Agricultural Plastics

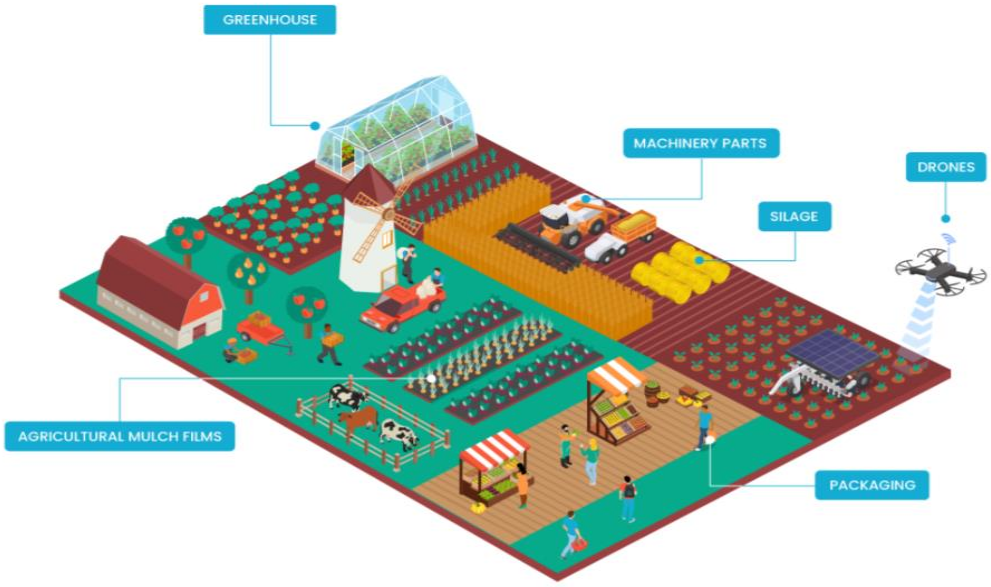
Sector-specific Approaches to Plastic Pollution and Product Design

1. The Role of Plastics in Agriculture

Plastics play a crucial role in modern agriculture, including plant production, livestock management, and aquaculture. Their use spans globally, though the types and extent of their use vary by region and country. This variation depends on factors such as the level of mechanisation, the length of supply chains, and reliance on exports[1]. Among non-packaging plastics, films are the most widely used in agriculture[2].

Plastics possess several unique qualities that make them indispensable in agriculture. Their lightweight, durable, and water-resistant nature allows them to adapt easily to various agricultural environments. Additionally, their chemical versatility enables plastics to be tailored for specific purposes, such as the controlled release of nutrients, improved seed germination, and enhanced plant health[3]. This flexibility in applications makes plastics suitable for a wide range of uses, from crop production and protection to post-harvest handling, transportation, and retail, ensuring efficiency throughout the agricultural process.

Figure 1. Examples of where Plastics are used in Agriculture and Farming



Source: Plastics Europe. The European Plastics System Unpacked

[1] Food and Agriculture Organization of the United Nations (FAO) (2021): Assessment of agricultural plastics and their sustainability: A call for action.
[2] Ibid.
[3] Ibid.

Figure 2. Key Benefits of Plastics in Agriculture

Source: Plastics Europe's elaboration based on data from the Food and Agriculture Organization of the United Nations - FAO's report "Assessment of agricultural plastics and their sustainability: A call for action"

The agricultural sector represents the fifth biggest application for plastics in Europe[4] and the sixth biggest application globally[5], with approximately 15.6 Mt of plastic products used in agricultural applications in 2021. The crop production sector, including fruits and vegetables, and livestock sectors are the largest users, accounting for ten Mt per year collectively, followed by fisheries and aquaculture with 2.1 Mt, and forestry with 0.2 Mt[6]. In addition to the direct uses of plastics, their application in farming, forestry vehicles and food packaging should also be considered.

Focusing on the types of plastic products used in European agriculture, data suggests that 63% of the non-packaging quantities were films used for silage and mulch (i.e. 0.45 Mt), 16% were used for greenhouses, 11% for twines, 6% for irrigation equipment, and 1% for nets.[6]

[4] Plastics Europe (2024): Plastics – the fast Facts 2023
[5] Plastics Europe (2023): Plastics – the Facts 2022
[6] Food and Agriculture Organization of the United Nations (FAO) (2021): Assessment of agricultural plastics and their sustainability: A call for action, p. 18/ see also Figure 7: Plastic use in agriculture in Europe for livestock and crop production.

Agricultural plastics contribute to food security by increasing crop yields and reducing food loss (SDG 2), promoting responsible consumption (SDG 12), supporting biodiversity through more efficient land use (SDG 15). The applications also aid in poverty eradication by boosting income opportunities for farmers through enhanced agricultural productivity (SDG 1).

Agricultural plastics are also among the more advanced areas of circularity due to widespread collection and recycling practices, innovative soil biodegradable and recyclable designs, and active value chain collaborations, although the degree of circularity varies by region.

