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Short Communication

Agroindustrial Waste as Fertilizer for Vetiver Grass Grown in Bags

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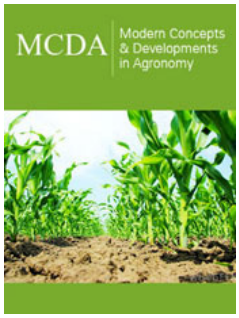

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Abstract

Vetiver essential oil is appreciated in perfumery, but its cultivation directly in the soil is detrimental to the harvesting process of its roots, as they are deep and dense, making it difficult to remove them from the soil. This work aimed to verify the influence of agroindustrial waste on the plant development of vetiver, grown in reused bags, filled with inert material to facilitate harvesting of the roots. Four agroindustrial waste doses (18, 36, 54 and 72L per bag) and the control treatment were evaluated, with four replications and five seedlings planted in each bag. After 90 days of planting the seedlings, the Largest Leaf Height (LLH) and Clamp Diameter (CD) were measured at 5cm from the ground. For LLH means there was no statistical difference. In CD measurements, control treatment was statistically equal only to the treatment with the lowest dose of waste and other treatments did not show statistical difference between them, with 95% significance, and the highest average CD was of the highest dose tested (72 L) of agroindustrial waste added to the bags, indicating its beneficial effect on vetiver cultivation.

Keywords: Vetiver grass; *Chrysopogon zizanioides*; Fertilizing; Essential oil; Growing conditions

Introduction

Vetiver (*Chrysopogon zizanioides*) is an evergreen grassy plant of Asian origin, more specifically from the southern Indian subcontinent, where the largest producers are still found India and Java. Vetiver is cultivated in the most diverse types of climates, especially tropical and subtropical, easily adapting to different types of environments. Vetiver essential oil is used in perfumery, as it provides stability to olfactory compositions. However, vetiver grass has varied uses in different areas, being used in bioengineering because it is capable of remediating highly toxic and degraded soils or regions of slopes and embankments, mainly due to the size of its roots, which can reach up to two meters deep. There are still studies on the use of its oil as a pesticide/acaricide [1].

Vetiver essential oil is also studied in pharmaceutical sciences as it has healing, sedative, antiseptic and even anti-cancer properties [2]. However, in Brazil the vetiver production is prioritized in bioengineering due to its excellent capacity for correcting soils and preventing landslides. The commercial exploitation of vetiver essential oil is still a challenge, due to the need for high energy costs for distillation (minimum of 5 hours), in addition to the difficulty in the process of harvesting its roots, as they are deep and dense, making it difficult for its removal from the ground. Thus, this work aimed to verify the influence of agroindustrial waste on the plant development of vetiver, grown in reused bags, filled with inert material to facilitate harvesting of the roots.

Material and Methods

The experiment was installed on October 21, 2023, at the State University of Maringá, Umuarama Campus, Technology Center. An amount of 20 big bags (capacity of 1053 L) were used, with five seedlings planted in each one, totaling 100 plots. Five treatments were

developed with four replications, in relation to the substrate composed of tree pod residues (chips) and agroindustrial waste, originating after decantation of the treatment waste of the olives industry.

The bags were filled with ¾ of their volume with tree chips (inert material) and different agroindustrial waste doses: 1) control (only tree chips) and addition of 2) 18 L, 3) 36 L, 4) 54 L and 5) 72 L of agroindustrial waste. After 90 days of setting up the experiment, the Largest Leaf Height (LLH) and Clamp Diameter (CD) were measured at 5cm from the ground, of each vetiver seedling planted in the bags. A Completely Randomized Design was considered, with Analysis of Variance of means and Tukey's difference test.

Result and Discussion

The chemical analysis of the agroindustrial waste indicated a high sodium content (1,108.97mgKg-1), with a possible effect on the salinity of the substrate [3], Justifying the importance of verifying a positive or negative effect of the agroindustrial waste used in this study as a source of organic matter. The data obtained for the plant development of vetiver in this study are in Table 1.

Table 1: Plant development of etiver with different doses of agroindustrial waste.

Treatments	Height of Largest Sheet (cm)	Clump Diameter at 5cm from the Ground (cm)
Control	85.7 a ± 3.02	4.1 b ± 0.58
18 L of agroindustrial waste	95.4 a ± 6.19	6.5 ab ± 0.60
36 L of agroindustrial waste	111.7 a ± 5.75	7.0 a ± 1.04
54 L of agroindustrial waste	99.2 a ± 37.77	7.5 a ± 2.08
72 L of agroindustrial waste	99.9 a ± 16.56	7.8 a ± 0.65

For the LLH means there was no statistical difference (p = 0.5507), but for the CD there was a statistical difference (p = 0.0025), both with 95% significance. It was possible to verify a growth trend in the vetiver clump as the dose of agroindustrial waste increased, with the largest average diameter obtained for the treatment of the addition of 72L of agroindustrial waste (7.8cm).

The control was statistically equal only to the lower dose treatment and the other treatments showed no statistical difference between them, with 95% significance. Therefore, agroindustrial waste demonstrated a positive influence on the plant development of vetiver grass.

Conclusion

The agroindustrial waste had a beneficial effect on the cultivation of vetiver in bags, with an increasing clump diameter according to the agroindustrial waste as the dose increased. Measurements will continue to be carried out every 90 days and for 18 months. The roots will be harvested, and the essential oil extracted, to verify the influence of the agroindustrial waste on the yield and chemical composition of vetiver essential oil.

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