

Urea Loaded Hydroxyapatite Nanocarrier for Efficient Delivery of Plant Nutrients in Rice

Saheli Pradhan, Maheshwar Durgam and Damodhara Rao Mailapalli

Supporting Information

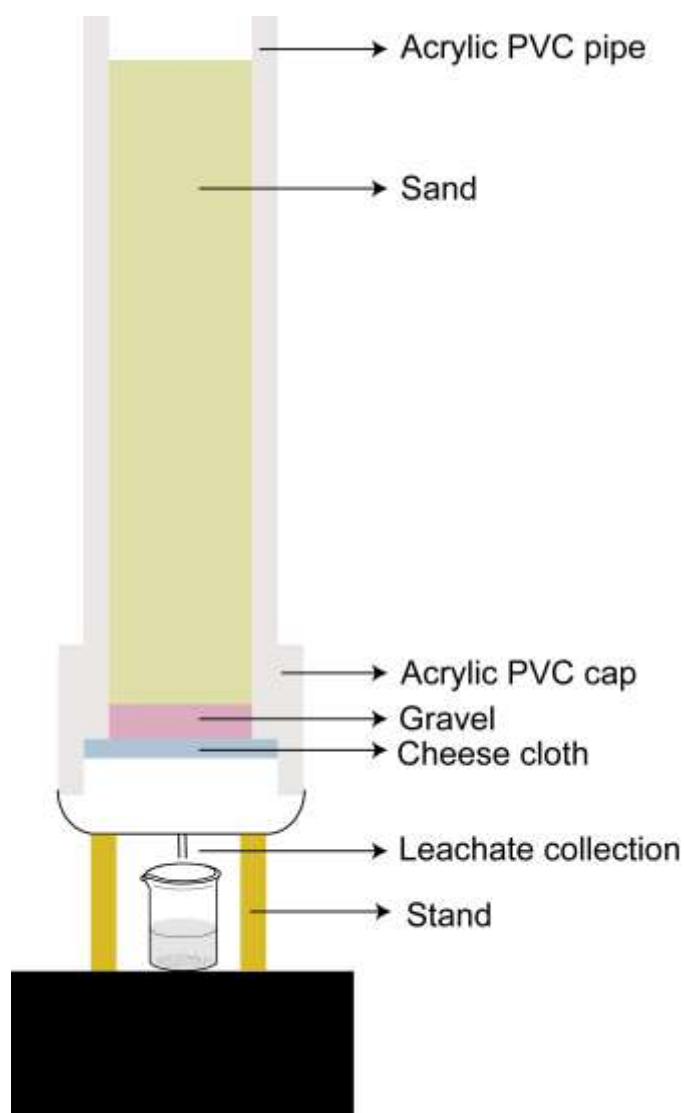


Figure S1. Schematic representation of sand column design. The inner diameter of the sand column is 4.5 cm and height 50 cm; 9 similar columns were used for the study.

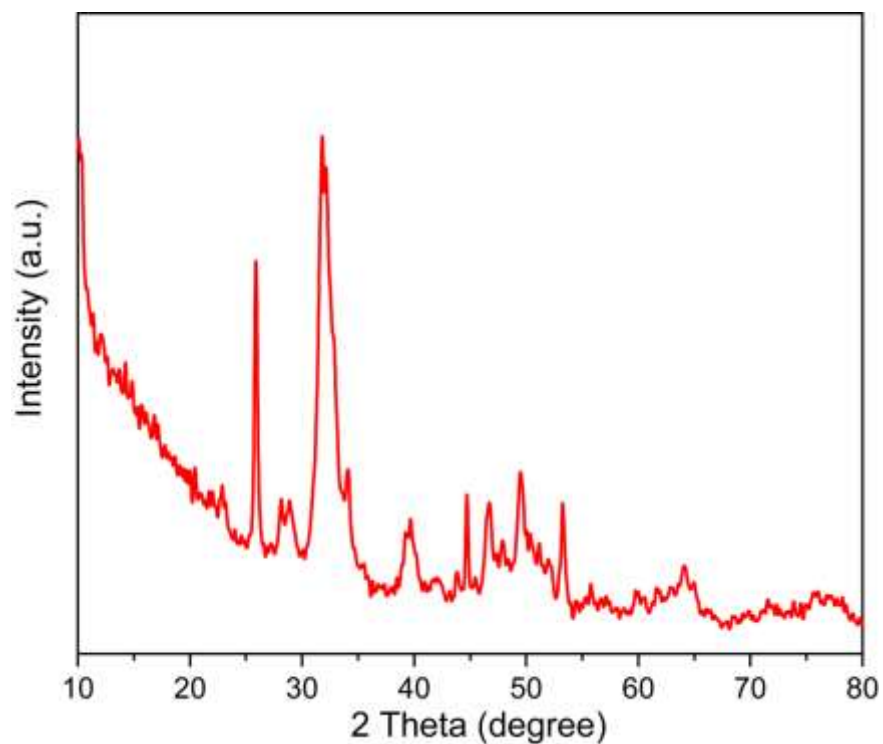


Figure S2. PXRD pattern of HANP showing its crystalline nature.

