

COMBINED EFFECTS OF MICRO-/NANOPLASTICS AND HUMIC SUBSTANCE ON ALLIUM SATIVUM AND IMPORTANCE OF HUMIC SUBSTANCE IN ALLEVIATING TOXICITY

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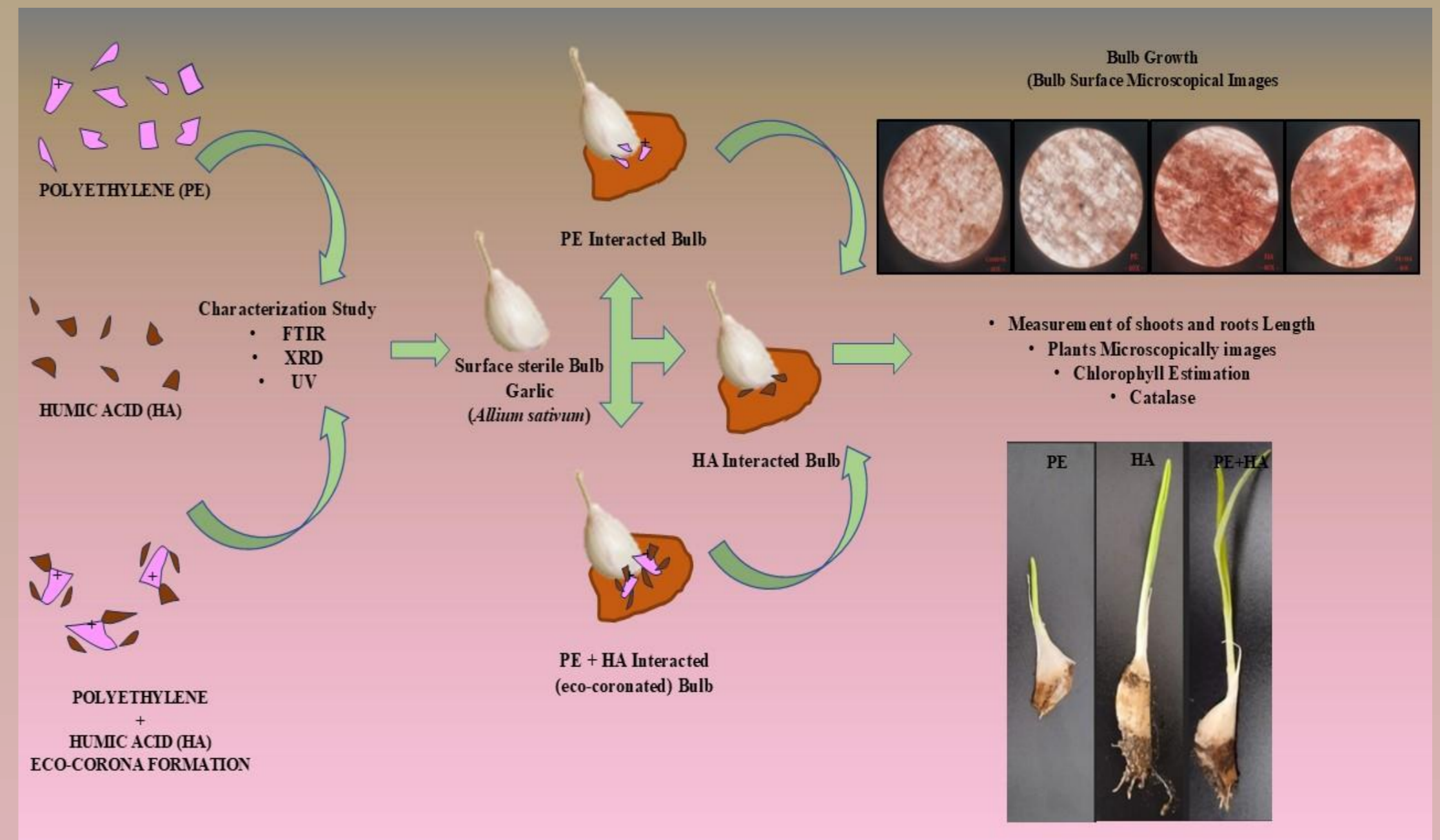
Introduction

