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## Mulching Paper in Modern Agriculture-A Review

\*<sup>1</sup>Jayshree V Chopade, <sup>2</sup>Ajay Dakh, <sup>3</sup>Akash Devarangadi, <sup>4</sup>Akshay Ghare and <sup>5</sup>Saurabh Madane

\*<sup>1, 2, 3, 4, 5</sup>Department of Mechanical Engineering, Pimpri Chinchwad College of Engineering & Research, Ravet, Pune, Maharashtra, India.

### Abstract

Mulching paper has emerged as a transformative practice in modern agriculture, revolutionizing traditional farming techniques and contributing to sustainable and efficient crop production. Mulching paper, typically made from biodegradable materials such as recycled paper or natural fibers, serves as a protective layer on the soil surface. It plays a crucial role in weed suppression, moisture conservation, soil temperature regulation, and nutrient retention. By effectively suppressing weed growth, mulching paper reduces competition for resources and minimizes the need for herbicides, promoting healthier crops. The mulching paper contributes to nutrient retention in the soil. It helps prevent the leaching of essential nutrients, ensuring their availability to plants for sustained growth and productivity. Over time, the biodegradable nature of the mulching paper enriches the soil's organic matter content, improving soil fertility and enhancing long-term sustainability.

**Keywords:** Mulching, agriculture, paper mulch, weeds, crop production

### 1. Introduction

In modern agriculture, the mulching paper has emerged as a ground-breaking practice that revolutionizes traditional farming techniques and offers a pathway to sustainable and efficient crop production. By utilizing biodegradable materials, such as recycled paper or natural fibers, mulching paper serves as a protective layer on the soil surface. Its multifaceted benefits, including weed suppression, moisture conservation, soil temperature regulation, and nutrient retention, have made it an invaluable tool for farmers seeking improved yields, reduced environmental impact, and long-term agricultural sustainability. Conventional weed control methods in agriculture often rely on herbicides, which can have detrimental effects on the environment and human health. However, the mulching paper presents a promising alternative by effectively suppressing weed growth and

mitigating resource competition between weeds and crops. Acting as a physical barrier, mulching paper hinders the emergence and development of unwanted plants, minimizing the need for herbicides and fostering the vitality and productivity of cultivated crops.

#### 1.1. Types of Mulching

There are two types of mulches depending upon the material used for mulching. They are as under:

a) **Organic Mulches:** Natural materials such as trim buildups & products, cultivate yard excrement & by-items of the timber industry, when utilized for mulching, are known as organic mulches: Natural mulches make no post-utilization transfer issue but their accessibility is an issue [1].



Fig 1: Different organic mulches

**b) In-Organic Mulches (Plastic Mulches):** Inorganic materials such as plastic movies are known as inorganic mulches when utilized for mulching. Whereas characteristic mulches may not be accessible at all times & places, plastic mulches can be made accessible in several colors & thicknesses to get specified comes about [1]. Inorganic mulches comprise manufactured materials- plastics, scene textures (geotextiles), stones, and rocks. They are for the most part utilized since the materials don't break down, or they break down after amplified periods. In this way, substitution costs are diminished. Natural mulches are the more favored choice due to their soil moving forward qualities, but inorganic choices have their put.



Fig 2: Plastic Mulch

**2. Effect of Mulching on Weed Control**

The manual hand row weeder may be effective up to 40 days after transplanting, but it requires a lot of labor. On the other hand, the row weeding machine can reduce labor requirements, but it can only be used up to 30 DAT in SRI fields due to the potential damage to the lateral vegetative parts of the rice crops. Additionally, the width of the weeders may not allow for the removal of all infested weeds within the rows, leading to harmful competition with the plants [2]. Overall, mulching can be an effective strategy for weed control and can provide other benefits for the soil and plants. The type of mulch used and the application method will depend on the specific crop and growing conditions, but mulching can be a valuable tool in an integrated weed management program [4].

**2.1. Biodegradable Mulches**

It's important to note that the effectiveness of biodegradable mulches for weed management can depend on several factors, including the type and thickness of the mulch, the type of weed species present, and the timing and method of application. In some cases, additional weed management practices may be necessary to achieve effective weed control. Overall, the use of biodegradable mulches can be a promising and environmentally friendly approach to weed management, but further research is needed to optimize their effectiveness and develop integrated weed management strategies that can maximize their benefits.