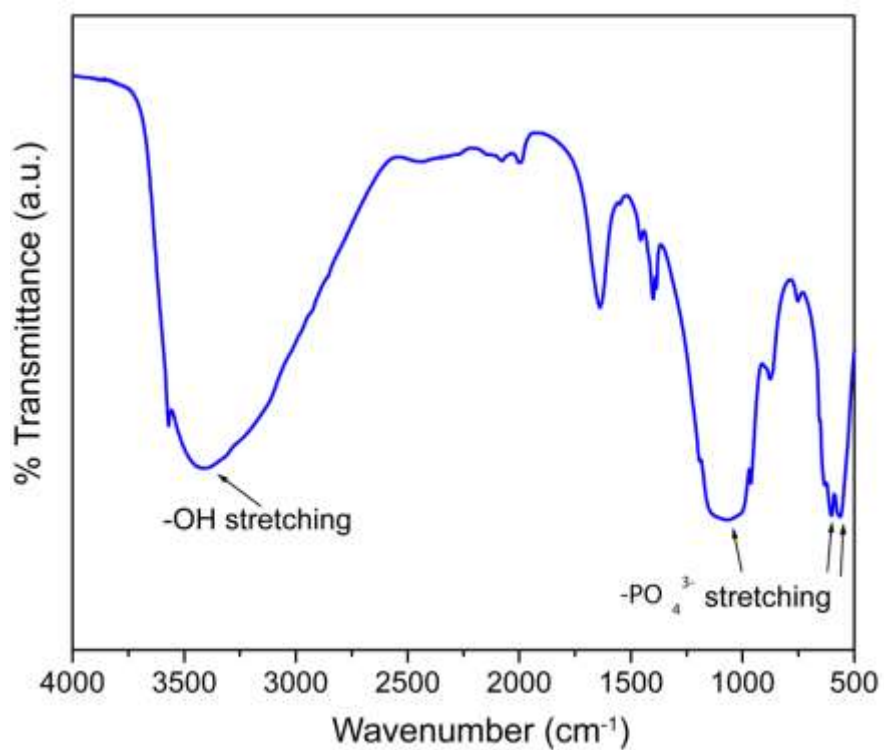


Figure S3. FTIR spectra of HANP shows its characteristic –OH and PO₄³⁻ stretching frequency. Presence of hydroxyl group also confirmed its hydrophilic nature.

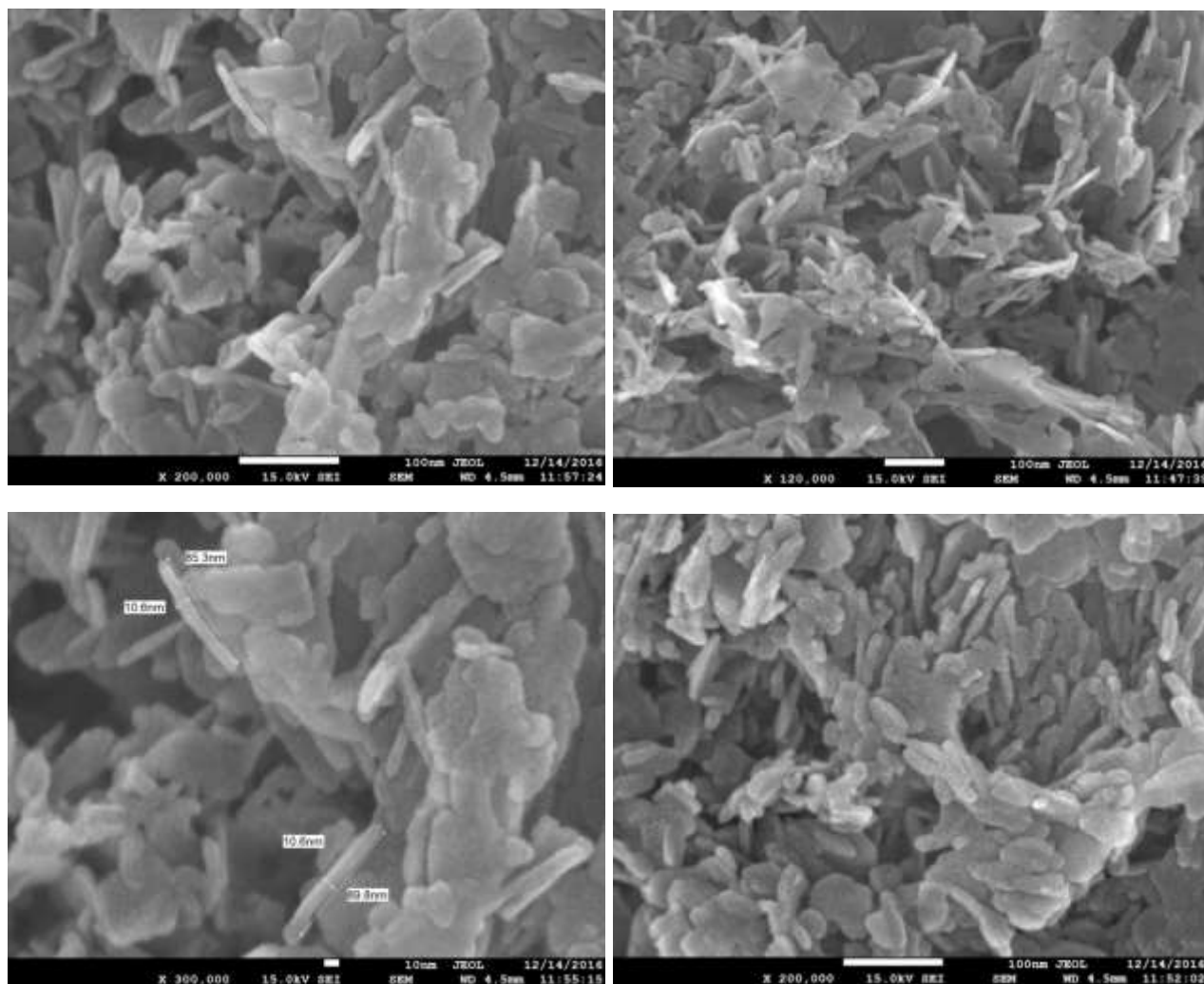


Figure S4. FESEM image of HANP which demonstrates its rod like morphology.