Plastic have transformed our modern world with a range of outstanding properties. Plastics are artificially produced and polymerized from various monomers (Bucknall, 2020). Current research investigates how *Allium sativum* and growth are affected by polyethylene (PE) humic acid (HA), and a PE+HA combination (*Allium sativum*). The impacts of nanoplastics and microplastic on terrestrial systems are unclear at this time. Current research investigates how *Allium sativum* and growth are affected by polyethylene (PE) humic acid (HA), and a PE+HA combination (*Allium sativum*).

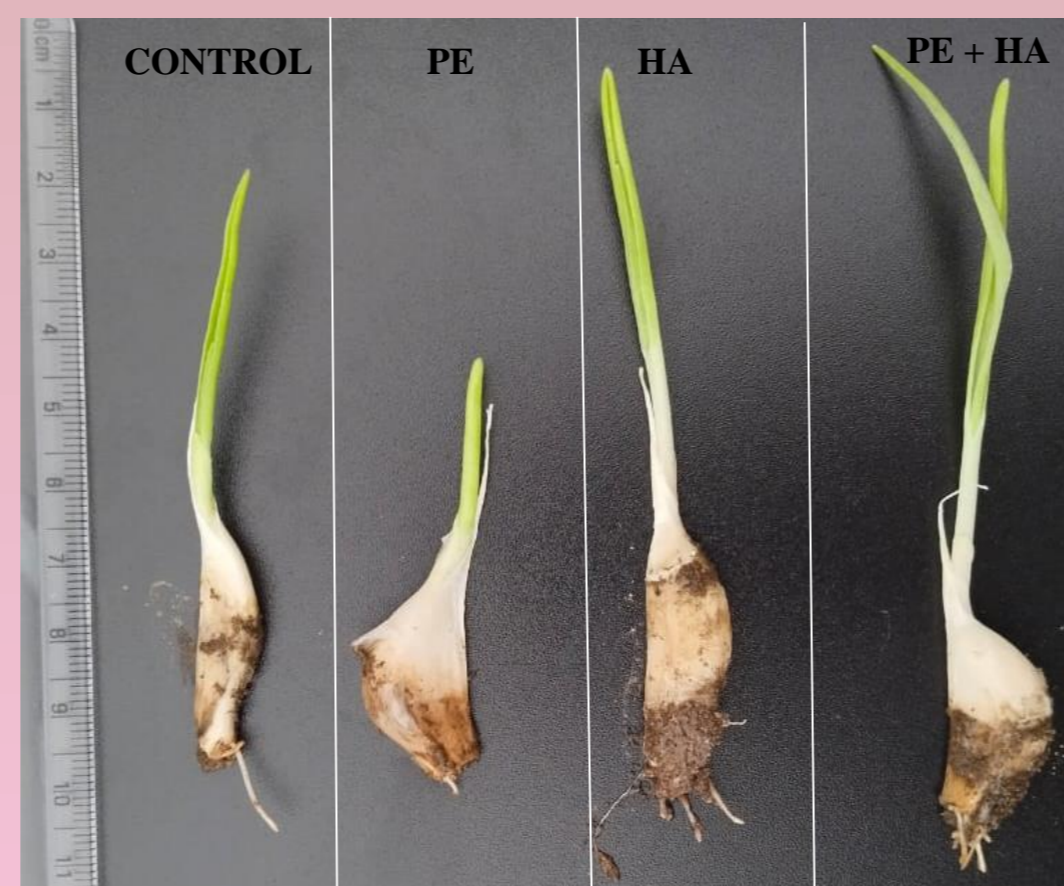
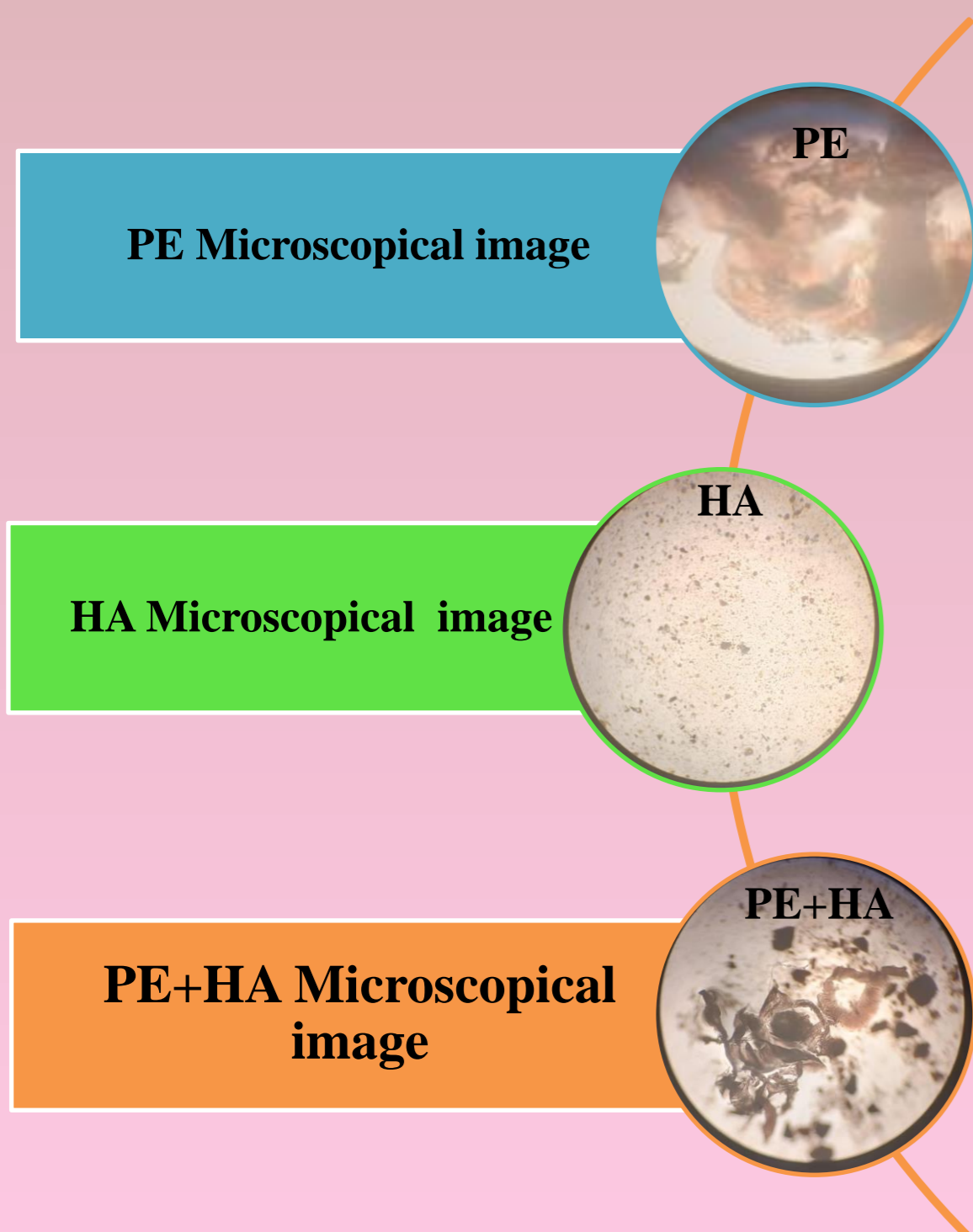
Methodology

