Supporting Material for

Micro-flow synthesis of a formulation of phosphorus fertiliser to enhance P-content in soil and p uptake in wheat

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Table S1. Reaction scheme for the preparation of CS-ACP-Cit

Fig. S1 Schematic illustration of CFI system for the preparation of ACP-Cit

Fig. S2 Schematic illustration of CFI system for the preparation of CS-ACP-Cit

Fig. S3 X-ray diffraction patterns of (a) ACP, (b) ACP-Cit, (c) CS-ACP-Cit, β-TCP (JCPDS no. 09-0169) and hydroxyapatite (JCPDS no. 09-0432)

Fig. S4 Size distribution of commercial apatite and the prepared composites: ACP; phosphate-citrate (ACP-Cit) and chitosan-phosphate-citrate (CS-ACP-Cit-8)

Fig. S5 Scanning electron microscopy (SEM) images of prepared composites: (A) ACP; (B) ACP-Cit and (C) CS-ACP-Cit

Fig. S6 Wheat growing stages

Table S1. Reaction scheme for the preparation of CS-ACP-Cit

Reaction	Ref.
$Ca^{2+} + H_2PO_4^- + OH^- \rightarrow$ ACP + H_2O	[1]
Surface association of citrate on ACP: ACP + $C_6H_5O_7^{3-} \rightarrow$ ACP–$C_6H_5O_7^{3-}$	[2]
Incorporation of citrate into ACP: ACP + $C_6H_5O_7^{3-} \rightarrow$ ACP– ($C_6H_5O_7$) + PO_4^{3-}	[3]
Chi + $C_6H_5O_7^{3-} \rightarrow$ Chi–$C_6H_5O_7^{3-}$–Chi	[4]

