

Reviewer 4:

In this study, particles emitted from five typical sources (plastic burning, fruit bag burning, road traffic, agricultural film, livestock breeding) in the Guanzhong Plain, northwest China were collected. The authors investigate characteristics and eco-health risks of microplastics (MPs) and plasticizers (phthalates, benzothiazoles, bisphenol A) in PM_{2.5} and PM₁₀. It identifies source-specific markers and reveals that combustion-derived MPs pose the highest ecological risks, while livestock breeding and plastic burning exhibit elevated human health hazards. The topic is within the scope of ACP. Overall, I recommend this paper to be accepted after revisions.

Response:

We sincerely appreciate the time and effort you have dedicated to reviewing our manuscript. We have carefully considered each of your suggestions and have made the necessary revisions to improve the quality of our manuscript.

1. Please be aware of the tense.

Response:

Thank you for your suggestion. We have conducted a systematic review of verb tenses throughout the manuscript. Specifically, we have used the past tense throughout the sections on experimental methods and results to accurately reflect completed actions. In the discussion section, we have employed the present tense to describe current interpretations and implications of the findings.

2. Please define PM_{coarse} at its first appearance in Abstract and Introduction. Also, maybe PM_{2.5-10} could be better for understanding than PM_{coarse}.

Response:

Thank you for the suggestion. We have standardized our terminology by replacing "PM_{coarse}" with "PM_{2.5-10}" and defined PM_{2.5-10} at its first appearance in Abstract and Introduction.

"PMMA being more abundant in PM_{2.5-10} (aerodynamic diameters between 2.5 and 10 μm)."

3. In this paper, five sources of MPs are analyzed, but excluding emerging sources like industrial emissions, construction, or textile abrasion, which may contribute significantly to atmospheric MPs.

Response:

Our study specifically focuses on outdoor environmental sources directly linked to daily human activities and exposure (living sources), particularly in understudied rural areas in Northwestern China. To maintain this focus, all sampling sites, except for road traffic source, were located in rural areas. The sampling for road traffic source was done in city to capture MPs from high traffic emission intensity, replacing the weak emission state in rural areas. But it cannot be denied that there are also certain vehicle emissions in rural areas.

Sources like industrial emissions, construction, while important, were considered less representative of the immediate, daily-life exposure pathways central to our research. That is to say, these sources that are far from our daily lives may contribute less to the health effects caused by MPs. As for textile abrasion, it is indeed a significant source of indoor MPs. We will definitely include this in our future research. Thank you for the valuable suggestion.

4. It is recommended that a separate QC/QA section can be added in Methods section, which

could provide more QC/QA details for collection and analyses.

Response:

Thank you for your suggestion. The details of QC/QA procedures have already been documented in Section 2.3 of the Methods.

“Quality assurance/Quality control (QA/QC)

The flow rates of all samplers were calibrated using a mass flowmeter (Model 4140, TSI, Shoreview, MN, USA) before and after each sampling cycle. All quartz filters used in this study were preheated at 800°C for 3 h to remove any potential contaminants and then cooled before use. To minimize experimental error, sampling was conducted in duplicate for each particle size of each source. For the chemical measurements, one in every 10 samples was reanalyzed for quantity assurance purposes, and the SD errors of replicate trials were within 10% for the pyrolysis analyses. Calibration curves were established using reference standards. The linearities of the standard calibration curves were > 0.987. The standard deviations of the pyrolyzed standard were within 94.1% to 98.3%. Background contamination (Table S3) was monitored by processing operational blanks (unexposed filters) simultaneously with field samples.”

5. Section 2.2, what is the size of the filter membranes you cut for pyro-GC/MC analysis?

Response:

Thank you for your question. We cut filters with areas of 0.526 cm²(one circular punch from the filter) for MPs and 1.578 cm²(three circular punches from the filter) for each of the three plasticizers, respectively. We have added this detailed preparation information in Appendix 2 in Supplementary Information (SI) file.

“In the quantification of microplastic (MPs) contents, 0.526 cm² of a filter sample was folded with ferromagnetic pyrofoil (F670, Japan Analytical Industry Co., Ltd, Tokyo, Japan) using a clean flip head tweezer.”

“To quantify each of the three plasticizers, 1.578 cm² of the filter sample was cut into small pieces.”

6. Figure 2, the caption of Y-axis, is it the proportion of MPs in “PMs”? Or “MPs”.

Response:

Thank you for pointing this out. Sorry for the mistake. The caption of Y-axis is the proportion of MPs in total MPs (%). Figure 2 has been modified as below.

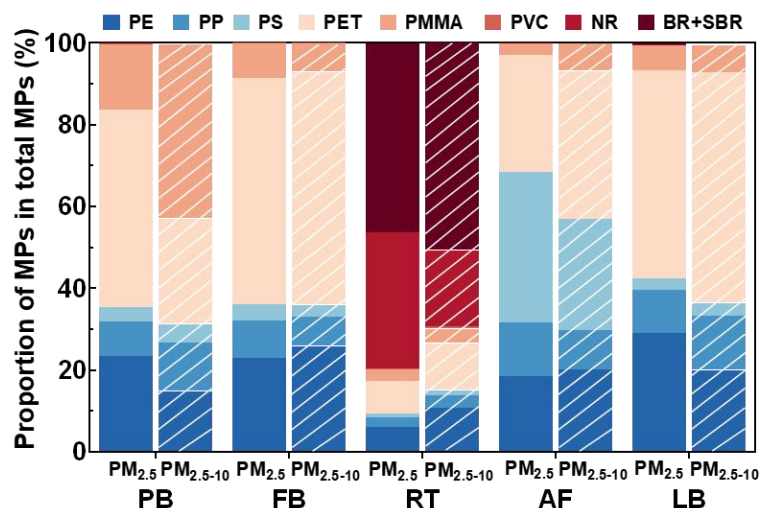


Figure 2 Chemical composition of microplastics in PM_{2.5-10} and PM_{2.5} from the five sources (PB: Plastic Burning, FB: Fruit-bag Burning, RT: Road Traffic, AF: Agricultural Film, LB: Livestock Breeding).

7. Figure 2, what does the slash lines stands for?

Response:

The slash lines are used to clearly distinguish the differences in the distribution of microplastics between PM_{2.5} and PM_{2.5-10}.

8. Line 198, the health risk assessment uses U.S. EPA-derived exposure parameters, which may not fully align with Chinese population characteristics.

Response:

Thank you for your comments. In our study, the reference dose (RfD) and slope factor (SF) were derived from U.S. EPA data, as these values are widely recognized and standardized, providing a consistent and representative basis for health risk assessments globally. These parameters are also fundamental properties of chemical species and are almost unaffected by nation and regions.

However, parameters such as exposure time and exposure frequency were estimated based on the activity patterns of the population in the Guanzhong region. This point allowed us to incorporate local characteristics into our research. In future research, we will continue to refine our methods by integrating more localized exposure parameters to better reflect the behaviors of the Chinese population.

9. References are sometimes listed without page ranges. Also, there are some wired words (i.e., PM_{2.5}) in Line 614 and 617.

Response:

Sorry for the errors. The same errors have been revised in the manuscript.

10. Introduction section Line 45, please consider adding these references: Micro/nanoplastics in the Shenyang city atmosphere: Distribution and sources, *Environ. Pollut.*, 2025, 372, 126027; Characterization of atmospheric microplastics in Hangzhou, a megacity of the Yangtze river delta, China, *Environ. Sci.: Atmos.*, 2024, 4, 1161-1169.

Response:

The authors have added the references in Lines 63 and 67.