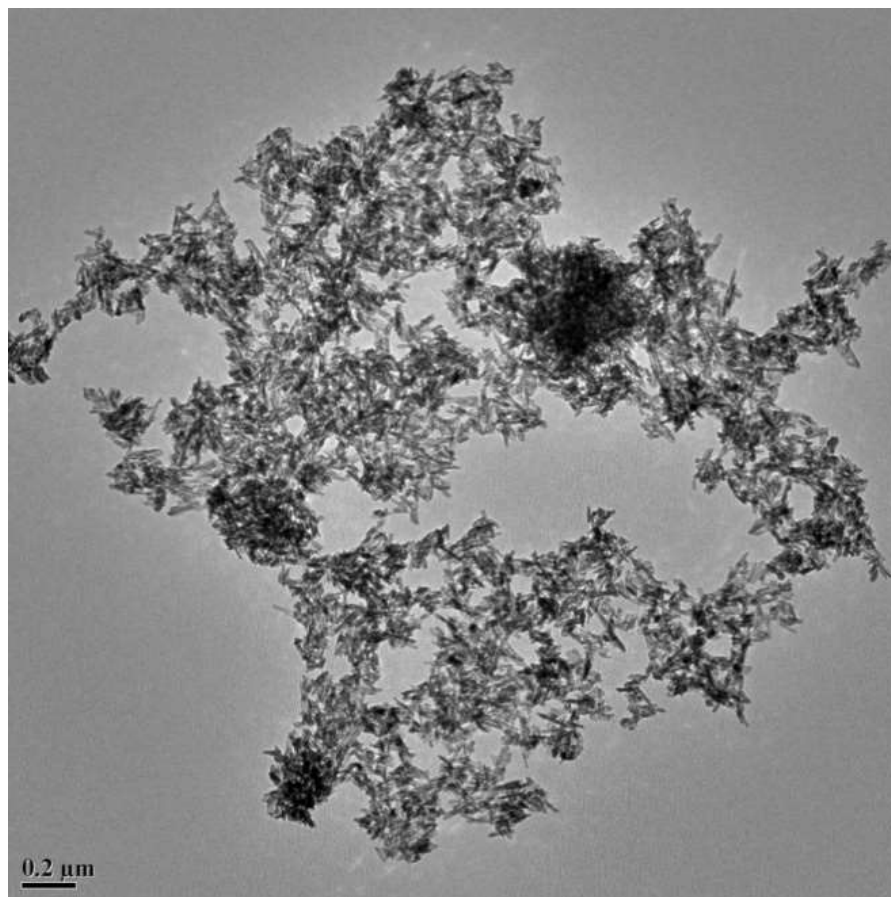


Figure S5. TEM image of HANP.

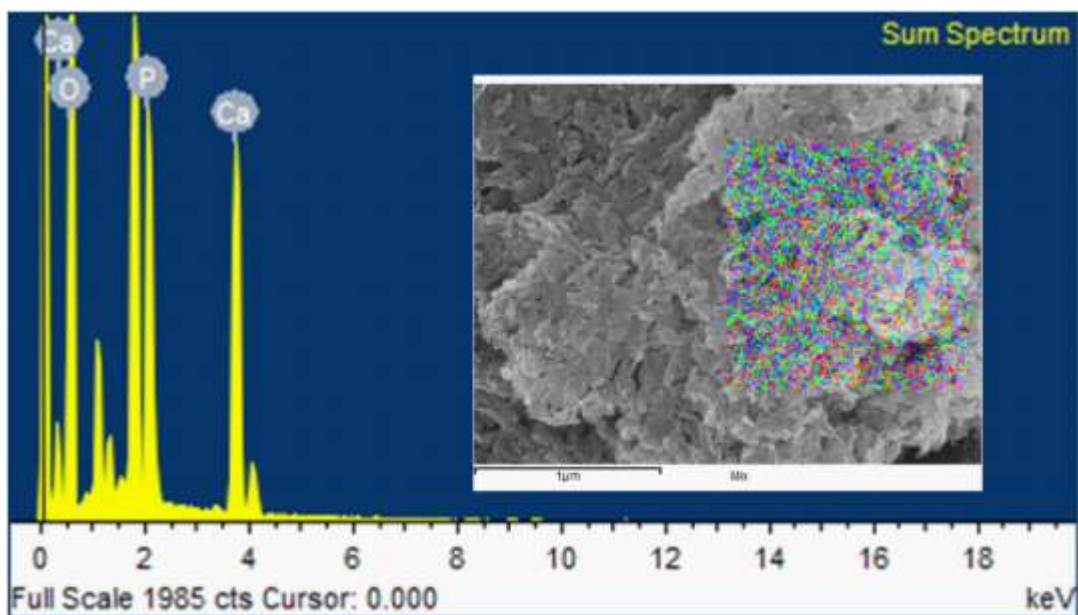


Figure S6. EDX analysis of HANP which shows Ca, O and P are the major chemical constituents, even no trace of N was detected.

