**ABSTRACT**

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| **Title of the Thesis** | **:** | Effect of Zinc and Iron fortification on Growth, Yield and Quality of Pigeon pea under Rainfed conditions of Jammu |
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| **Major Subject** | **:** | Agronomy |
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**ABSTRACT**

An investigation entitled **"Effect of Zinc and Iron fortification on Growth, Yield and Quality of Pigeon pea under Rainfed conditions of Jammu"** was conducted during the *kharif* season of 2021 at Advanced Center for Rainfed Agriculture, Rakh Dhiansar, Sher-e-Kashmir University of Agricultural Sciences and Technology, Chatha, Jammu. The soil of the experimental field was sandy loam, near to neutral in reaction, low in organic carbon, available nitrogen and available zinc but medium in available phosphorus and potassium with sufficient quantity of available iron and electrical conductivity in the safer range. The experiment was laid under Randomized Block Design with three replications and eleven treatments *viz.* **T1-**RDF-25 kg N2: 50 kg P2O5: 30 kg K2O (Absolute control), **T2-**RDF + soil application of ZnSO4 @ 25 kg/ha, **T3-**RDF + soil application of ZnSO4 @ 18.75 kg/ha(75% of 25 kg ha-1), **T4-**RDF + soil application of FeSO4 @ 5 kg/ha, **T5-**RDF + soil application of FeSO4 @ 3.75 kg/ha (75% of 5 kgha-1), **T­6-**RDF + soil application of ZnSO4 @ 25 kg ha-1 + FeSO4 @ 5 kg ha-1, **T7-**RDF + Soil application of 18.75 kg/ha 0f ZnSO4+ 3.5 kg/ha of FeSO4, **T8-**RDF + foliar application of ZnSO4 @ 0.50% at flowering and pod initiation, **T9-**RDF + foliar application of FeSO4 @ 0.50% at flowering and pod initiation, **T10-**RDF + foliar application of ZnSO4 @ 0.50% + FeSO4 @ 0.50% at flowering and pod initiation and **T11-**RDF + water spray at flowering and pod initiation (Control).The sowing of crop was done on 23rd of July, 2021 with crop geometry of 60cm × 15cm.The recommended dose of N, P2O5 and K­2O was applied as basal through urea, DAP and MOP at the time of sowing. Soil application of zinc and iron was done through zinc sulphate hepta-hydrate and ferrous sulphate hepta-hydrate applied at the time of sowing while as the foliar sprays were given at flowering and pod initiation stage of pigeon pea.

The experimental results revealed that significantly higher values for plant height, number of branches plant‑1 and dry matter accumulation at all growth stages were obtained in treatment T6. However, treatment T6 was found to have significantly higher leaf area index and crop growth rate up to 90 DAS while as at 120 DAS and at harvest treatment T10 was found to have significantly higher values. Results further revealed that significantly higher values for yield and yield attributes *viz.* number of pods plant-1 (105.20), number of seeds pod-1 (4.02), 100 seed weight (10.61 g), seed yield (1764 kg ha-1), stalk yield (6151 kg ha-1) and biological yield (7915 kg ha-1) were obtained with treatment T6. The quality parameter *viz.* crude protein (23.81%) was found to be significantly higher in treatment T6, while as zinc and iron content (31.10 and 57.32 mg kg‑1 respectively) were found to be significantly higher with treatment T10. The lowest values for all the growth parameters, yield and yield attributes, uptake of nutrient and quality parameters were obtained under T1. The economic analysis revealed that among different treatments, treatment T6 was found to have fetched more gross returns (141912 ₹ ha-1), net returns (107272 ₹ ha-1) and B:C ratio (3.10). Treatment T6 with respect to all the parameters was statistically at par with treatments T7, T10, T2, T8 and T3.

Thus, it can be concluded that treatment T6 resulted in significantly higher growth, yield attributes and yield which was statistically at par to treatment T10. Besides this treatment T10 also enhanced the quality of pigeon pea significantly and realized numerically similar values for B:C ratio. Therefore, treatment T10-RDF + foliar application of zinc sulphate @ 0.50 % and ferrous sulphate @ 0.50 % at flowering and pod initiation, besides providing nutritional security among poor and undernourished masses can also be recommended as an effective approach of zinc and iron fortification for enhancing growth, yield and profit under rainfed conditions of Jammu.

**Key words:** Pigeon pea, Zn and Fe Fortification, Growth, Yield, Quality

**Signature of Major Advisor Signature of the Student**