Response of common bean (Phaseolus vulgaris L.) growth to soil contaminated with microplastics

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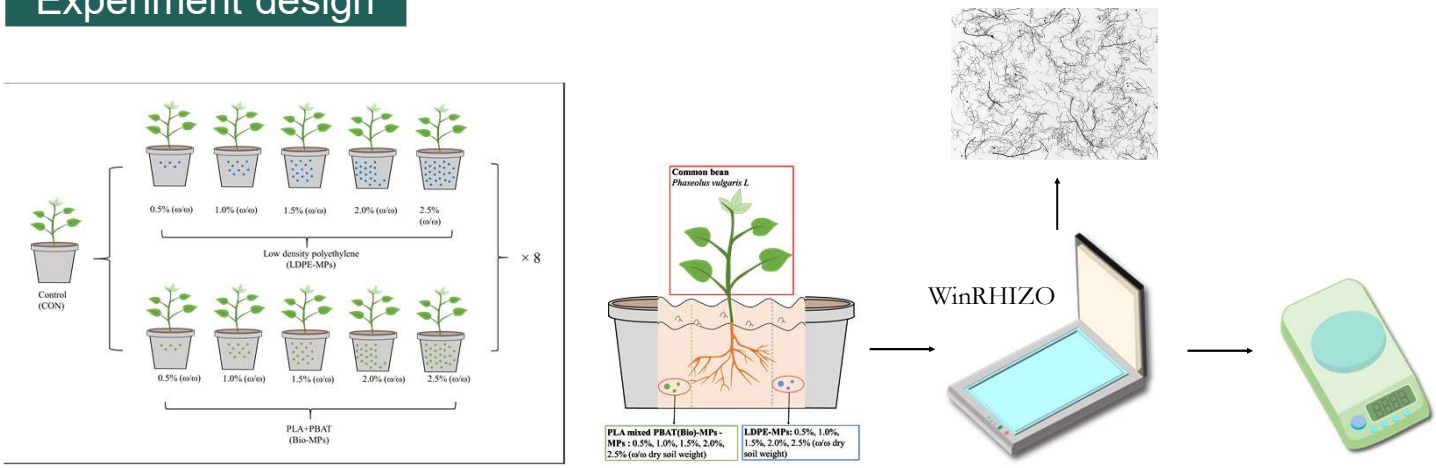
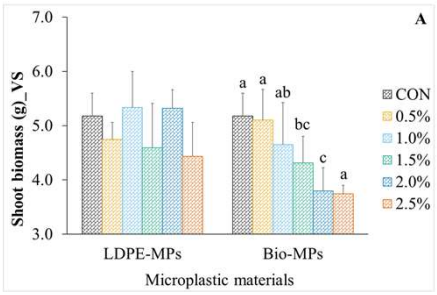
Introduction

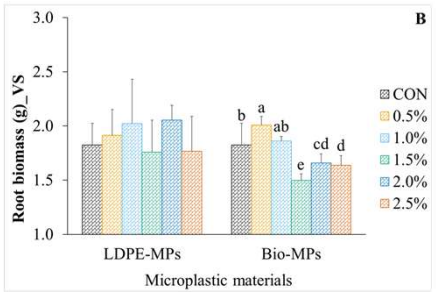
Although concerns surrounding microplastics (MPs) in terrestrial ecosystems have been growing in recent years. The growing body of literature have indicated that MPs could affect the soil biophysical environments, i.e. decreased soil bulk density and soil microbial activities, increased soil evaporation and desiccation cracking. The increasing concerns surrounding plastic pollution in agriculture have led to the development of biodegradable materials. However, little is known about its ecological impacts. Here, we conducted a pot experiment to investigate the the responses of plant growth to MPs pollution.

Experiment design

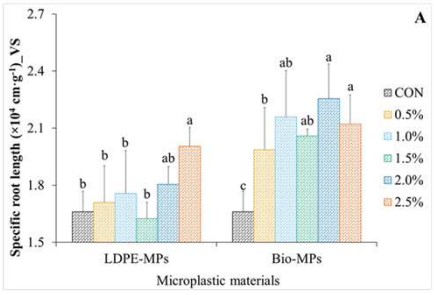


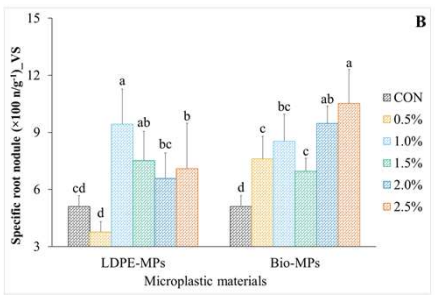
Results



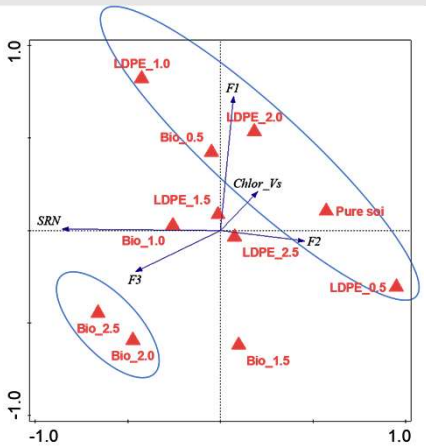


- LDPE-MPs showed no significant effects on shoot and root biomass, while Bio-MPs, especially at 1.5%, 2.0% and 2.5% w/w significantly inhibited the root and shoot biomass.





- Bio-MPs produced higher specific root length and specific root nodules while LDPE-MPs also showed significant impacts on specific root nodules.



- Factor 1 was mainly associated with total plant biomass, thus defined as plant biomass.
- Factor 2 (F2) included PodNb and FruitB and defined as plant production.
- Factor 3 included FRL and SRL and defined as root characteristics.

Conclusion

- Bio-MPs have a stronger effect on the growth of common bean (Phaseolus vulgaris L.) than LDPE-MPs.
- Bio-MPs at higher concentrations capable of eliciting the responses of common bean growth.
- The results presented have demonstrated that the occurrence of MPs in soil are capable of changing the plant growth, this is a fundamental understanding for future efforts to assess risks of agricultural MPs pollution in soil-plant systems.