- Seed Collection**
 - Local market (Mahveer super market), Arcot, Ranipet Tamilnadu, India. We purchased the *Allium sativum* pulp utilized in the research. Surface sterilized seed treat with PE, HA, and PE+HA interacted soil. Repulished daily with prepared treated solution for control D.H₂O use.
- Soil Collection**
 - The soil was taken from puttuthaku village, vellore, Tamilnadu. The soil was selected from the leguminous plant rhizosphere soil. 1000ml sterile glass beaker used for study, interaction study carried out up to 20 days, root and shoot (Measurement, Chlorophyll estimation and CAT) carried out.
- PE Preparation**
 - The plastic water bottle made up of polyethylene (PE) rapping with in a sterile blade and the plastic are broken into the microplastic/nanoplastic then sieved (2µm).
- HA Preparation**
 - 250g of soil were added in the distilled water (500ml) and then filter in cleaned cotton cloth and dry, dried pieces of soil are grind in the mortar and pestle. After it get powder humic acid is now ready to use for experimental purpose.
- PE+HA Preparation**
 - The humic substances and micro/nano plastic (1:1) ratio are taken. Shape expressed at Microscopic, FTIR, XRD for PE, HA and PE+HA

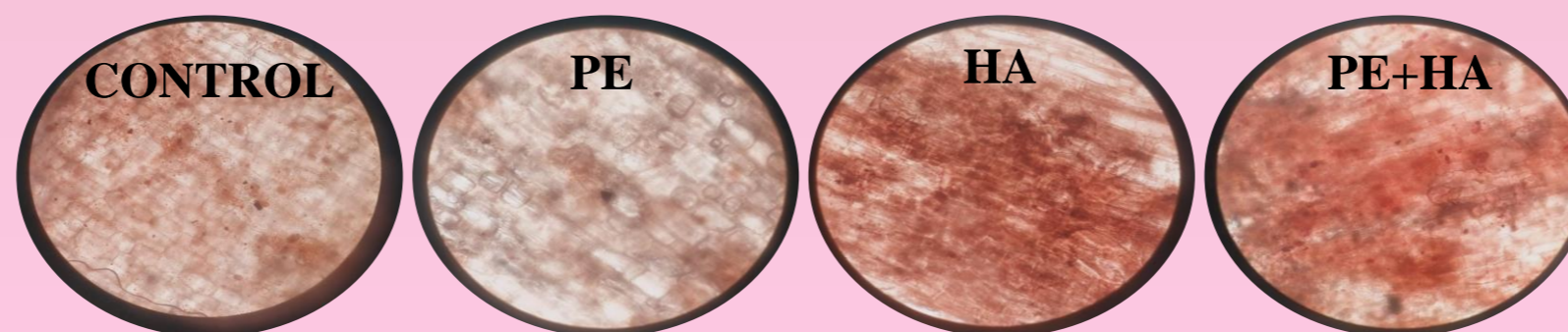
Outline



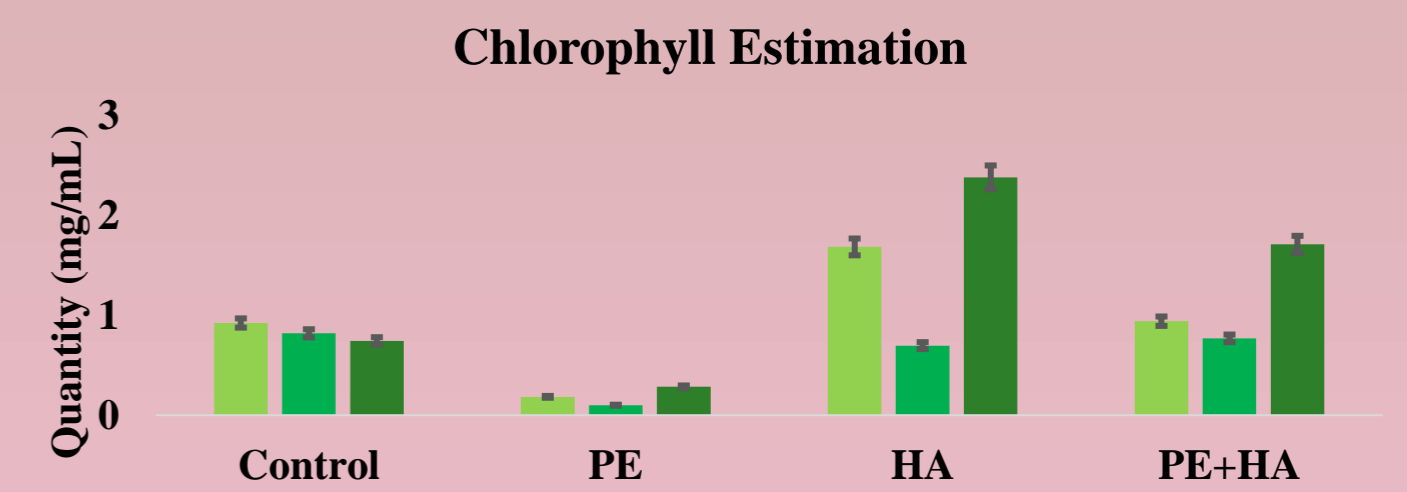
Results



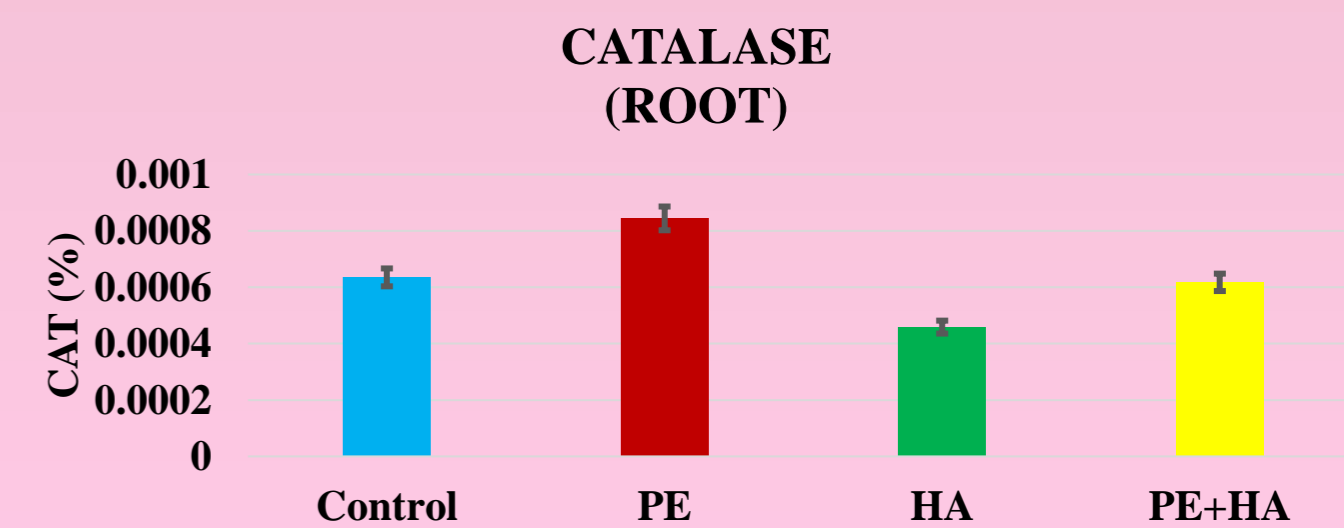
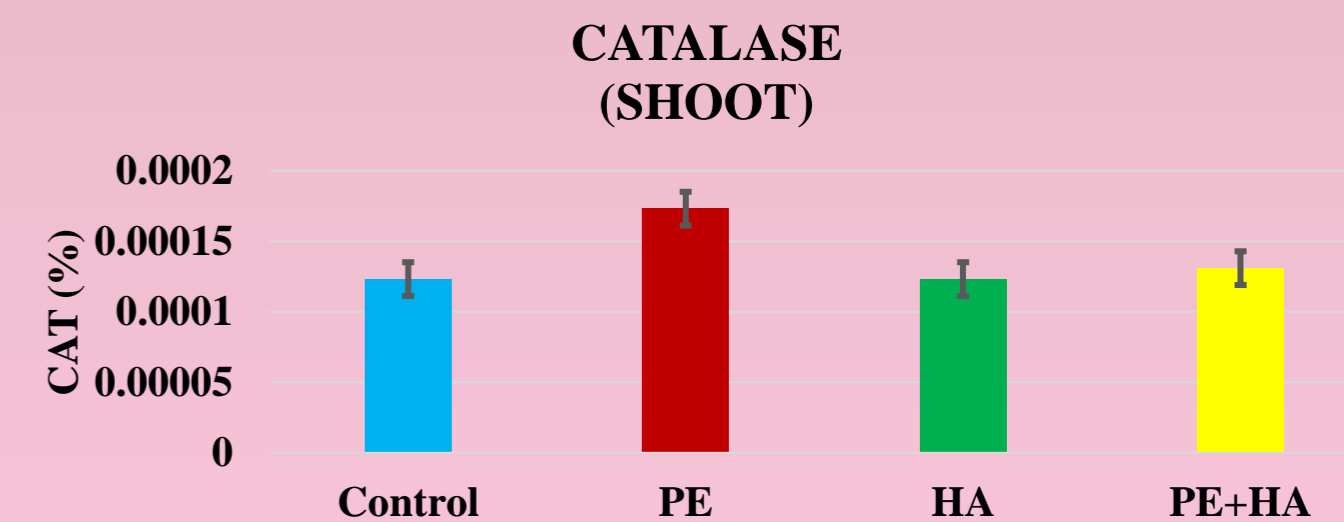
Shoot & Root length measurement of treated HA, PE+HA & untreated control showing healthy grown plant and PE shows slow growth rate of *Allium Sativum* on 20 days



