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# EDGE EFFECT ON BIOFERTILIZED PLANTS OF ILEX PARAGUARIENSIS ST. HIL. (YERBA MATE)

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**RESUMO**

Introduction: The response of treatments in a field trial are affected by soil, weather, plant management, and treatments applied on neighbouring plots. Additionally, experimental parameters measured in the plants in the center and the ones on the edge of each plot are also known to show differences. This is referred to as 'edge effect' and is of interest for the interpretation of results since it can help in the selection of plants to be sampled and measured that are representative of the experiment. Biofertilizers are products composed of living microorganisms applied to crops to increase yield. Some of them can persist in the soil and exert their effect over a period, either by a direct effect or by altering the soil microbial communities in the vicinity of the plant roots. Objective: This study aimed to evaluate the edge effect on biofertilized plants of *Ilex paraguariensis* St. Hil. Methods: A field trial was performed with seven treatments: inoculation with two *Bacillus altitudinis* strains (19RS3 and T5S), *Kosakonia radicincitans* (strain YD4), and their combinations (19RS3/T5S, 19RS3/YD4, and T5S/YD4). Non-inoculated plants were included as a negative control. Experimental blocks were set in three parallel lines (right, centre, and left) of fifteen *I. paraguariensis* plants each. One non-inoculated line was used to separate the treatments. Roots of six-year-old plants were spray-inoculated with 100 mL of a bacterial suspension adjusted to 0.5 of McFarland's scale. Inoculation was repeated three times during November-December 2017 and again in September-October 2018. Plants were harvested in July 2018 and June 2019. The harvested leaves of each plant were weighed. Statistical differences were investigated by Analysis of Variance (ANOVA) using the software InfoStat version 2020 at a 0.05 significance level. Results: For 2018, the ANOVA showed a significant difference between the centre and border lines in each treatment (p= 0.0445). Fisher's Least significant Difference tests showed the centre lines to be different, with the highest yield per plant (means of 3.67 kg for the centre versus 3.00 and 3.23 kg for the borders), a value for the centre line up to 22.23 % higher than the borders. Although differences for 2019 were non-significant (p-value of 0.0645), a difference of up to 17.19 % was observed for the centre lines (3.00 kg per plant) compared to the borders (2.56 and 2.57 kg per plant). Conclusions: The presence of the edge effect in the field test on biofertilized plants of *I. paraguariensis* St. Hil was observed. Differences observed in 2018 could be explained by a synergistic effect in the centre lines due to the inoculation of the border lines. Plants in the centre would benefit not only from their inoculation but also from having inoculated plants in their

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proximity. The reduction in these differences during the following year could be explained by the pre-existing bacteria established in the soil, contributing to reaching an appropriate inoculum for the border lines. Knowledge of these differences will help in the design and analysis of future experiments to evaluate the effect of biofertilizers on *I. paraguariensis*.

**PALAVRAS-CHAVE**: Bacillus, biofertilizer, edge effect, field trial, Ilex paraguariensis



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