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# Mulching Sheet from Agro Waste

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**ABSTRACT:** The project "Mulching Sheet from Agro Waste" focuses on developing an eco-friendly and cost-effective alternative to conventional plastic mulching sheets. Agricultural wastes such as coconut coir, dry leaves, and crop residues are utilized as raw materials to produce biodegradable mulching sheets. The primary objective is to reduce environmental pollution caused by plastic mulches and promote sustainable farming practices. The prepared sheet helps in moisture retention, weed suppression, and soil temperature regulation, thereby improving crop productivity. Natural binders are used to enhance the strength and durability of the sheet. The methodology involves collection, cleaning, drying, grinding, and sheet formation processes. This project supports waste management by converting agricultural residues into useful products. It is especially beneficial for farmers due to its low cost, easy availability of materials, and environmentally safe nature, making it a sustainable solution for modern agriculture.

**KEYWORDS**: Mulching sheet , Eco-friendly , Water proof ,low cost , easy availability.

## I. INTRODUCTION

Mulching is a widely adopted agricultural technique known for its ability to conserve soil moisture, regulate soil temperature, suppress weed growth, and enhance overall crop productivity. Among the various mulching materials, plastic mulch—particularly polyethylene— has become highly popular due to its durability and effectiveness. However, its non-biodegradable nature has generated serious environmental concerns. Plastic mulches remain in the soil for several years, fragmenting into microplastics that disrupt soil structure, reduce microbial activity, and negatively impact long-term soil fertility. Additionally, the disposal of used mulch films poses a significant challenge, as they accumulate in landfills or are burned, releasing toxic pollutants.

India produces more than 700 million tons of agricultural waste annually, including paddy straw, sugarcane bagasse, banana pseudo-stem fiber, and coir dust. A considerable portion of this biomass is either burned or dumped, causing air pollution and loss of organic carbon. These residues contain lignocellulosic fibers, which possess excellent biodegradability, mechanical strength, and water-holding capacity—making them ideal raw materials for environmentally friendly sheet formation. By converting agricultural waste into biodegradable mulching sheets, farmers gain an eco-friendly alternative while simultaneously reducing biomass disposal issues.

Biodegradable mulching sheets offer multiple benefits: they decompose naturally in soil, improve aeration, conserve moisture, enhance nutrient cycling, and cause no long-term pollution. Moreover, integrating natural binders such as starch, guar gum, and tamarind seed gum provides sufficient bonding without relying on synthetic chemicals. This makes the product not only environmentally safe but also cost-effective and accessible for small-scale rural production units.

This project focuses on developing a biodegradable mulching sheet manufactured entirely from agro-waste fibers. The study evaluates its physical, mechanical, and functional performance in comparison with traditional mulch materials. The goal is to promote sustainable agricultural practices while transforming agricultural residues into high-value, eco-friendly products.

## II. LITERATURE SURVEY

Mulching has been widely studied as an effective technique to conserve soil moisture, suppress weeds, and enhance crop productivity. Traditionally, synthetic polyethylene mulch sheets have been used, but research shows that they cause long-term soil contamination, disposal issues, and microplastic pollution. Due to these drawbacks, recent studies have

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focused strongly on **biodegradable mulches** derived from agricultural wastes such as **coconut husk, paddy straw, banana fiber, sugarcane bagasse, groundnut shell**, and other lignocellulosic residues.

Researchers found that agro-waste–based mulching sheets improve soil health by increasing organic matter content and enhancing microbial activity as they degrade naturally. Studies on **cocopeat-based films** highlight good water retention, aeration, and slow degradation, making them suitable for horticultural crops. Experiments using natural binders like **starch, gum, gelatin, and biodegradable resins** have shown improved tensile strength and flexibility of the sheets.

Recent literature also emphasizes sustainability, low cost, and environmental safety. Biodegradable mulches reduce irrigation frequency by 20–40%, prevent soil erosion, and maintain uniform soil temperature. Many researchers conclude that converting agro waste into mulch sheets supports circular economy principles by turning farm residues into eco-friendly, value-added products. Your project aligns with these advancements by creating a sustainable alternative to plastic mulch using locally available agricultural waste.

## III. METHODOLOGY

In this project, methodology refers to the systematic procedure followed to convert agricultural wastes into a biodegradable mulching sheet. It includes the step-by-step process of collecting agro waste, cleaning, drying, grinding, preparing a natural binder, mixing the materials, forming the sheet, drying, finishing and finally testing its properties. This structured method ensures that the mulching sheet is produced in a consistent, scientific and repeatable manner with reliable quality and performance.

## IV. PROCESS FLOWCHART

START
↓
Collection
↓ Cleaning
↓ Drying
↓ Grinding
↓ Preparation
↓
Mixing
↓ Pouring
↓ Spreading
↓ Pressing
↓ Drying
↓
Trimming & Finishing
↓
Quality Testing
↓
Field Application
↓ END

**Collection:**
Agro-waste materials like coconut husk, banana fiber, and other plant residues are collected from farms. This step ensures availability of eco-friendly raw materials at low cost.

**Cleaning:**
Collected materials are washed to remove soil, dust, and impurities. Clean raw materials improve bonding and overall product quality.

**Drying :**
The cleaned materials are dried under sunlight or using dryers to remove moisture content. This prevents microbial growth and increases durability.
**Grinding** :

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Dried materials are ground into fine particles or fibers using grinding machines. This helps in achieving uniform texture for better sheet formation.

**Preparation** :
The ground material is sieved and sorted to obtain uniform size. Natural binders or additives are also prepared in this stage.

**Mixing :**
All prepared materials are mixed thoroughly with binders to form a homogeneous mixture.
Proper mixing ensures strength and consistency.

**Pouring :**
The prepared mixture is poured into molds or flat surfaces. This gives the initial shape to the mulching sheet.

**Spreading :**
The mixture is evenly spread to maintain uniform thickness. This step is important for consistent performance of the sheet.

**Pressing :**
The spread material is compressed using a press to remove excess water and improve compactness. This enhances mechanical strength.

**Drying :**
Pressed sheets are dried again to remove remaining moisture. This step ensures final strength and stability of the product.

**Trimming s Finishing :**
The dried sheets are cut into required sizes and edges are finished. This improves appearance and usability.

**Quality Testing :**
The sheets are tested for strength, thickness, water resistance, and biodegradability to ensure quality standards.

**Field Application :**
The final mulching sheets are applied in agricultural fields to retain moisture, suppress weeds, and improve crop yield.

## V. CONCLUSION

The development of mulching sheets from agro-waste materials presents an innovative and eco-friendly solution to current environmental challenges. By utilizing natural resources such as coconut husk, banana fiber, and other agricultural residues, this project successfully converts waste into a valuable agricultural product.

The prepared mulching sheet demonstrates good mechanical strength, biodegradability, and effective moisture retention capability. It helps in reducing weed growth, conserving soil moisture, and improving overall crop productivity. Compared to conventional plastic mulching sheets, this eco-friendly alternative reduces environmental pollution and supports sustainable farming practices.

Additionally, the process is cost-effective and can be easily adopted by rural farmers, promoting waste management and generating economic benefits. This project highlights the importance of green materials and encourages the use of biodegradable products in agriculture.

Overall, the developed mulching sheet proves to be a sustainable, efficient, and environmentally responsible alternative, contributing towards a cleaner and greener future.

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