Note: Chi = chitosan

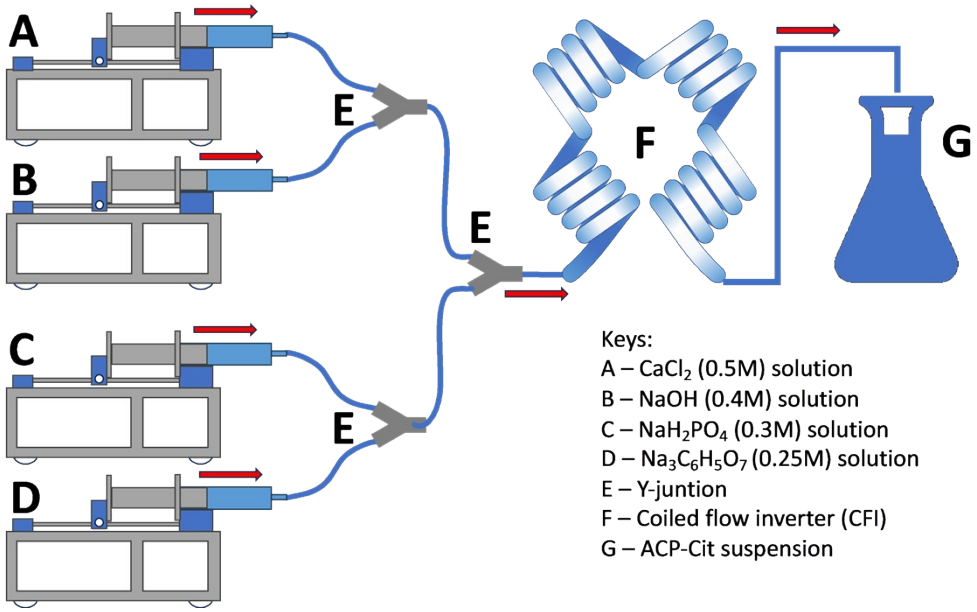

Fig. S1 Schematic illustration of CFI system for the preparation of ACP-Cit

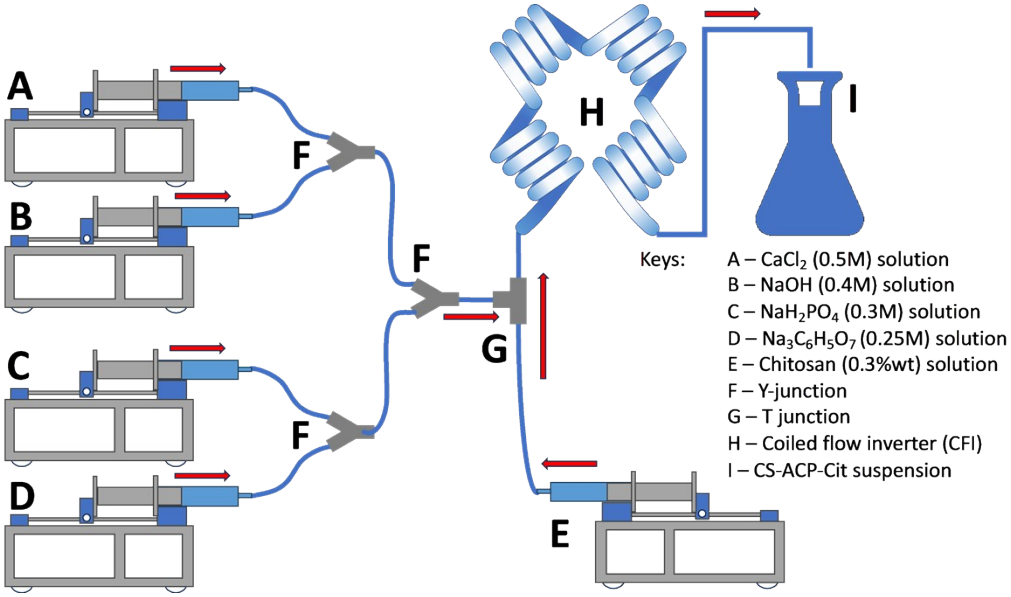

Fig. S2 Schematic illustration of CFI