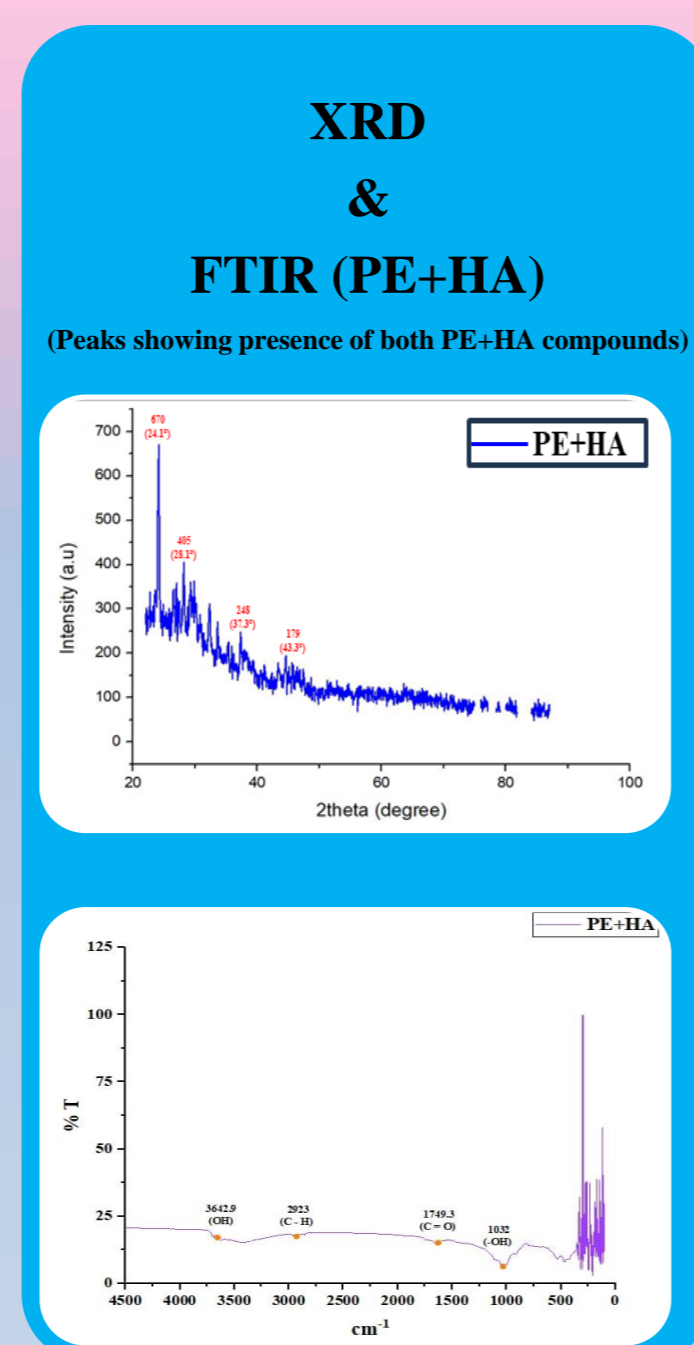
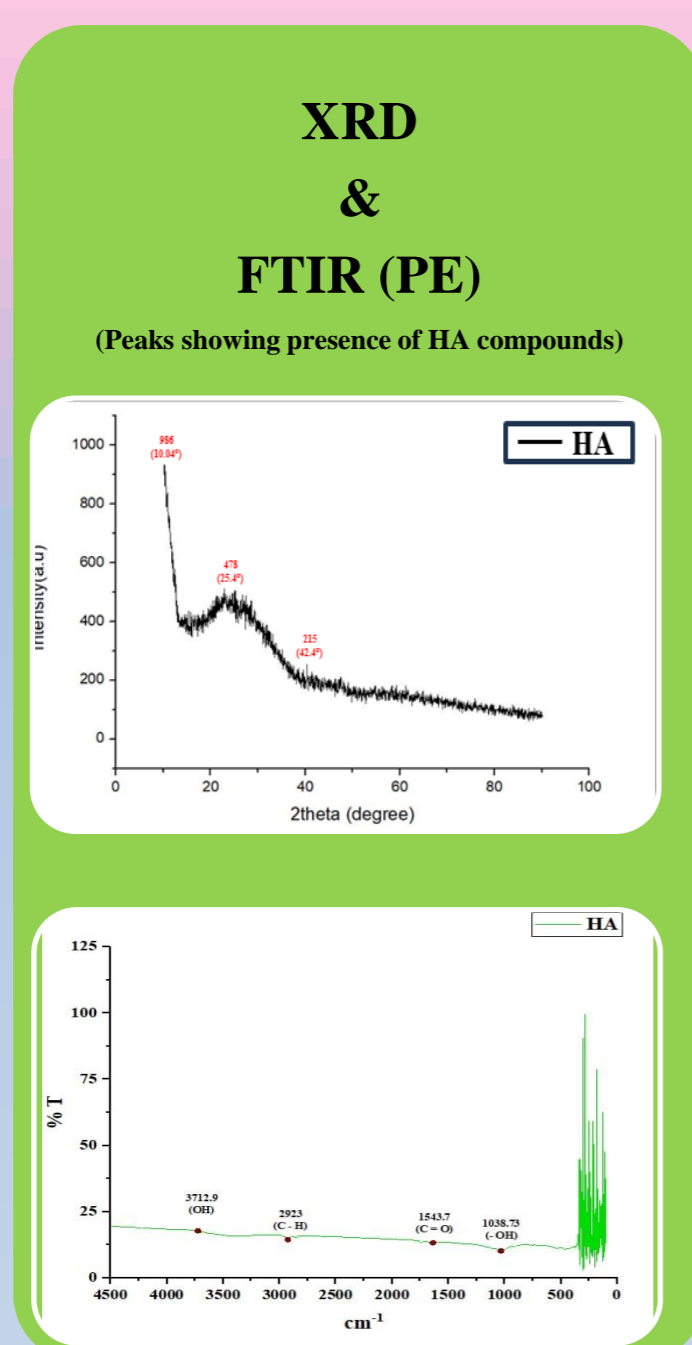
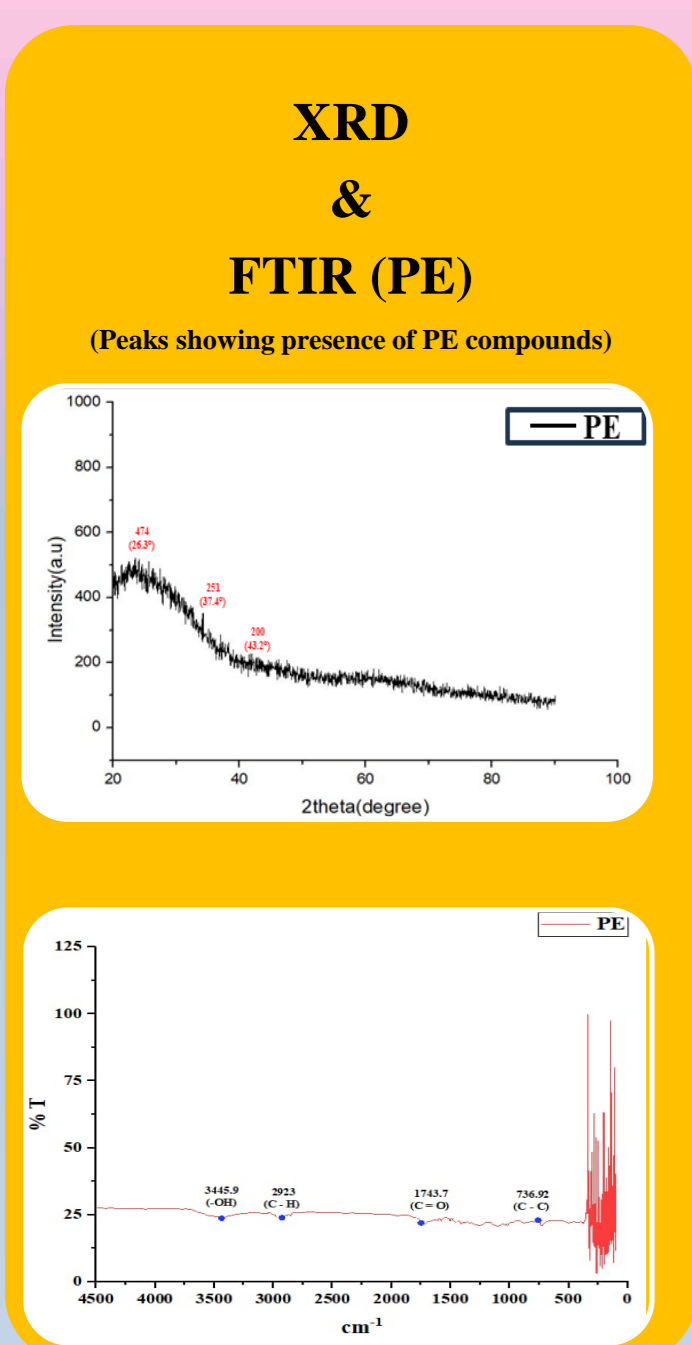
Garlic root tip acetocarmine staining control, HA, PE+HA (showing healthy cell) & PE (shows less number of healthy cells)