The environmental awareness about plastic waste in agriculture have spurred global efforts to create circular solutions. In terms of recycled content rates, the agricultural sector is the most advanced in Europe, with 37.5% of its plastics currently made from recycled materials, compared to other sectors[7]. In addition, agriculture, farming and gardening applications have the highest proportion of circular content[8] (41.7%).

2. Implications of Certain Proposed Provisions in the ILBI-PP on Agricultural Plastics

Banning or restricting certain polymers as proposed in the draft text of the agreement[9], i.e. by some stakeholders could have widespread socio-economic, environmental and security of supply implications. According to forecasts, the global demand for greenhouse, mulching and silage films is projected to increase by 50% from 6.1 Mt in 2018 to 9.5 Mt in 2030[10]. Without access to these materials, farmers globally could face unrealistic and seasonal limitations for crop cultivation, higher operational costs from more expensive alternatives, while yields might decrease due to less effective moisture and temperature control. This could have serious implications for food security, particularly in regions with harsh climates or limited resources.

In sectors like aquaculture, the lack of plastic materials for nets and ropes could disrupt operations and lead to lower food production, further putting pressure on global food supply chains.

Such restrictive measures may also create economic, operational, and resource management challenges, particularly for small-scale farmers and regions dependent on plastic-based agricultural practices. Policymakers would need to balance these factors and develop an enabling framework for scaling up already existing circularity solutions and supporting innovation efforts to avoid disrupting global food production systems.

3. The Way forward

A balanced approach is required to tackle plastic pollution while maintaining the functionality and efficiency of agricultural practices. Legal provisions in Part II/5 Product design and performance of the compiled text should ensure the inclusion of sector-specific product design principles and/or tailored guidelines to accommodate the unique needs of the agricultural sector. This would ensure that essential uses of plastics, such as water conservation, soil health, and crop protection, are preserved while developing innovative soil biodegradable or other sustainable plastics alternatives specifically designed for agricultural applications.

[7] Plastics Europe (2024): The Circular Economy for Plastics – A European Analysis 2024

[8] Circular content refers to plastics made from circular feedstocks. Circular feedstocks are recycled feedstock, bio-based feedstock, carbon captured feedstock.

[9] As foreseen in Part II/ 1 Primary plastic polymers, Part II/ 2 on Chemicals [and polymers] of concern and the 3bis measures aiming to list Part II of Annex B [Problematic and avoidable plastic products] and Part III of Annex B [Problematic plastic products]

[10] Food and Agriculture Organization of the United Nations (FAO) (2021): Assessment of agricultural plastics and their sustainability: A call for action

Based on the identified challenges and existing circularity practices for agricultural plastics, the following interventions have been recommended in the literature[11] to enhance circularity and improve the management of agricultural plastics:

- Developing comprehensive guidelines for the sustainable use of plastic products for all stakeholders that encompass all aspects of plastics within agrifood value chains and include best practices.
- Setting minimum standards for agricultural plastic products and their performance to reduce the risk of pollution and improve circularity. This would include also minimum specifications for products, their constituents, performance and associated equipment to reduce leakage and improve circularity.
  Adopting minimum levels for the use of recycled materials in the manufacturing process has also proved to enhance circularity and incentivise investments in recycling infrastructure[12]. For example, in 2017, China introduced more stringent standards (GB 13735-2017) for a minimum thickness for non-biodegradable mulch films to improve its retrievability from soil[13]. CEN has developed the standards EN 13432 (for compostable plastics) and EN 17033 for biodegradable plastic mulch films. Other examples of standards aiming to improve the circularity of plastics applications include:

Standard
prEN 13206: Thermoplastic covering films for use in agriculture and horticulture
prEN 18109: Design for recycling of twines and nets
prEN 13207 Thermoplastic silage films and tubes for use in agriculture
prEN 14932 - Thermoplastic stretch films for wrapping silage bales
prEN 13655 - Thermoplastic mulch films recoverable after use, for use in agriculture and horticulture
ISO 23517:2021(en) Plastics — Soil biodegradable materials for mulch films for use in agriculture and horticulture — Requirements and test methods regarding biodegradation, ecotoxicity and control of constituents
prEN 17098-1 - Barrier films for agricultural and horticultural soil disinfection by fumigation - Part 1: Specifications for barrier films

- Product reuse and the replacement of short-term single-cycle products with reusable ones
- Environmental biodegradability can be considered as potential solution for specific applications where no solution to prevent the unintentional loss in its use environment is feasible, or which are intentionally brought and left in the environment. Examples of such applications are very thin (< 25 µm) agricultural mulch films.

[11] Ibid.
[12] Ibid.
[13] Chinese Academy of Agricultural Sciences & Ministry of Agriculture and Rural Affairs. 2020. Management of Agricultural Plastics in China: the Plastic Mulch Film - a report for Food and Agriculture Organization of the United Nations (FAO).

- Introducing labelling of products to promote identification and traceability.
- Rapid establishment of Extended Producer Responsibility (EPR) schemes or alike.
- Addressing barriers to recycling by investing in new technologies and techniques to improve retrievability and cleaning of end-of-life plastic products.
- Investing in innovative practices and products supported by research and innovation grants to foster new ideas and facilitate the development of cutting-edge solutions.