system for the preparation of CS-ACP-Cit

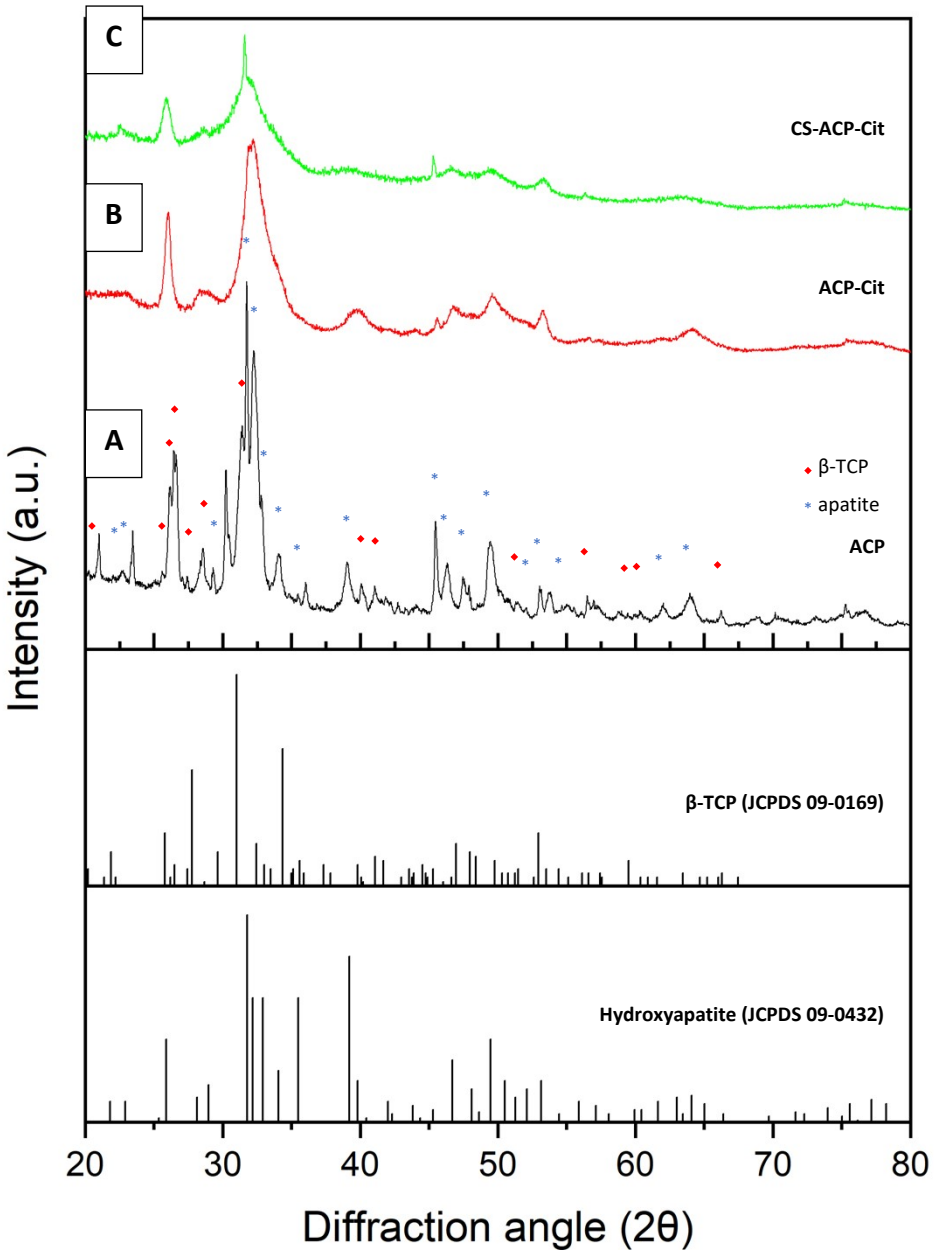

Fig. S3 X-ray diffraction patterns of (A) ACP, (B) ACP-Cit, (C) CS-ACP-Cit, β-TCP (JCPDS no. 09-0169) and hydroxyapatite (JCPDS no. 09-0432).