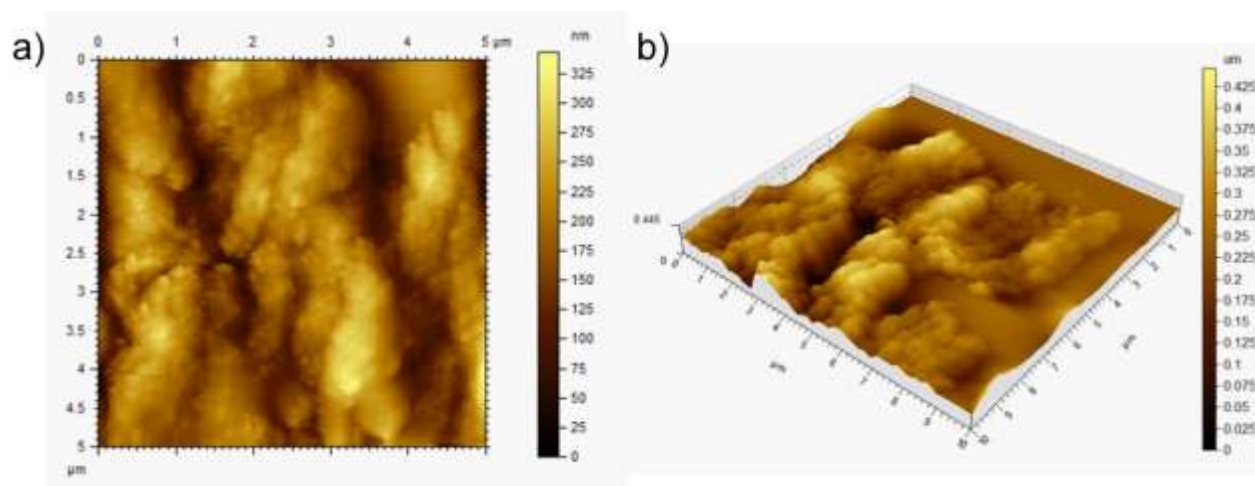


Figure S7. AFM image of HANP; (a) 2D height profile, (b) 3D height profile. Average height profile is found to be 42 nm.

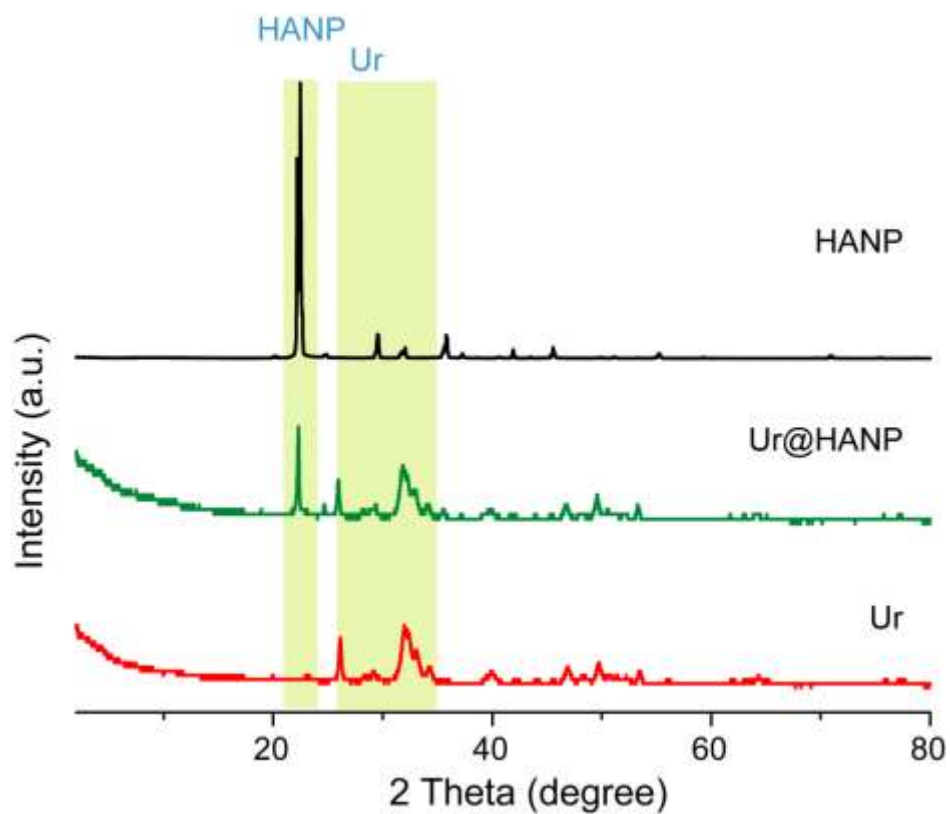


Figure S8. Comparison of PXRD pattern between HANP, Urea and Ur@HANP. In Ur@HANP characteristic Ur and HANP crystalline peak is well retained.

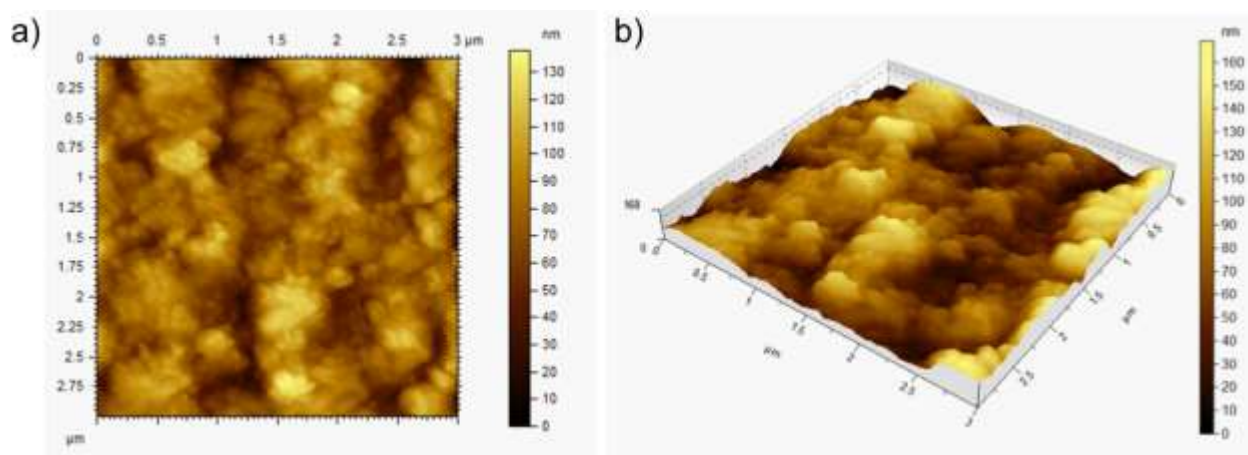


Figure S9. AFM image of Ur@HANP; (a) 2D height profile and (b) 3D height profile; morphological integrity was retained even after loading of urea on to it.

