# Kenaf (*Hibiscus cannabinus*): A Sustainable Source of Horticultural Growth Media

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## Abstract

Kenaf is an herbaceous annual, soft fiber crop that may have the potential for commercial success in the state of Florida due to the high yields that can be obtained in the state's warm climate. The core of the crop, usually a waste by-product created during fiber production, can be utilized as growth media for containerized plants when pulverized, exhibiting properties comparable to that of peat moss. The commercial horticulture industry is heavily reliant on peat moss as a potting medium. However, peat moss releases carbon emissions into the atmosphere during harvest and during transportation, making it a contributory factor to climate change. Kenaf core could act as a sustainable alternative to peat moss. Furthermore, every part of the kenaf plant can be utilized in various industries: the fibers for papermaking, the seeds in oil production, the core as a growth media, and the leaves for livestock feed. The versatility of this crop could make it a valuable cash crop for the southeastern United States.

## Introduction

Fiber crops are an important group of agricultural crops due to the diverse applications that the raw materials provide. They have been used for centuries to make cordage, twine, and textiles. More recent findings indicate fiber crops can be used to produce pulp and paper, animal feed, and composites for infrastructural and automotive uses (Killinger, 1969).

Kenaf is a soft fiber crop that is commercially grown in various countries around the world, such as India and China. There is also a substantial amount of research being performed in Malaysia on using kenaf for bioenergy. The crop has potential to have a high commercial value in the state of Florida. It can be grown in a diverse range of conditions and has a high resistance to drought (Maiti, 1997). With its warmer climate, the southeastern United States could benefit from the growth of this crop.

*Hibiscus cannabinus.* Retrieved 02/05/23 from: https://en.wikipedia.org/wiki/Kenaf#/media/File:Hibiscus_cannabinus0.jpg

The useful parts of kenaf include the seed, the leaves, the flowers, and the stem, which consists of two parts: the outer bast layer and the inner core layer. The inner core layer, when pulverized into fine or coarse pieces, was analyzed in various studies to determine its ability to act as a partial replacement for peat moss. The commercial cultivation of this crop means the core can be utilized, rather than thrown into landfills as a waste by-product. Moreover, the success of the core as a potting media means it could be used by the horticultural industry as a partial peat moss replacement in various types of plants.

The goal of this study is to outline that kenaf media can act as a suitable replacement for traditional potting media, specifically peat moss. This would show that it could act as a sustainable alternative and the horticultural industry would become less dependent on peat, which would lead to a reduction in carbon emissions overall.

## Objectives

- Analyze ground kenaf core as a replacement for potting media in containerized plants.
- Examine the potential of kenaf to act as a sustainable alternative for peat moss in the horticultural industry.

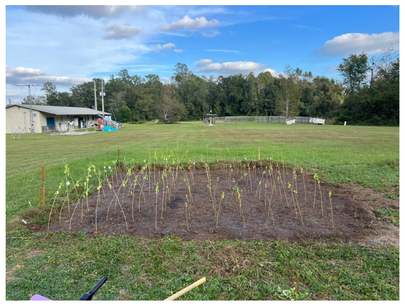
## Methods

***Literary Analysis***

- A literature review was conducted and data was obtained from various cited research articles.

***Field Study***

- 134 kenaf seeds of the "whitten" variety were planted in the greenhouse at the BEST Lab for observational and learning purposes.
- After germination, the nursling kenaf plants were transferred to a small field and planted in the ground.



## Results

- Wang (1994) found that the quality of plants grown in kenaf media was very good to excellent, greater than those grown in commercial media.
- Producing various potted tropical foliage and wooded nursery crops in 70-80% coarse-grained kenaf showed similar or greater growth than producing it in two popular commercial mixes (Wang, 1994).
- High amounts of fine kenaf media resulted in an an unacceptable amount of shrinkage. Reducing the proportion of fine kenaf to 70% and adding coarse kenaf media or peat moss yielded shrinkage like that of the commercial mixes used (Wang, 1994).