Chlorophyll Estimation control, HA, PE+HA chl content is more & PE presence of chl content is less



Catalase Activity (Shoot and root) – control, HA, PE+HA showing less activity & PE shows more catalase activity



Conclusion

Nanoplastics is a direct toxicity to plants roots and soil microbiota, as a particle size decreases, effects on microbiota are hypothesized to become more chemical/toxic as opposed to physical. While micro/nano sized particles are not expected to be taken up into the root, the situation is different for micro/nano plastic particles. If micro/nano plastic particles fragment into smaller pieces. Using the micro/nano plastic interacted soil grown *Allium sativum*, PE, C, HA, PE+HA we found the root, shoot length, and chlorophyll estimation of the *Allium sativum* leaf carried out and characterization study FTIR, XRD of PE, HA and PE+HA. As, the result of *Allium sativum* root tip using acetocarmine we saw in compound microscope HA, PE+HA observed healthy cells. Throughout this research results the phytotoxic effects of PE on higher in plants. The plant growth rate was increased with the addition of HA in the *Allium sativum*. It was determined that the natural organic compound humic acid when it combine with PE. HA helps the growth formation root and shoot length of the *Allium sativum*.

This study is likely contributed to a better understanding of the interaction between micro/nano plastic and HA in the *Allium sativum*.

Reference

Bucknall, D. G. (2020). Plastics as a materials system in a circular economy: Plastics in the Circular Economy. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 378(2176). <https://doi.org/10.1098/rsta.2019.0268>