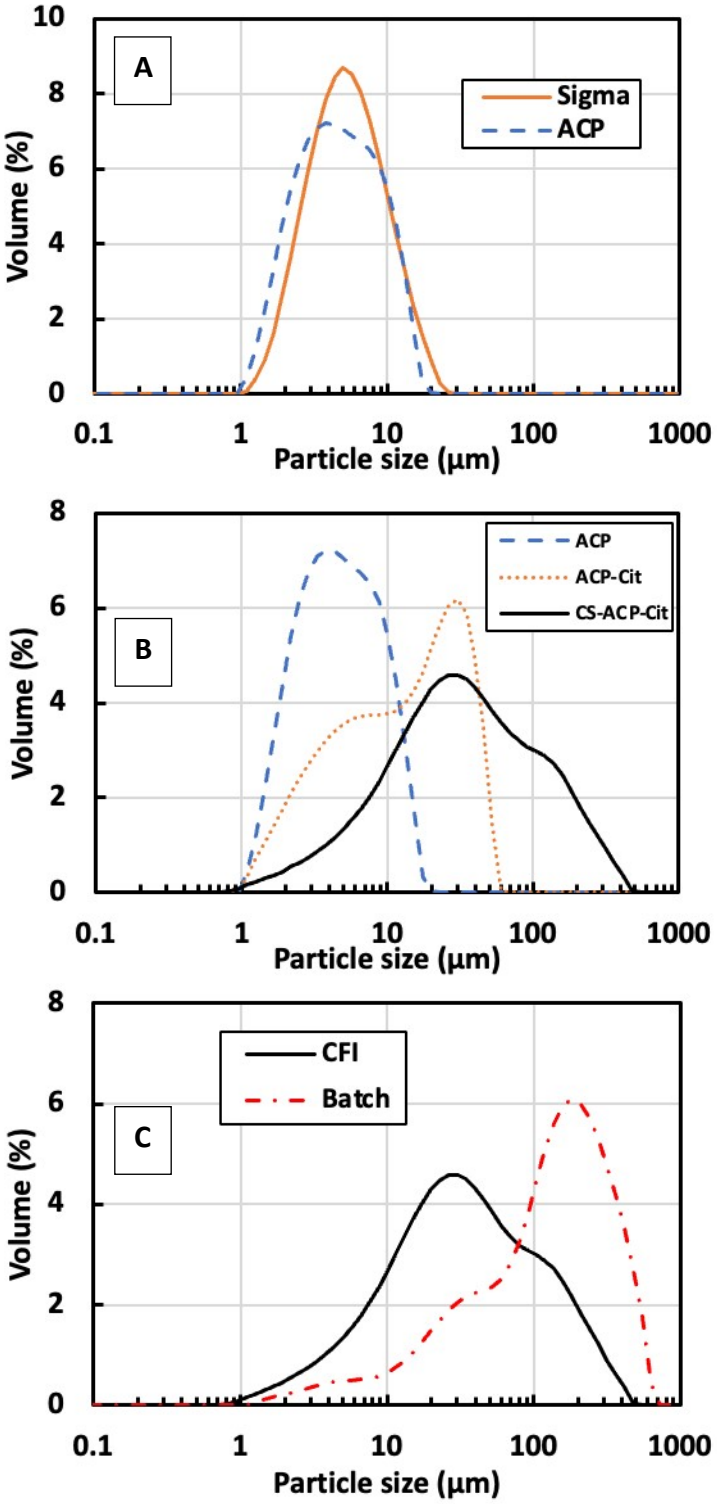

Fig. S4 Size distribution of commercial apatite and prepared composites.

A: Commercial apatite (Sigma Aldrich) and ACP;

B: ACP, ACP-Cit and CS-ACP-Cit prepared by coiled flow inverter (CFI);