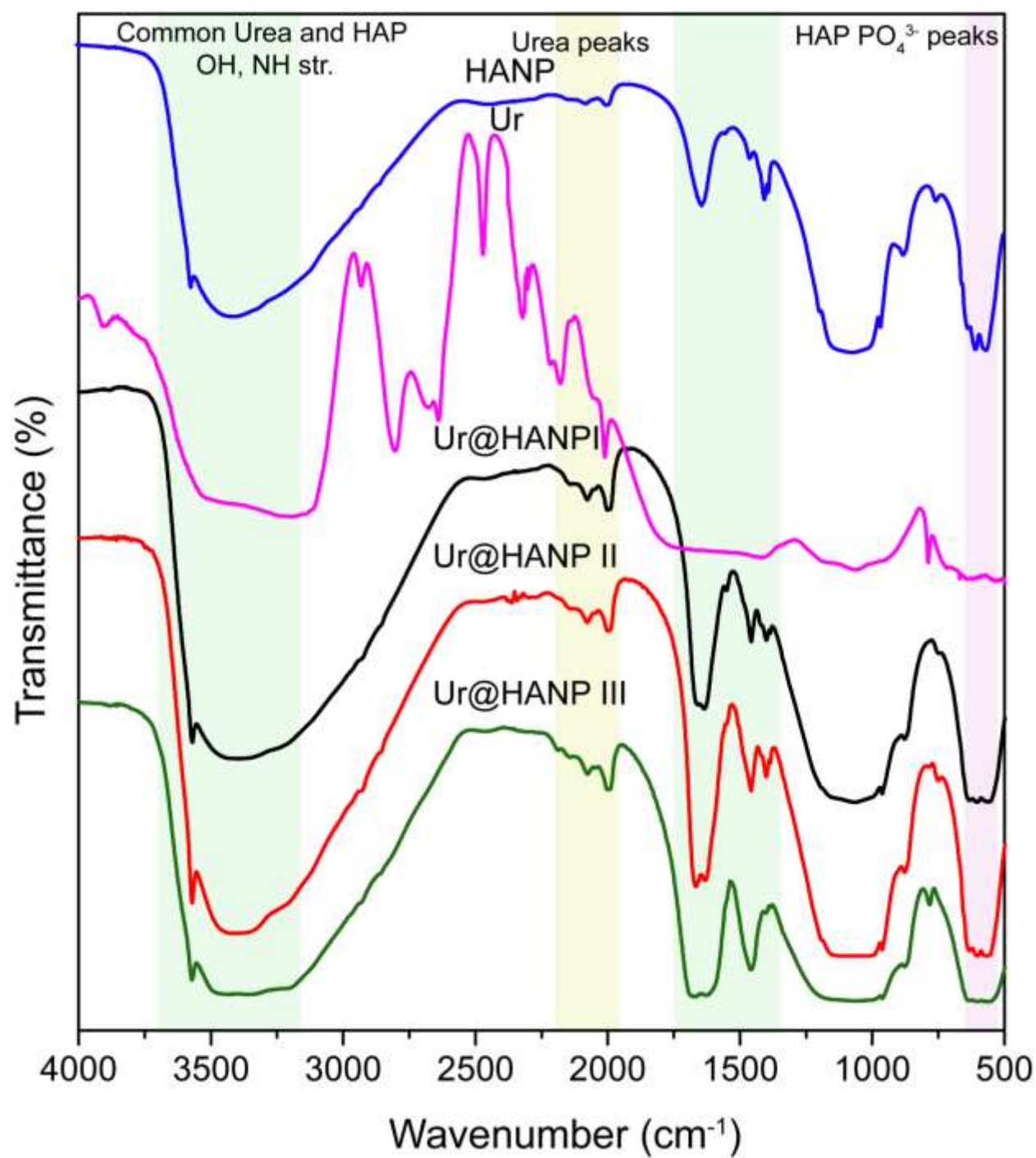


Figure S10. Comparison of FTIR spectra between HANP, Urea and Ur@HANP (three different sets). FTIR spectra of Ur@HANP shows characteristic stretching frequency of HANP and urea.

