

Use of Hydromulch in Agriculture

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Introduction

Agriculture is the backbone of our global food supply, and ensuring its sustainability is crucial for a growing population and a changing climate and the adoption of plastic films for mulching has represented a significant advancement in enhancing agricultural yields (Kasirajan *et.al.*,2012), particularly in regions where water availability and environmental conditions are limiting factors. This practice dates back to the 1950s, driven by its capacity to elevate soil temperature.

These soil covers offer various benefits such as increasing overall crop yields, mitigating soil erosion, and controlling weed growth. Furthermore, mulches influence soil temperature and structure, creating a microclimate that optimizes water and fertilizer utilization while altering the soil's energy balance. The predominant choice for mulching material is low-density polyethylene (LDPE) due to its favourable physical properties, including impact resistance, processability, thermal and chemical resistance, flexibility, and water impermeability (Kader *et.al.*, 2017). Additionally, LDPE is economically viable. However, the use of LDPE raises significant environmental concerns because its production relies on fossil fuels and it poses challenges as a non-biodegradable material, resulting in waste accumulation and adverse ecological consequences.

The excessive use of LDPE mulches has led to the accumulation of substantial amounts of plastic waste, creating environmental issues within agricultural ecosystems. After their intended use, a large portion of these mulches (approximately 80%) ends up in landfills or natural ecosystems. Fragments of plastic from these waste materials can be discovered in soils, water sources, and even organisms, including humans, which has implications for both the environment and human health. One innovative method that has gained prominence in recent years is the use of hydromulch in agriculture. Hydromulches have been proposed as an alternative to plastic mulches made of LDPE. Hydromulch can be defined as a mixture of water



with some type of lignocellulosic material or polymers, plus other additives suitable for the particular purpose, which is applied not as a film but as a liquid (Cline *et.al.*,2011).

Hydromulch, also known as hydroseeding, is a mixture of water, mulch, seeds, and additives that is sprayed over the soil surface to promote vegetation growth. This practice offers several advantages that can significantly benefit modern agriculture.

Components of hydromulch

1. **Water:** The base of the mixture, water provides the medium for seed germination and initial plant growth.
2. **Mulch:** Mulch is typically made from a combination of wood, paper, or straw, and serves as a protective layer that conserves moisture, stabilizes the soil, and provides a barrier against erosion.
3. **Seeds:** The chosen seeds, such as grass or cover crop seeds, are an essential part of hydromulch and germinate within the mulch layer.
4. **Additives:** These can include fertilizers, tackifiers, and bonding agents, which enhance the effectiveness of hydromulch.

Benefits of Hydromulch in Agriculture:

1. **Erosion Control:** One of the primary benefits of hydromulch is its ability to prevent soil erosion. The mulch layer acts as a shield, reducing the impact of wind and water, which can displace soil and valuable nutrients. This is especially important in hilly or sloped agricultural areas.
2. **Moisture Retention:** Hydromulch helps retain moisture in the soil, reducing the need for frequent irrigation. This not only conserves water but also creates a more stable and hospitable environment for plant growth.
3. **Seed Germination:** The combination of moisture, protection, and nutrients from additives creates an ideal environment for seed germination. This results in healthier and more uniform plant growth.
4. **Soil Health:** Hydromulch contributes to soil health by enhancing organic matter and nutrient content. As the mulch decomposes, it enriches the soil, making it more fertile over time.



Fig 1: An example showing how hydromulch is used for restoration of lawn/garden at faster rate

Applications in Agriculture

1. **Reseeding:** It's commonly used to reseed pastures, lawns, or crop fields, promoting the establishment of new vegetation.
2. **Land Rehabilitation:** Hydromulch is effective in reclaiming eroded or degraded land, restoring it to productive agricultural use.
3. **Slope Stabilization:** On steep slopes or embankments, hydromulch helps control erosion and stabilizes the soil, reducing the risk of landslides.
4. **Roadside Vegetation:** It's used for roadside re-vegetation, where quick growth and erosion control are essential.

Environmental Impact

1. **Erosion Reduction:** By preventing soil erosion, hydromulch helps protect water bodies from sedimentation and reduces the need for chemical erosion control measures.
2. **Water Quality:** It enhances water quality by reducing sediment runoff, which can carry pollutants into streams and rivers.
3. **Sustainable Practices:** Hydromulch aligns with sustainable agricultural practices by conserving water, enhancing soil health, and reducing the need for chemical fertilizers.

Challenges and Considerations



While hydromulch has numerous advantages, it's essential to consider factors like cost, maintenance, and potential invasive species that may be introduced through seed application. Additionally, proper equipment and expertise are required for effective application.

Conclusion

The use of hydromulch in agriculture represents an innovative and sustainable approach to addressing soil erosion, enhancing moisture retention, and promoting seed germination. Its applications are diverse, ranging from reseeding to land rehabilitation and slope stabilization. As agriculture continues to adapt to evolving environmental challenges, hydromulch offers a valuable tool to boost sustainability and crop yield while minimizing its impact on the environment. Embracing this technology can contribute to a more resilient and eco-friendly agricultural future.

Reference

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