C: CS-ACP-Cit prepared by batch and CFI

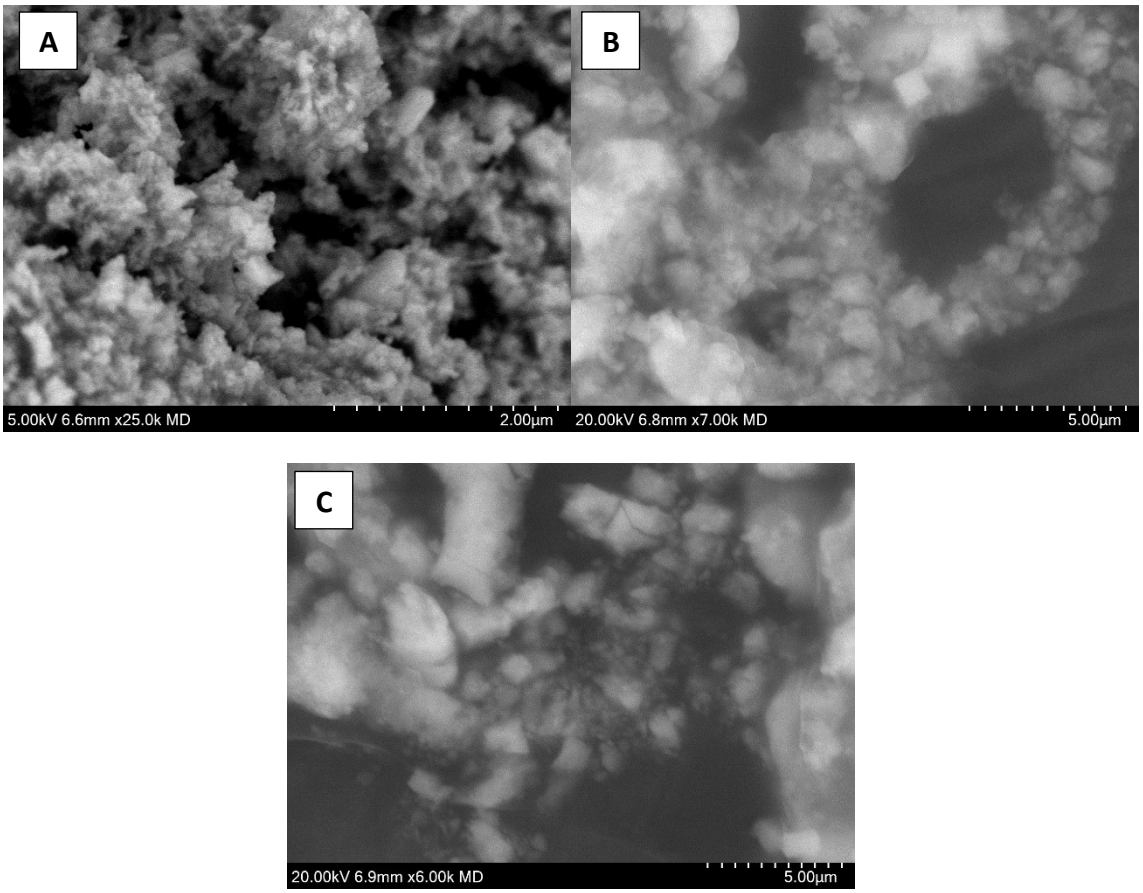

Fig. S5 Scanning electron microscopy (SEM) images of prepared composites: (A) ACP; (B) ACP-Cit and (C) CS-ACP-Cit

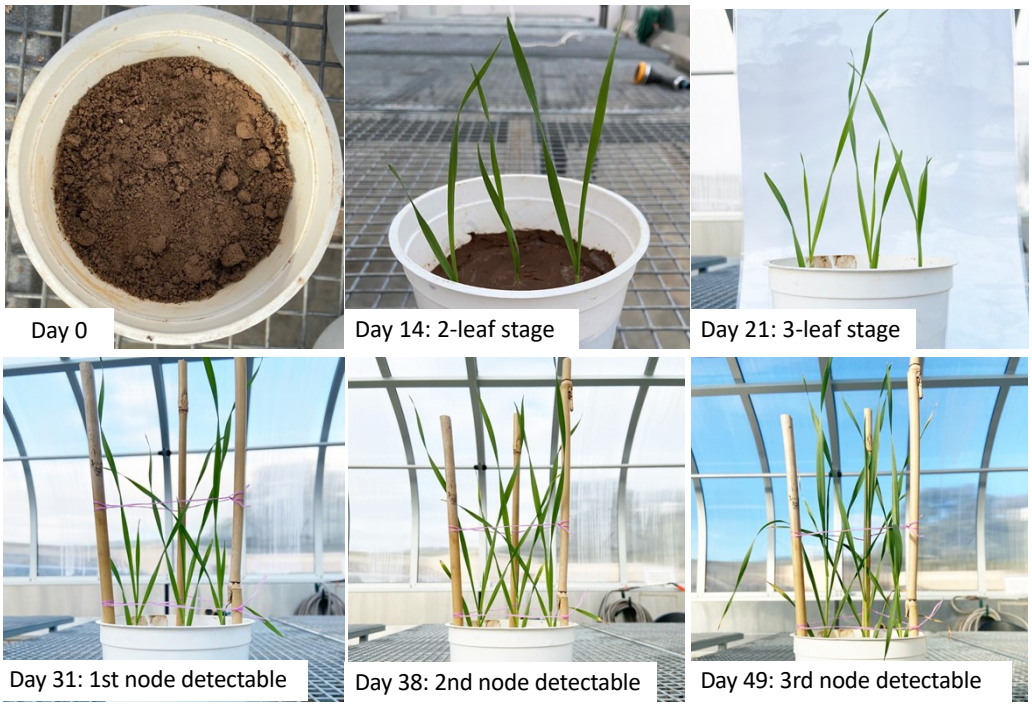

Fig. S6 Wheat growing stages

References

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