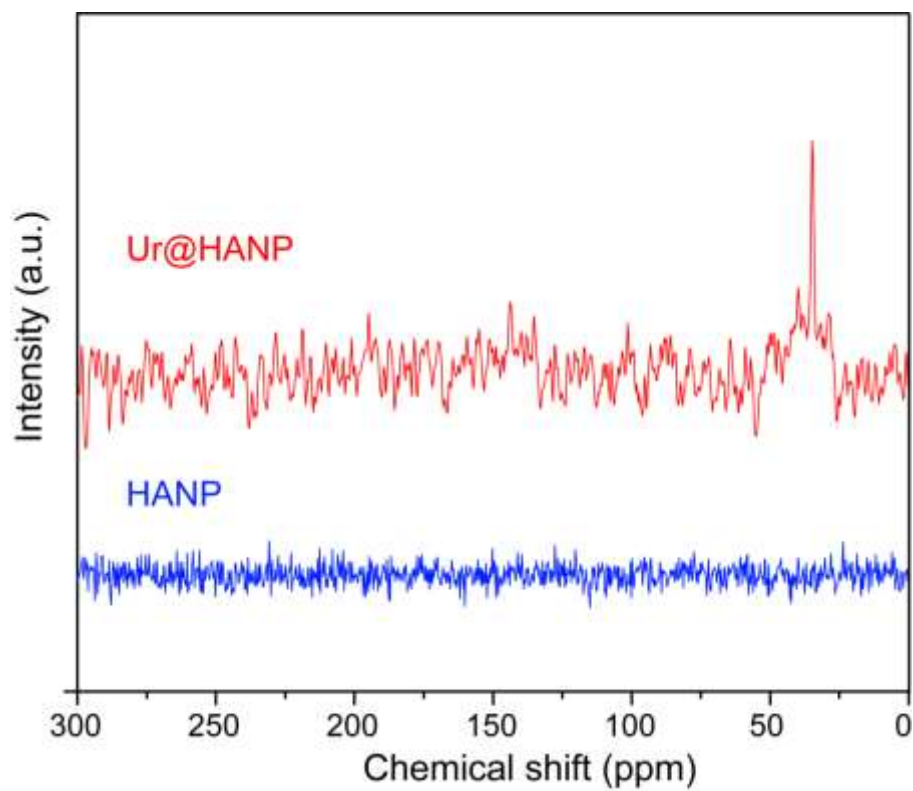


Figure S11. Comparison of solid state CP MAS ^{15}N NMR between HANP and Ur@HANP. HANP is ^{15}N NMR silent, meanwhile Ur@ HANP shows characteristic urea peak.