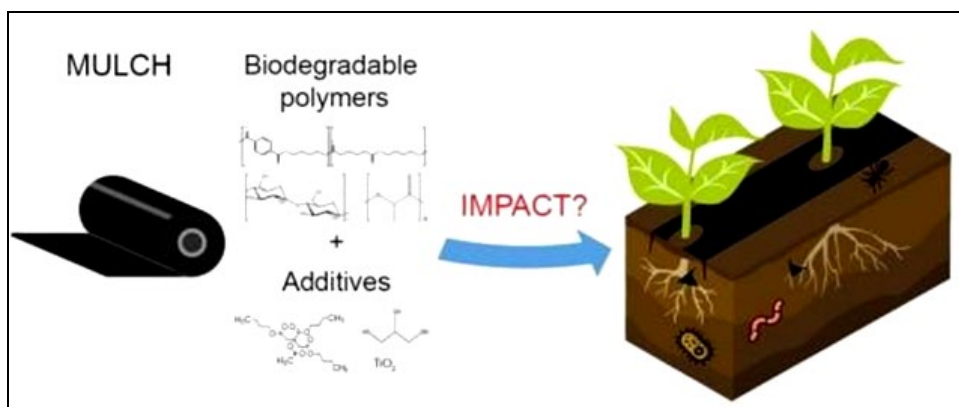


Fig 3: Biodegradable mulches

**2.2. Non-Biodegradable Mulches**

Non-biodegradable film mulches can provide a long-lasting physical barrier that effectively blocks light and suppresses weed growth. Additionally, black films can help raise soil temperature and retain soil moisture, promoting plant growth and fruit quality in crops such as strawberries and watermelons [8].

While non-biodegradable films such as silver-black PE films can provide benefits for crop production, their environmental impact must be carefully considered.

Biodegradable mulch films offer a more environmentally sustainable alternative and should be considered as part of an integrated approach to weed management and crop production [12].



Fig 4: Non-biodegradable mulch

**Table 1:** Type of Mulch according to the need

Sr. No	Condition	Mulch Paper
1	Rainy season	Perforated mulch
2	Orchards	Thick Mulch
3	Solarisation	Thin, transparent
4	Summer crop	White film
5	Insect control	Silver film
6	Seed germination	Thinner film
7	Weed Control with Solarisation	Transparent mulch

[<https://www.agrifarming.in/types-of-mulching-advantages-of-mulching>]

**3. Different Ways for Spreading Mulching**

**3.1. Manually Mulching**

The bed was previously covered with mulch paper and drip lines using labor. To perform this operation, two to three persons are required to lay mulch over the soil bed, while two more people are required behind them to shovel the soil onto the edges of the mulch bed and manually punch holes by bending. Punching holes by continually bending makes work hard and could result in back pain problems. Round holes are made at the center of the film using a punch or a bigger diameter pipe and a hammer or a heated pipe end could be used. The lack of available workers is a major issue in this atomized environment. The challenge of physically laying the mulching paper limits the usage of this method in India, despite its age and versatility. This results from the scarce workforce supply and high labor costs. There is automatic machinery, but either India does not have access to them or only large-scale farming uses them. The procedure to resolve this issue takes additional time. One machine is being built at the moment; it operates when coupled to a tractor. The challenge of physically laying the mulching paper limits the usage of this method in India, despite its age and versatility



**Fig 5:** Mulch spreading with the help of labor

**3.2. Bull-Cart Mulching**

A bull-drawn machine for laying paper mulch. The primary object of the invention is to provide the machine of simple, inexpensive construction, which is adapted to unroll paper mulch upon previously prepared soil while concurrently scraping aside a relatively thin layer of the surface soil from the path of the mulching paper. - the soil upon the passage of the machine, automatically falling and overlapping the edges of the paper which has been previously unrolled upon the ground without the employment of mechanical means for turning the soil over the marginal edges of the paper as the machine is drawn in a forward direction by horse or other power. [United States Patent Office 1930]

These consist in providing means whereby the roll of paper may rest directly upon the ground, that may follow the contour of the ground, and be always in contact with its surface. The V-shaped shield-scrapers are adapted to force to

each side a relatively thin layer of the surface soil as the machine is driven in a forward direction-the soil being supported from falling into the path of the mulching paper by the walls of the shield-scraper and the adjustable tailpieces, hinged to the end of the latter. Upon the passage of the machine, the soil scraped to each side of the surface, afterward covered by the mulch, automatically falls over and upon the marginal edges of the previously laid mulch paper, thus securing the latter against displacement by wind or other natural causes.



**Fig 7:** Bull-cart mulching

**3.3. Tractor Mulching**

The majority of agricultural operations, including irrigation, land expansion, sowing, threshing, and transport, are frequently carried out by tractors, which have emerged as one of the essential power sources in modern agriculture. Tractors help shorten the necessary time. It is currently a significant component of mechanized farming.

A device for putting plastic mulch with a tractor has been created. It was created to automate the current plastic mulching process. It shortens the time needed for the mulching procedure. More regularly, the tractor needs to be adjusted with the bed. The drip emitter should be turned up towards the plastic mulch as the drip roller is fitted onto the drip roll carrier. Before beginning to lay the plastic mulch, the drip lateral and plastic mulch were positioned beneath the press wheel assembly. To create airtight plastic mulched soil beds, the soil covering assembly was correctly adjusted to lift and push the dirt over the edges of the plastic. Press wheels have been designed to correctly stretch the plastic at the bottom of the trench rather than on the side. These tasks become highly laborious, time-consuming, and boring when performed manually.



**Fig 6:** Tractor Mulching

## Conclusion

Mulching paper is a valuable tool in modern agriculture, providing multiple benefits that contribute to improved crop quality, higher yields, and more sustainable farming practices. Its weed suppression, moisture conservation, temperature regulation, and soil health enhancement properties make it a valuable addition to farmers' toolboxes, helping them achieve better results while minimizing the use of chemical inputs and conserving natural resources.

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