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Effect of vermicompost in combination with inorganic fertilizers and vermiwash on growth and yield of *Amaranthus polygamous*

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Abstract

Sole reliance on inorganic farming methods can lead to environmental problems and health issues. An integrated nutrient management system is the alternative approach to address these challenges and enhance agricultural sustainability. This study investigates the potential of vermicompost (VC) in combination with inorganic fertilizers (IF) with or without vermiwash (VW), on the growth and yield of *Amaranthus*. Vermicompost contained 1.12% nitrogen, 0.73% potassium, and 1.24% phosphorus, while vermiwash contained 0.346% nitrogen, 0.41% phosphorus, and 0.24% potassium. A field experiment was conducted using Randomized Complete Block Design (RCBD) with three replicates to assess the effects of different percentages of vermicompost (50%, 75%, 100%, and 125%) and inorganic fertilizer (IF) combinations with or without vermiwash foliar spray on growth and yield of *Amaranthus polygamous*. The treatments used in this study were T1: 50% VC + 50% IF + VW, T2: 50% VC + 50% IF, T3: 75% VC + 25% IF + VW, T4: 75% VC + 25% IF, T5: 100% VC + VW, T6: 100% VC, T7: 125% VC, T8: 100% IF + VW, T9: 100% IF, T10: 75% VC + VW, T11: 75% VC, and T12: Control (No fertilizer). Plant height, leave numbers, average leaf length, width, and crop yield were recorded. The data were statistically analyzed using Analysis of Variance and treatment means were compared using Duncan's multiple range test. The results showed that thirty days after seed sowing, T1 treatment (50% VC + 50% IF + VW) had significantly higher plant height (55.34 cm), number of leaves (22), average leaf length (15.54 cm), and average leaf width (7.8cm) compared to other treatments. However, there were no significant differences among T1, T2 (50% VC + 50% IF), T8 (100% IF + 10% VW), and T9 (100% IF). The highest yield (21.17ton/ha) was obtained from T1 (50% VC + 50% IF + VW); however it was not significantly different from T2 (50% VC + 50% IF), T8 (100% IF + 10% VW) and T9 (100% IF). The highest net benefit was recorded in T8 (100% IF + VW). T1 and T2 also showed comparable net benefits to T8 and T9. Therefore, this concluded that the combined application of vermicompost, inorganic fertilizers, and vermiwash significantly enhances *Amaranthus* growth and yield, compared to control and chemical fertilizers alone highlighting the potential of integrated nutrient management for sustainable agriculture.

Keywords: *Amaranthus*, Inorganic-Fertilizers, Organic-Fertilizers, Vermicompost, Vermiwash

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