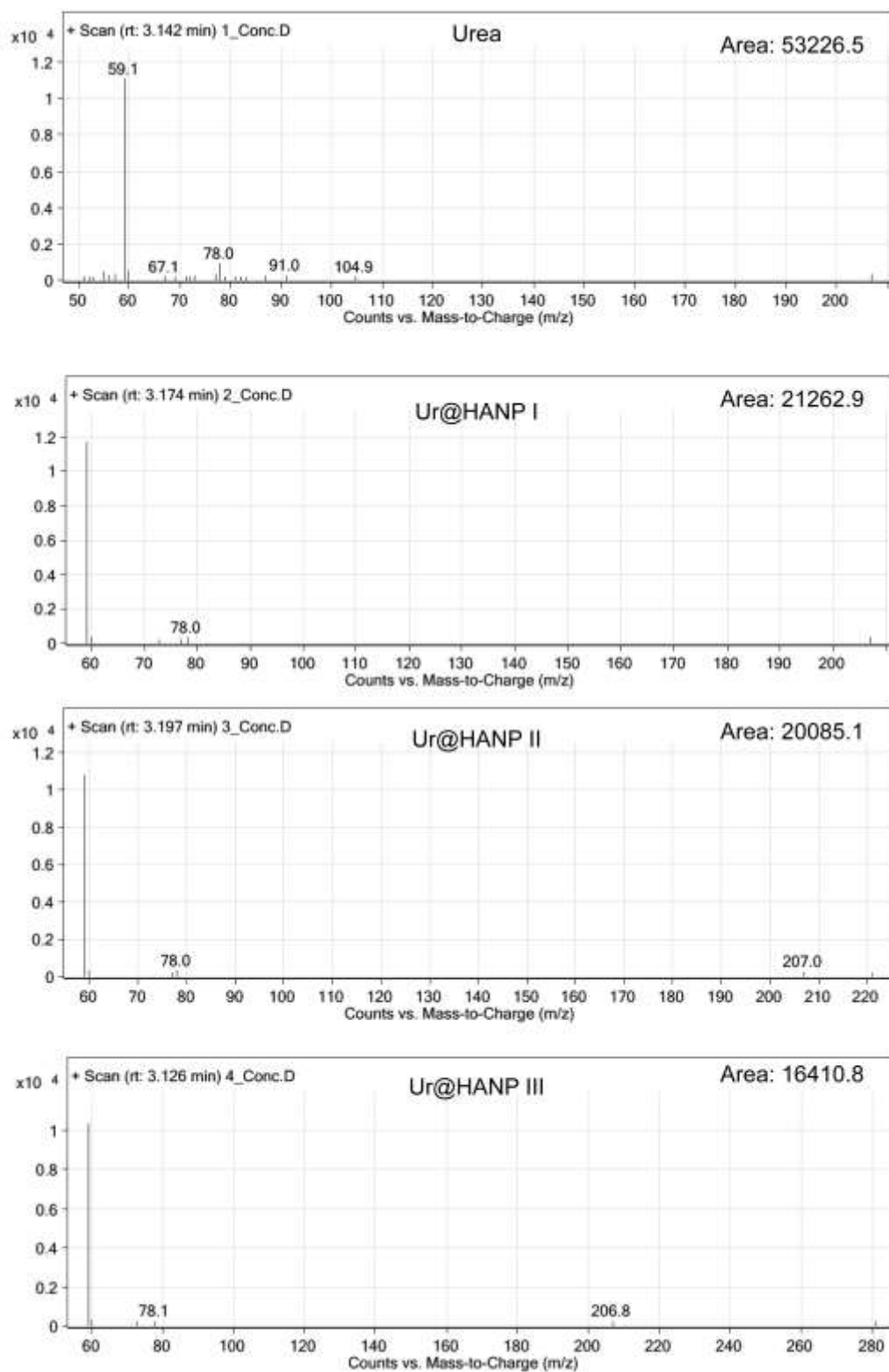


Figure S12. GCMS spectra of urea and urea loaded HANP

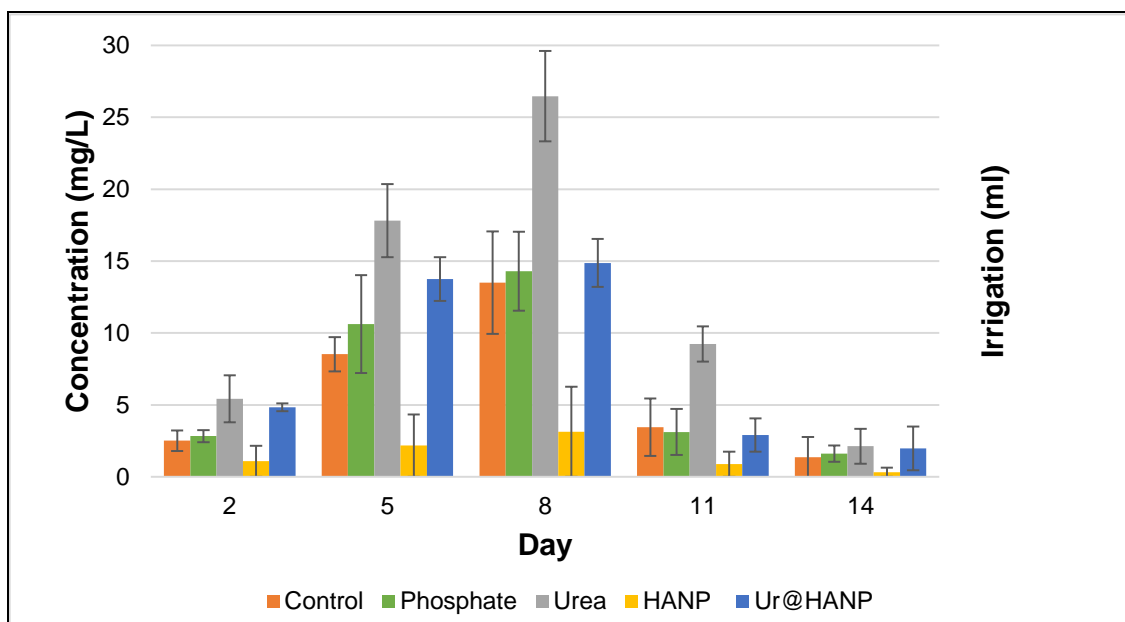


Figure S13. Nitrate concentrations in leachate samples of sand column experiment

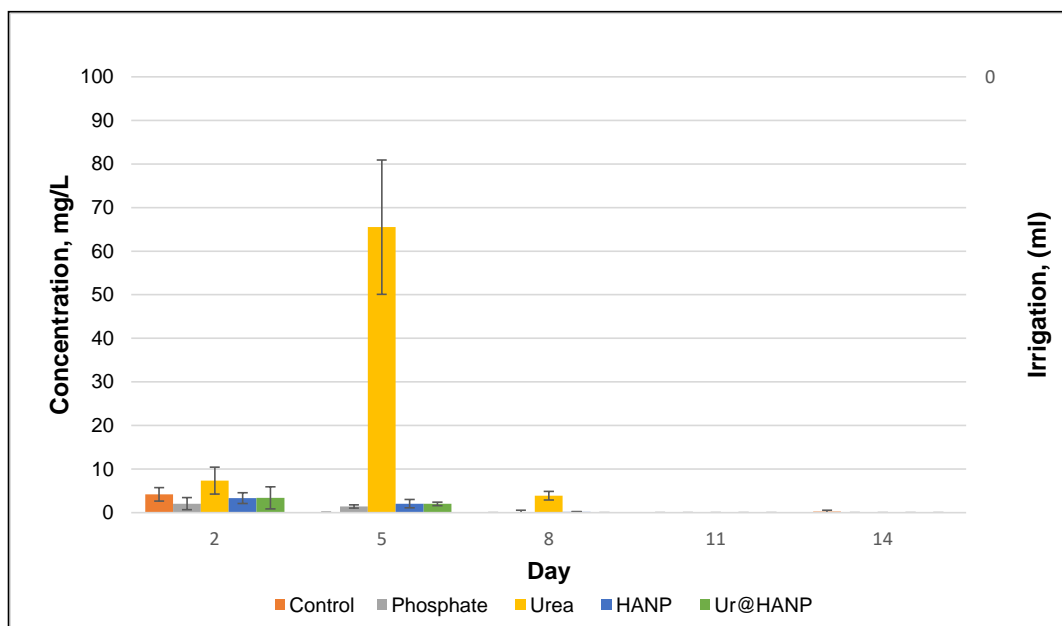


Figure S14. Ammonia concentrations in leachate samples of sand column experiment