Fig. 1. Appearance of hibiscus roots 221 days following transplanting on the surface and in (**A**) a medium consisting of 70% coarsely ground kenaf stem core and 30% peatmoss or (**B**) a commercial medium (Sunshine no. 1) . Media were inverted to show the root coverage at bottom (now top).

- Root coverage of hibiscus plants appeared to be much denser in a medium consisting of 70% coarse kenaf and 30% peat moss than the commercial medium Sunshine no. 1 (Fig. 1) (Wang, 1994).

- Webber *et al.* (1999) compared fine- and coarse-grade kenaf in various ratios with peat moss and and perlite in growing periwinkles.
- Results (from Table 3) showed a 1:1 ratio of coarse-grade kenaf and peat moss was most consistent in periwinkle yield in comparison with the control, a 1:1 ratio of pine bark and peat moss (Webber *et al.*, 1999).

Table 3
Plant height, shoot weight, and total plant weight for Study 1 and height, canopy diameter, and shoot weight for Study 2 at harvest for 1993 and 1995

| Study 1 Potting medium[a] | Height (cm) 1993 | Height (cm) 1995 | Shoot dry wt. (g) 1993 | Shoot dry wt. (g) 1995 | Total dry wt. (g) 1993 | Total dry wt. (g) 1995 | Study 2 Potting medium[b] | Height (cm) 1993 | Height (cm) 1995 | Canopy dia. (cm) 1993 | Canopy dia. (cm) 1995 | Shoot dry wt. (g) 1993 | Shoot dry wt. (g) 1995 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1KF:1PM:1P | 20.1 | 36.9 | 3.8 | 4.3 | 6.4 | 5.2 | 1KC:1PM | 25.0 | 36.8 | 21.7 | 20.0 | 4.49 | 3.47 |
| 2KF:1PM:1P | 20.3 | 31.9 | 3.5 | 3.7 | 5.5 | 4.7 | 2KC:1PM | 26.0 | 30.7 | 23.5 | 17.2 | 4.15 | 3.02 |
| 3KF:1PM:1P | 19.8 | 30.3 | 3.3 | 2.7 | 5.3 | 3.6 | 3KC:1PM | 25.2 | 26.5 | 21.1 | 13.8 | 3.76 | 1.75 |
| 1V:1PM:1P | 29.3 | 37.4 | 8.9 | 4.9 | 12.0 | 5.8 | 1B:1PM | 18.9 | 37.6 | 21.0 | 20.7 | 3.78 | 4.44 |
| LSD (0.05) | 4.4 | 3.7 | 1.4 | 0.8 | 1.9 | 1.0 | LSD (0.05) | 2.0 | 3.2 | 1.9 | 2.4 | 0.26 | 0.93 |

[a] KF, kenaf (fine-grade); PM, peat moss; P, perlite; and V, vermiculite.
[b] KC, kenaf (coarse-grade); PM, peat moss; and B, pine bark.

- Both Webber *et al.* (1999) and Wang (1994) demonstrated that pulverized kenaf used in their experiments resulted in an increased air porosity and decreasing container capacity, indicating that additional irrigations are required as kenaf percentage increases.
- The field study performed showed that kenaf can grow at a fast pace in the proper conditions. The most growth occurred when Fertilome potting mix was used.

## Conclusions

The results from the experiments demonstrate that ground kenaf, specifically coarse-grade, has the potential to act as a suitable containerized growth medium component in producing high-quality greenhouse and nursery crops. These results indicate that ground kenaf may be suitable as a sustainable replacement in horticultural growth media, meaning that a much lower amount of peat moss would be required and carbon emissions from peat moss production would decrease overall.

In the future, more research should be conducted on using kenaf media for different types of potted plants, rather than the ones outlined in these experiments. Research should also be conducted analyzing how the plants would react in the postharvest phase under interior and retail conditions. As kenaf research continues to be explored, the possibilities for it to become a commercial crop in Florida will increase.

## References

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