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Performance of Bell Peppers under different vermicompost application regimes

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INTRODUCTION & AIM

Bell pepper (*Capsicum annuum*) is a key horticultural crop in Zimbabwe, but its production faces challenges such as high costs for chemical fertilizers, which are often unaffordable for resource-constrained farmers. This leads to lower investments in quality seeds and pest management, resulting in poor fruit quality and yields. Additionally, chemical fertilizers are environmentally unsustainable. Despite these issues, demand for bell peppers is rising due to their popularity in spicy cuisines and their health benefits.

Recently, there has been growing interest in organic soil amendments as alternatives to chemical fertilizers, with vermicompost emerging as a popular choice. Vermicompost, produced through the decomposition of organic waste by earthworms, is a nutrient-rich organic fertilizer. However, its use and effectiveness as a sole nutrient source for pepper production among smallholder farmers in Zimbabwe remain underexplored. This study aims to evaluate the performance of bell peppers with different vermicompost application rates to determine the optimal rate for sustainable and cost-effective nutrient management for smallholders.

METHOD

Site : Horticulture Research Institute,Zimbabwe

Experimental design : RCBD,6treatments,3 replication

Crop Management

Pepper seedlings were grown and managed at the Horticulture Research Institute in seedling trays using pine bark media. Land preparation included plowing, disking, marking rows, and setting up the trial area, with a spacing of 0.9m x 0.3m. Treatments were correctly assigned to their respective plots, and recommended cultural practices for pepper production were implemented. The trial was conducted during the 2021/2022 summer season.

Experimental Material

- **Pepper Variety:** California Wonder
- **Vermicompost:** Produced from the castings of earthworms and applied directly to the soil.
- **Vermifoliar:** A liquid fertilizer made from earthworm by-products, applied as a foliar spray.

Data Collection

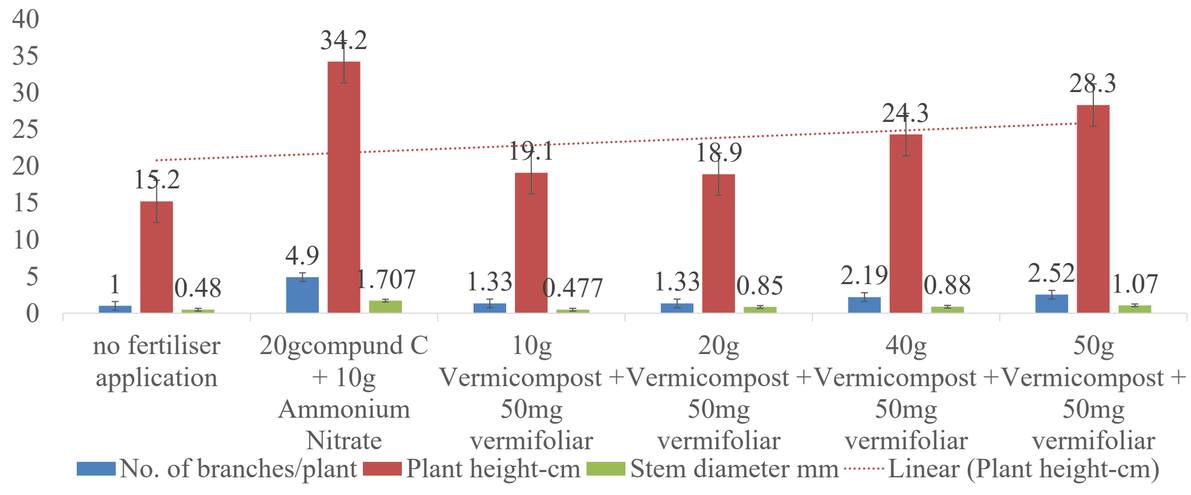
Growth parameters included plant height, stem thickness, and the number of branches per plant. Yield parameters included the number of fruits per plant, marketable and non-marketable yields, average fruit size, and fruit weight. Analysis of variance was performed using GenStat 18th edition.

RESULTS & DISCUSSION

Table 1 : Effect of vermicompost rates on pepper production

Treatment	Fruit Count	Average Fruit Weight	Average Fruit Width	Marketable Yield t/ha
No fertiliser application	22[a]	77.7[a]	4.26[a]	1.51[a]
20g Compound C + 10g AN	129.7[c]	163.8[b]	6.92[b]	15.41[c]
10g vermicompost +50mg vermifoliar	40.3[a]	74.2[a]	4.55[a]	5.50[a]
20g vermicompost+ 50mg vermifoliar	85.7[ab]	85.2[a]	4.81[ab]	8.30[ab]
40g vermicompost + 50mg vermifoliar	87[ab]	109.3[a]	4.81[ab]	10.62[b]
50g vermicompost+50mg vermifoliar	105.7[b]	129.0[b]	5.79[c]	10.99[b]
Pvalue	0.001	ns	ns	0.001
Lsd (5%)	25.8	43.56	1.076	8735
Cv%	28.4	23.5	11.4	16.3

Effect of vermicompost rates on pepper growth



The application of vermicompost significantly enhanced the growth, fruit size, and marketable yield of bell pepper. The combination of 50g of vermicompost and 50ml of vermifoliar was the optimal treatment, yielding results comparable to chemical fertilizers.

CONCLUSION

Vermicompost represents a viable organic fertilization strategy for resource-limited farmers, reducing reliance on synthetic fertilizers and benefiting areas with poor soil fertility. Its adoption can increase yield, improve fruit quality, and promote better soil health. However, while effective, chemical fertilizers still yield the highest overall production, indicating that vermicompost may best serve as a complement in high-yield systems.

FUTURE WORK / REFERENCES

- Assess sustainability over multiple seasons.
- Evaluate long-term effects, conduct cost-benefit analyses, and explore on-farm scalability under diverse soil and climatic conditions.

References

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- Remolleno, J.M., & Radores, L.C. (2020). Growth and yield performance of bell pepper as applied.