

# Strawberry fields forever? Strawberry production leaves long-term plastic pollution, research finds

July 9 2023

---



Polyethylene mulched strawberry fields, San Luis Obispo, CA. Credit: Seeta Sistla

Researchers have found that the plastic mulch used to support the growth of Californian strawberries sheds large quantities of plastic mulch fragments. These particles have been shown to negatively impact soil qualities, casting doubt on the long-term viability of their use. The findings from the survey are likely to apply world-wide to plastic use in agricultural production.

Presenting their work at the [Goldschmidt geochemistry conference](#) in Lyon, postdoctoral researcher Dr. Ekta Tiwari (from Sistla group at California Polytechnic State University) said "What we are seeing a huge quantity of macroplastic plastic material—particles bigger than 5mm across—being shed where the mulch is used to enhance strawberry production. These can remain in the soil for decades or longer."

Plastics, such as polyethylene, are increasingly used in agriculture, for example in polytunnels. Plastic mulch films are extensively used in agriculture, where they provide a range of benefits. They are tucked in around the base of the plant, which can help control weeds and pathogens, reduce water evaporation, and prevent soil splashing on fruit (which is particularly important for strawberries).

The mulch is applied in rows and then removed after the crop's seasonal production is complete. However, even careful land stewardship by farmers does not ensure all the plastic is removed because fragments get left behind and adhere to the soil during removal. After decades of annual [plastic mulch](#) application and removal, the researchers observed the accumulation of plastic fragments within farm soils, even in really well-managed fields. The researchers looked for macroplastics, which

are plastic pieces more than 5mm across.

Ekta Tiwari continued "We carried out a systematic survey of strawberry fields after the seasonal removal of these plastic film. We found that the distribution was fairly uniform. On field surfaces alone, we found up to 213,500 macroplastic particles per hectare. That doesn't include subsurface particles, which we did not survey. In addition, we are currently analyzing the same [soil samples](#) for microplastics, which are [smaller particles](#), less than 5mm across; these are not yet included in our findings."

Most of the particles are polyethylene (identified using Fourier transform infrared spectroscopy). In preliminary findings, the researchers found that as the levels of macroplastic pollution increased, soil moisture content, microbial respiration, and plant-available nitrogen declined.

Dr. Tiwari added "The plastic mulch provides benefits, but at the expense of long-term soil quality. It's difficult and expensive to remove these particles from the soil, so once they are there they can stay there indefinitely."

"We tend to think that strawberries are simply things to be enjoyed, but this shows that even something as delicious as fresh strawberries can come with a cost to the environment. We are working with the manufacturers to see if we can mitigate these costs."

There are alternatives to using polyethylene mulches, such as biodegradable plastic mulches, or natural mulches such as straw, but these choices come with an economic cost. However, the use of plastics in agriculture is also [increasingly regulated](#).

Commenting, Professor Sean Schaeffer (Department of Biosystems

Engineering & Soil Science, University of Tennessee, U.S.) said, "Plastics, and plastic mulches in particular, are vital to maintain [agricultural production](#). They are used for various purposes including soil moisture retention, soil warming/cooling, as well as weed or [pest control](#). Agricultural [plastic use](#) is increasing worldwide, with California being the largest user of agricultural plastic in the US."

"Research on the fate and transport of plastics in [soil](#) and [water systems](#) is relatively recent, so studies like this are vital to increasing our understanding of the scope the plastic problem. We currently know relatively little about the distribution, size, and types of plastic in soils in the largest states, both in [land area](#) and in agricultural production."

This is an independent comment, Professor Schaeffer was not involved in this work.

This work is ongoing and has not yet been peer-reviewed. The researchers are currently evaluating the level of microplastic pollution (particles smaller than 5mm) left by plastic mulches. This study provides baseline data to understand the extent of plastic pollution in the U.S. agriculture system and can help improve land management practices by assessing the biogeochemical consequences of [plastic](#) accumulation in agricultural soils.

Provided by Goldschmidt Conference

Citation: Strawberry fields forever? Strawberry production leaves long-term plastic pollution, research finds (2023, July 9) retrieved 27 April 2024 from <https://phys.org/news/2023-07-strawberry-fields-production-long-term-plastic.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.