



Production of Eco-friendly handmade Pulp and Paper from *Cynodon dactylon* grass

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Abstract

The main objective of the present work is using non-wood fibre material collected from religious waste for the production of eco-friendly handmade pulp and paper. Pulps are prepared from *Cynodon dactylon* grass, the grass mainly used in a Ganesh puja as a Durva. The Religious waste is a useful source of production of eco-friendly paper. Preparation of eco-friendly paper requires less time, less energy and low cost. The handmade grass paper can be a good alternative for wood fibre paper production industries

key words- *Cynodon dactylon* grass, Non-wood fibre, Eco friendly Paper

Introduction

In India the demand for paper is tremendously increasing. Paper is an important part of life. For the production of paper requires hard wood as material, but insufficient wood fibre material is available to meet demand. Hurter W R et al., (1998) suggested non-wood fibre is a good alternative for pulp production compared to wood fibre. Worland J. et al., (2015) reported that billions of trees are cut down each year for the production of pulp and paper and, on the other hand, it is almost impossible to imagine life without paper. The *Cynodon dactylon* grass is used tremendously in religious activities like God Ganesh festival, Goddess Durga festival & other religious activities.

The main objective of the work is using religious waste as raw materials to produce non-wood fibre paper. Laurjssen et al., (2010) explained the benefits of waste paper recycling & manufacture of handmade paper reduces environmental pollution, maintain ecological balance.

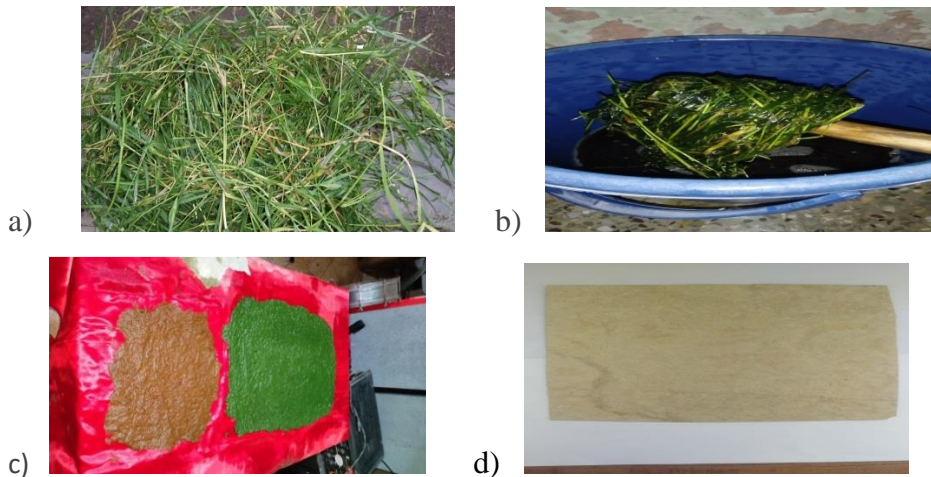
The purpose of this work is to produce handmade eco-friendly non-wood fibre trees, to conserve & protect forest trees & maintain environmental balance.

Materials & Methods

Pulping Process of *Cynodon dactylon* grass -

The *Cynodon dactylon* grass is used for the preparation of Pulp & paper. The healthy & fresh *Cynodon dactylon* was chopped into small pieces & washed with tap water. After washing, soak in NaOH for 2 to 3 hours. Prepared Pulp materials were dried in sunlight for 2-3 hours. After that, paper sheets are made manually.

Fig-1) Pulping Processing Photographs-

a) *Cynodon dactylon* grass

b) Pulp processing

c) *Cynodon dactylon* grass Pulp

d) Sample Paper

Results and Discussion

Comparison of Physical properties of *Cynodon dactylon* grass paper & Industrial Paper summarized in Table-1). It was observed that quality *Cynodon dactylon* grass paper is equivalent to other industrial paper. The preparation of pulp & paper from grass is a very easy, quick & low-cost process. *Cynodon dactylon* grass paper can be an effective alternative for wood fibre material. The grass paper prepared by mixture of Religious waste & chemical NaOH. Sonia rani et al.(2018) explained the simple manufactured process to produce Pulp & paper form *Cymbopogen caesius* grass, its good alternative to wood fibre pulp.

Another worker explained the manufacture process of handmade paper from non-wood fibre (Mohhub Alam et al., 2018; Hurter W R et al., 1998; Ververis C et al., 2004; Yehia Fahmyet al et al 2017) the main benefits of handmade grass paper to reduce deforestation & recycling religious waste.

Angzzass sari et al. (2015) suggested Cogon grass is a suitable alternative fibre for pulp and paper. Cogon grass content: Cellulose and Hemicellulose, Cogon grass fibre compact, abundances, long fibre and high strength.

This study attempts to contribute to protecting the global environment and economy by producing eco-friendly handmade paper and various paper products from *Cynodon dactylon* grass.

Table-1) Comparison of Physical properties of *Cynodon dactylon* grass paper & Industrial Paper

Sr. No.	Quality	Eco-Friendly Paper	Industrial Paper
1.	Texture	Rough	Soft
2.	Sharpness	No	Yes
3.	Colour	Light green and pale yellow colour	White and multicolor
4.	Foldable	Yes	Yes
5.	Writing	Yes	Yes
6.	Erase	Yes	Yes
7.	Drawing	Yes	Yes
8.	Bio-degradable	Yes	Yes
9.	Pollution Free	Yes	Yes
10.	Environmental Free	Yes	Yes

Table-2) The required amount of raw materials to produce A4 size handmade paper of *Cynodon dactylon* grass paper

Sr.No.	Materials	Quantity
1	100 Gram Grass+ 100MI Water+ 3-5 Gm Caustic Soda(NaOH)	2 Paper (A4 Size)
2	1 Kg Grass & 1Liter Water 13-15Gram Caustic Soda(NaOH)	20-22 Paper (A4 Size)
3	10 Kg Grass 5 Liter Water 50-60 Gram Caustic Soda(NaOH)	220-230Paper (A4 Size)

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