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{ENHANCING THE MECHANICAL PROPERTIES OF KENAF FIBER REINFORCED  
SODIUM ALGINATES BIODEGRADABLE POTS}

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**ENHANCING THE MECHANICAL PROPERTIES OF KENAF FIBER-  
REINFORCED SODIUM ALGINATES BIODEGRADABLE POTS**

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## ABSTRACT

### ENHANCING THE MECHANICAL PROPERTIES OF KENAF FIBER-REINFORCED SODIUM ALGINATES BIODEGRADABLE POTS

The rapid use of conventional plastic pots in agriculture and horticulture has raised significant environmental concerns due to their non-biodegradability. Biodegradable alternatives, while environmentally friendly, often lack sufficient mechanical strength to handle soil, water, and plants. This study focuses on improving the mechanical strength of biodegradable pots made from sodium alginate by reinforcing them with natural kenaf fibers. Kenaf fibers were extracted from the bark and core of kenaf stalks. They were chemically treated with 5% NaOH and 2% (APTES) silane to improve surface properties, then pulverized to produce a homogeneous mixture. The treated kenaf fibers at varying kenaf fiber weight were mixed with fixed 2.5 g of sodium alginate, 1ml glycerol was added as a plasticizer, and calcium chloride solution was sprayed to harden the biodegradable pot. The tensile properties of the biodegradable pots were examined using a tensile test. Chemical properties of treated and untreated fibers and the fabricated pots were analyzed using FTIR, while physical properties such as water absorption, density, and biodegradability were also evaluated. Tensile testing revealed that the strength of the biodegradable pots reinforced with 5% NaOH and 2% (APTES) Silane treated kenaf fibers showed higher tensile strength than those with untreated kenaf fibers, with the optimum fiber weight within the studied range at 10g. A further increase to 15 g resulted in reduced mechanical properties, which was attributed to fiber agglomeration and void formation. Statistical analysis using ANOVA confirmed that both the chemical treatment of kenaf fibers and the fiber content had a significant influence on tensile strength. Water absorption of the biodegradable pots decreased with increasing kenaf fibers contents, indicating improved moisture resistance, and soil burial tests confirmed that all pots were biodegradable and the incorporation of kenaf fibers increased their resistance to deterioration. The results suggests that treated kenaf fiber-reinforced sodium alginate pots are mechanically robust, moisture resistant, and environmentally friendly, offering a sustainable alternative to conventional plastic pots.

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