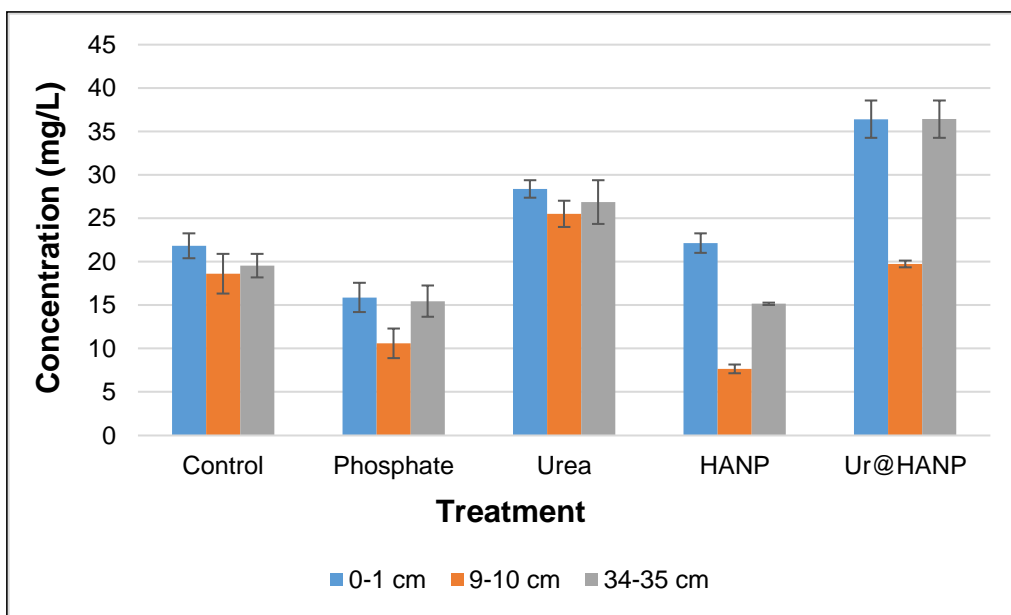


Figure S15. Distribution of total N at three different depths in the sand

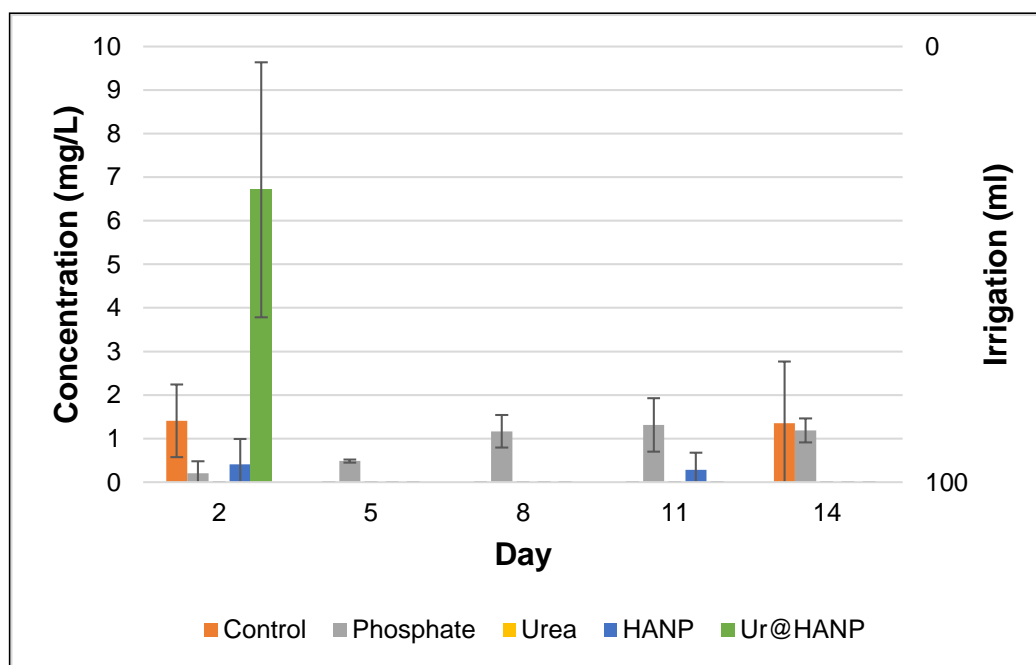


Figure S16. Ortho-P concentrations in the leachate samples of sand column experiment

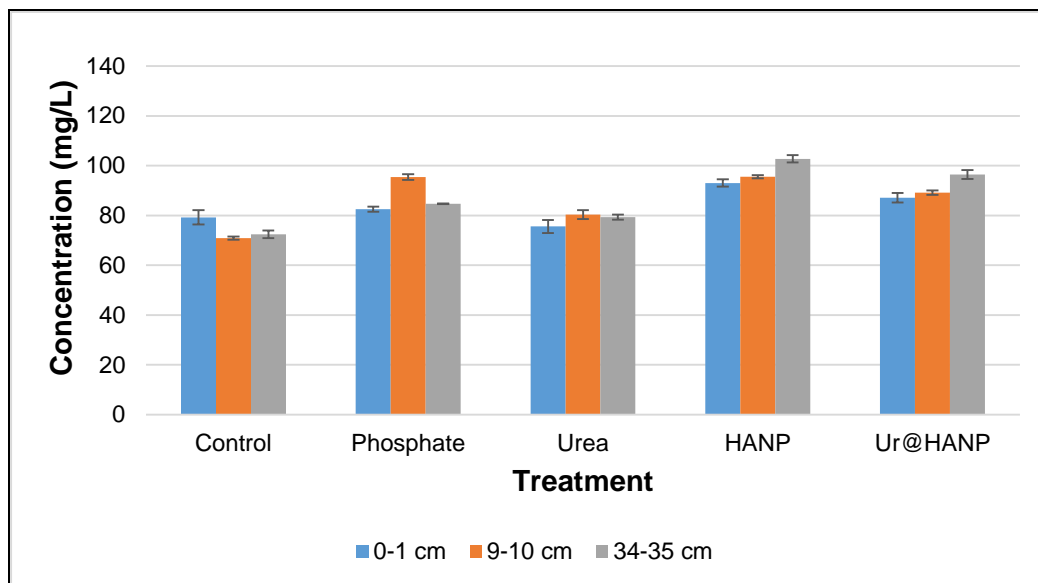


Figure S17. Distribution of total P at three different depths in the sand