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Impact of Microplastics in Environmental Pollution

CSIR-NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW

How microplastics in the soil contribute to environmental pollution

phys.org, 11 February 2021

Plastic, with its unabated global production, is a major and persistent contributor to environmental pollution. In fact, the accumulation of plastic debris in our environment is only expected to increase in the future. "Microplastics" (MP)—plastic debris <5 mm in size—are particularly problematic in this regard, owing to how easily they can be ingested by marine organisms and eventually find their way to humans. But, it is not just the marine environment that contains MP debris. Studies on agricultural soil have revealed that MPs adversely affect not only the soil quality but also the physiology of soil organisms and, in turn, the interaction between soil and plants. Still, because most studies on MPs have focused on marine environments, it is not clear how abundant MPs are in different types of soils based on the agricultural practice (a source of MP) employed. Moreover, it remains to be determined whether only external sources of MP (sewage, wastewater, and runoff water due to rain) are responsible for the soil pollution.

Scientists from Incheon National University, Korea, headed by Prof. Seung-Kyu Kim, now explore these questions in their latest study published in Journal of Hazardous Materials. "Most studies on MPs have focused on the marine environment, but substantial amounts of MPs can be generated in the agricultural environment via weathering and fragmentation of plastic products used in agricultural practices. We hoped to find out the amount of MPs in Korean agricultural soils and how they change according to different agricultural practices and environmental conditions," says Prof. Kim.

For their study, the scientists examined four soil types corresponding to different agricultural practices: soils from outside and inside a greenhouse (GS-out and GS-in, respectively), mulching (MS), and rice field soil (RS). Of these, the former three samples represented the use of polyethylene film, while the RS sample represented little to no use of plastic. To minimize the effect of non-agricultural sources of MP, scientists collected…….. Read More....

Environmental scientists cite need for studies looking into impact of microplastics

phys.org, 12 February 2021

A pair of environmental scientists are warning that the worldwide population could be facing another health crisis—ailments that impact people due to ingestion of microplastics. In their Perspectives piece published in the journal Science, A. Dick Vethaak, with Vrije Universiteit Amsterdam and Juliette Legler, with Utrecht University, note that the effects of ingesting microplastics on the human body are unknown.

As the authors state, prior studies have shown that microplastics have made their way to virtually every part of the planet. As an example, one team of researchers recently found that over 1,000 tons of microplastics fall on national parks in the U.S. every year. As a result, organisms have been ingesting them—either by breathing them in or by swallowing them in foods or water. The list of creatures ingesting plastics includes human beings, of course, but no one knows what the effects are.

Notably, the scant research to date might not have been done correctly—a group of researchers recently found that environmental microplastics are more internalized than pristine microplastics, into macrophages, a finding that suggests that future work looking at the impact of microplastics is required under real-world conditions with microplastics found in the environment—not new plastics tested in the lab.

The authors also point out that prior research has shown that different kinds of pollution have different kinds of impacts on plants and animals—many of these impacts pose a considerable risk to human health. But such findings have only come to be known because scientists did the research. Sadly, they note, the same degree of effort has not yet been focused on possible health effects of microplastics. They point out…….. Read More...

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Planting plastics: study finds a growing amount of microplastics in the agricultural soil

ZME Science, 13 February 2021

Microplastics are contaminating agricultural land as well as the oceans, affecting the interaction between the soil and the plants. The amount varied according to the agricultural practice used by the farmers and probably affects all soil organisms.

Over time, plastic items in the ocean can break down into smaller pieces, known as microplastics. They can be the size of a rice grain or even smaller, making them easy to be ingested by sea creatures. Millions of tons of plastic enter marine ecosystems every year, and quantities are expected to increase in the coming years.

But while the impact of ocean microplastics has been at the focus of researchers for the past few years, not that much attention has been placed on the microplastics that are accumulating on land — including agricultural areas. A study estimated that 107,000 to 730,000 tons of microplastics are dumped onto agricultural soils in the U.S. and Europe every year.

The potential sources of microplastics in the agricultural environments include sewage sludge, compost, irrigation of wastewater, road runoff, atmospheric deposition, and plastics in agricultural practice. Microplastic can also come from organic fertilizer from biowaste, as several studies have recently shown.

It is estimated that 79% of 6.3 billion tons of the total plastic waste generated in 2015 accumulated in landfills or the natural environment and 7% of the plastics produced globally were utilized for agriculture. Plastic mulching, which covers a large part of the European agricultural surface, has grown rapidly in recent years worldwide. Polyethylene films have also been widely used in greenhouses and seem to be contributing to microplastic pollution.

A group of researchers from Incheon National University in Korea wanted to explore how abundant microplastics are in different types of soils based on the agricultural practice employed, something that hasn't been thoroughly explored. Moreover,……. **Read More...**

An underestimated source of marine microplastic pollution

Science Daily, 24 February 2021

The scientists found that most of the plastic particles in water samples taken from the German Bight, an area in the south-eastern corner of the North Sea which encompasses some of the world's busiest shipping lanes, originate from binders used in marine paints. "Our hypothesis is that ships leave a kind of 'skid mark' in the water which is of similar significance as a source of microplastics as tyre wear particles from cars are on land," Scholz-Böttcher says.

In the autumn of 2016 and 2017, the Oldenburg team took water samples from various locations in the German Bight with the research vessel "Heincke." Scholz-Böttcher and her two colleagues Christopher Dibke and Marten Fischer used stainless steel sieves to filter plastic particles of much less than one millimetre in diameter out of the seawater and then analysed the chemical composition of the collected particles. They used a special analytical method in which the plastic molecules were first heated to temperatures of almost 600 degrees Celsius to break them down into smaller, characteristic fragments, and then separated and assigned to different polymer groups based on their mass and chemical properties. With this method the researchers were also able to quantify the mass of each plastic type. "Previous studies have only measured particle numbers for the North Sea. We, for the first time, also determined the mass distribution, and thus obtained a more comprehensive picture of the emergence of the different plastic types," Scholz-Böttcher stresses.

The team was surprised by the results: the samples contained above all indicators for polyvinyl chloride (PVC), polymers known as acrylates, and polycarbonates. Their mass accounted for about two-thirds of the total microplastic content in the mean and up to 80 percent in certain samples. Packaging plastics such as polyethylene…….. **Read More…**