination percentage (100%), highest initial (10.00) and final population.

Biological control is proposed to be an effective and non-hazardous strategy to reduce crop damage caused by plant pathogens. The role of *Trichoderama viride* in protecting plants from the black root rot infection has been tested on the faba bean under greenhouse conditions. The results of this study suggest that the biological control agent *Trichoderama viride* can play a role in a means for the control of the black root rot in faba bean. Another study which were done abroad with the basis of using of synthetic plant resistance inducers like Salicylic Acid (SA) and Hydrogen Peroxide (H_2O_2) as antimicrobial agents or disease resistance inducer revealed that the tested bio-control agents and chemical inducers either individually or combination significantly reduced linear growth of black rot casing fungi. In general, the combination between bio-control agents and chemical inducers were more effective than used any of them individually.