**ABSTRACT**

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| Title of thesis  Name of the Student  Registration No. | :  :  : | Effect of Bio-fertilizer Consortium and Foliar nutrition on Growth and Yield of Wheat under Different fertility Levels and their Residual Effect on Summer Black gram  Ranjeet Singh Bochalya  J-17-D-303-A |
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**ABSTRACT**

The present study entitled **“Effect of bio-fertilizer consortium and foliar nutrition on growth and yield of wheat under different fertility levels and their residual effect on summer black gram”** was conducted at the Research Farm, Division of Agronomy, Faculty of Agriculture, SKUAST- J, Chatha during *Rabi* and *Summer* seasons of 2018-19 and 2019-20. The soil of the experimental site was sandy clay loam in texture, slightly alkaline in reaction, low in organic carbon and available nitrogen but medium in phosphorus and potassium. The experiment was laid out in Split-Split Plot Design with three factors and replicated thrice. Eighteen treatment combinations comprising of three fertility levels, *viz.* Control, RDF and 75% of RDF were taken as main plot treatments, two sub -plot treatment comprising of bio-fertilizer consortium *viz.,* seed treatment (1.25kg/ha) and soil application (1.25kg/ha) and three foliar application of 2% NPK(19:19:19)*viz.,* at tillering, flowering and tillering+ flowering stage as sub-sub-plot treatments. Wheat crop was sown at spacing of 20 cm with seed rate of 100 kg/ha. Half dose of nitrogen as per the treatment combination alongwith uniform basal application of 50 kg P205 and 25 kg K2O/hectare was applied to all the treatments through Urea, DAP and MOP and the remaining nitrogen was top dressed in two equal splits at CRI and before booting stages. However, black gram was sown after wheat to study the residual effect of treatment applied to wheat crop at spacing 30cm with seed rate of 20 kg/ha.

Among the fertility levels, RDF observed significantly superior growth parameters viz plant height, number of tillers/m2, dry matter accumulation, yield attributing characters, tillers/m2, test weight, grain and straw yield and nutrient uptake as compared to75%of RDF. Whereas, control (no fertilizer) recorded lowest values of all growth, yield attributing characters as well grain and straw yield during 1st and 2nd year of study. Significantly higher plant height, dry matter accumulation, yield, yield attributing characters, harvest index and nutrient uptake were recorded under bio-fertilizer consortium applied in soil as comparison to seed treatment of bio-fertilizer consortium in wheat crop. While protein content was recorded highest in seed treated of bio-fertilizer consortium as compared to soil application of bio-fertilizer. Among the foliar applications of 2% NPK (19:19:19), foliar application of 2% NPK at tillering + Flowering stage recorded higher values of all growth characters, yield and yield attributing parameters during both the study years but the values obtained were statistically at par with foliar application of 2% NPK at tillering stage. The highest harvest index and protein content were recorded with foliar application of 2% NPK at flowering stage as compared to tillreing and tillering + flowering stage.

Among the fertility levels, RDF treatment recorded highest economic return in terms of net return and B:C ratio followed by 75% RDF over control during both the years. Whereas, bio-fertilizer consortium applied in soil coupled with foliar application of 2%NPK at flowering stage recorded higher economics with respect to net return and B:C ratio.

Residual effect on succeeding black gram among the fertility levels, RDF observed significantly superior growth parameters *viz* plant height, yield attributing characters, No. of pods/plant, No. of grains/plant, 1000- grains weight, seed yield, stover yield and harvest index as compared to 75% of RDF and control. Whereas, soil application of bio-fertilizer consortium recorded higher plant height and yield attributing characters of black gramin comparison to seed treatment with bio-fertilizer consortium applied in wheat. Among residual effect of foliar application of NPK (19:19:19) higher values of growth character, yield and yield attributing parameters of black gram were recorded under application of 2% NPK (19:19:19) at flowering stage as compared to tillereing or tillering +flowering stages of wheat crop during both the years. Economics of black gram in terms of net return and B:C ratio was influenced by residual effect of various treatments applied in wheat crop and recorded higher in RDF fertility, soil application of bio-fertilizer consortium and foliar application of 2% NPK at flowering stage.

Based on two years of investigation, it can be concluded that application of 100% RDF with soil application of bio-fertilizer consortium recorded highest grain and straw yield of wheat which were found to be statistically at par with 75% RDF with soil application of bio-fertilizer consortium and 100% RDF with seed treatment of bio-fertilizer. Similarly, 100% RDF with foliar application of 2% NPK at tillering + flowering stage recorded highest grain and straw yield which were statistically at par with 100% RDF + foliar application of 2% NPK at tillering stage and 75% RDF + foliar application of 2% NPK at tillering + flowering stage and 100% RDF + foliar application of 2% NPK at flowering stage above.

Application of 100% RDF along with bio-fertilizer consortium at the rate of 1.25 kg/ha in soil and foliar spray of 2% solution of NPK at flowering stage to wheat showed better residual effect with the respect plant height and yield of succeeding black gram crop which was statistically non-significant. Besides also showed improvement in soil properties in terms of organic carbon N, P and K to considerable levels from their initial value. Hence application of 75% RDF along with bio-fertilizer consortium and 2% foliar application of NPK at tillering + flowering stage proved economically better option to enhance wheat productivity besides appreciable residual effect on black gram.

**Key words**: Bio-fertilizer consortium, foliar nutrition, wheat, black gram