

Testing for
plastics

20

TESTING FOR THE MICRO-PLASICS IN THE YAMUNA (LEAVING DELHI AND ENTERING), FOOD AND IN THE SOIL

Introduction

Microplastics are fragments of any type of plastic less than 5 mm (0.20 inch) in length, according to the U.S. National Oceanic and Atmospheric Administration (NOAA) and the European Chemicals Agency. They enter natural ecosystems from a variety of sources, including cosmetics, clothing, and industrial processes.

Two classifications of microplastics are currently recognized.

Primary microplastics include any plastic fragments or particles that are already 5.0 mm in size or less before entering the environment. These include microfibers from clothing, microbeads, and plastic pellets (also known as nurdles).

Secondary microplastics arise from the degradation (breakdown) of larger plastic products through natural weathering processes after entering the environment. Such sources of secondary microplastics include water and soda bottles, fishing nets, plastic bags, microwave containers and tea bags.

Sources of Microplastics

- Mismanaged Plastic waste
- Inland Navigation
- Wastewater Discharge
- Industrial Activities

Scope of work

The aim of this Project is to test microplastics (MPs) in river Yamuna, soil and vegetables and/ other edible products from the respective segment of Delhi using an organic phase and to analyse the microplastics. This will be achieved by conducting experiments in the laboratory.

River Yamuna flood plain in Delhi, starts from Palla to downstream (d/s) Okhla, which is about 48 km stretch. This stretch can be divided into three stretches of approximately 16-17 km each as Delhi Segment I (Palla to Wazirabad), Delhi Segment II (Wazirabad to Nizamuddin Bridge) & Delhi Segment III (Nizamuddin Bridge to Okhla downstream).

The scope of work includes

- Sampling
- Extraction
- Identification
- Quantification

Methodology for Micro-plastic Assessment of Yamuna

Sampling

1. Selective Sampling
2. Volume Reduce Sampling
3. Bulk Sampling

Extraction

1. Pre treatment- biological digestion-formalin can be added to digest the organic substance.
2. Picking out Micro-plastics
3. Counting and measuring sizes of Micro-plastics

Identification

Microplastic analysis consists of two steps: physical characterization of potential plastics (e.g., microscopy) followed by chemical characterization (e.g., spectroscopy) for confirmation of plastics

Both FTIR and Raman spectroscopy can be used to analyze microscopic sized samples.

Quantification

Microplastics quantification can be done on the basis of size and shape of the microplastics .

Nile Red produced the best results (without interfering in infrared spectra) rendering microplastics fluorescent at 254 nm, but with limited number of fluorescent polymers, and at 470 nm (with orange filter), with fluorescence of plastics as well as natural organic matter (requiring a digestion step).

Materials and Methods for soil testing

This specification covers complete soil exploration work including carrying out field tests and laboratory tests to evaluate soil parameters and preparation of detailed report including the recommendation regarding the following main items

1. Experimental Site And Soil Sampling
2. Compost Characteristics And Fractionation
3. Soil Fractionation
4. MPs Characterization by Transmission Electron Microscopy
5. MPs Characterization by Py/GC/MS

Testing of microplastics in food

1. Pretreatment Methods
2. Microplastic Identifications

Material Type, Shape, and Size

1. Plastic Materials in Food
2. Microplastic Shape and Size