IV SIMPÓSIO INTERNACIONAL EM INVESTIGAÇÕES QUÍMICO-FARMACÊUTICAS

Área: TDP

EFFECT OF BIOCHAR FROM *Kappaphycus alvarezii* ALGAE ON THE DEVELOPMENT OF SOYBEAN (*Glycine max*)

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INTRODUCTION

The increasing demand for sustainable agricultural production has driven the search for alternatives to chemical fertilizers due to their adverse environmental impacts, such as soil and water contamination. *Kappaphycus alvarezii*, a macroalga rich in macronutrients, has been investigated as a raw material for biochar production aimed at agricultural fertilization. This study aimed to evaluate the effects of biochar derived from this alga on the vegetative development of soybean (*Glycine max*), considering different concentrations and their influence on germination and seedling growth.

MATERIAL AND METHODS

K. alvarezii biomass underwent drying and pyrolysis at 450°C for two hours. The resulting biochar was analyzed for granulometry, moisture content, and macro- and micronutrient composition per Normative Instruction No. 61. Soybean seeds were cultivated in substrates with varying biochar concentrations (0%, 0.15%, 1.5%, 7.5%, and 15%) in 500 mL containers. Germination was monitored over 21 days, and seedlings were evaluated for root length, fresh and dry biomass, and leaf area.

RESULTS

Biochar characterization revealed high levels of potassium (29.11%), sulfur (10.58%), and boron (0.02%), while nitrogen, phosphorus, calcium, and magnesium levels were below the established standards. Granulometric analysis showed compliance with regulatory requirements, with 100% of the particles passing through a 10-mesh sieve. In the agronomic trial, the 0.15% concentration resulted in the highest leaf development (58.87 cm^2) and fresh biomass (0.42 g), while the 1.5% concentration compromised growth, resulting in the shortest root length (1.30 cm).

CONCLUSIONS

The results indicate that biochar derived from *K. alvarezii* has potential as a soil conditioner, particularly at low concentrations. However, high concentrations may inhibit seedling growth, possibly due to nutrient retention and osmotic effects. Combining biochar with other fertilizer sources may be a strategy to optimize its application in agriculture.