Unnamed Article

MD IMAM UL KHABIR[1]

[1]Affiliation not available

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Microbiome and metabolic activity of the Soybean nodule changed by the Rhizobacteria and *Fusarium* complex

M. Saleem[1], **Md Imam ul Khabir[1]** , Jannat Jhumur[1] ,Z. H. Pervaiz[2]

[1]Department of Biological Sciences, Alabama State University

[2]Department of Biological Sciences, Auburn University

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Soybean plants develop symbiotic associations with rhizobia to form nodules in which the biological nitrogen fixation (BNF) occurs, which is an important nitrogen source for plant growth. Though soybean root-microbiome interactions are studies, we know little about nodule microbiome and metabolome, and how it is influenced by beneficial and pathogenic microbes. Here,we investigated the effect of rhizobacterial (growth promoting) and *Fusarium spp* .,(causing root rot disease) consortia on nodule microbiome and metabolome via seed inoculation in a field experiment.The soybean seeds were inoculated with*beneficial* and *pathogenic* consortia while the*control* represented the un-inoculated seeds. These seeds were sown in an experimental field soil managed by the University of Nebraska,Lincoln (UNL).The nodules were collected from soybean plants and DNA was extracted.The frozen nodules were crushed in the super-deionized water and metabolome analysis was done at the UNL.The 16S rRNA gene amplicon sequencing was done at the University of Minnisota.Though *Proteobacteria* dominanted the nodule microbiome, the abundance of other phyla was also

significant across all treatments.Both consortia suppressed dominant bacterial families (including population of *Bradyrhizobiumsp* .)while rhizobacterial consortia incrased the diversity of nodule microbiome.The soybean nodules exhibited a rich community of bacterial phyla while microbiome was dominated by *Proteobacteria* in all treatments. Pathogen and beneficial consortia suppressed *Proteobacteria* though later increased OTU diversity and decreased the abundance of*Bradyrhizobiumsp* . Pathogen increased amino acids and organic compounds contents while rhizobacteria increased the contents of sugar acids, sugar alcohol, and organic acids.So,pathogen and benecifial consortia altered nodule microbiome and metabolome though their effects on BNF remain understudied.