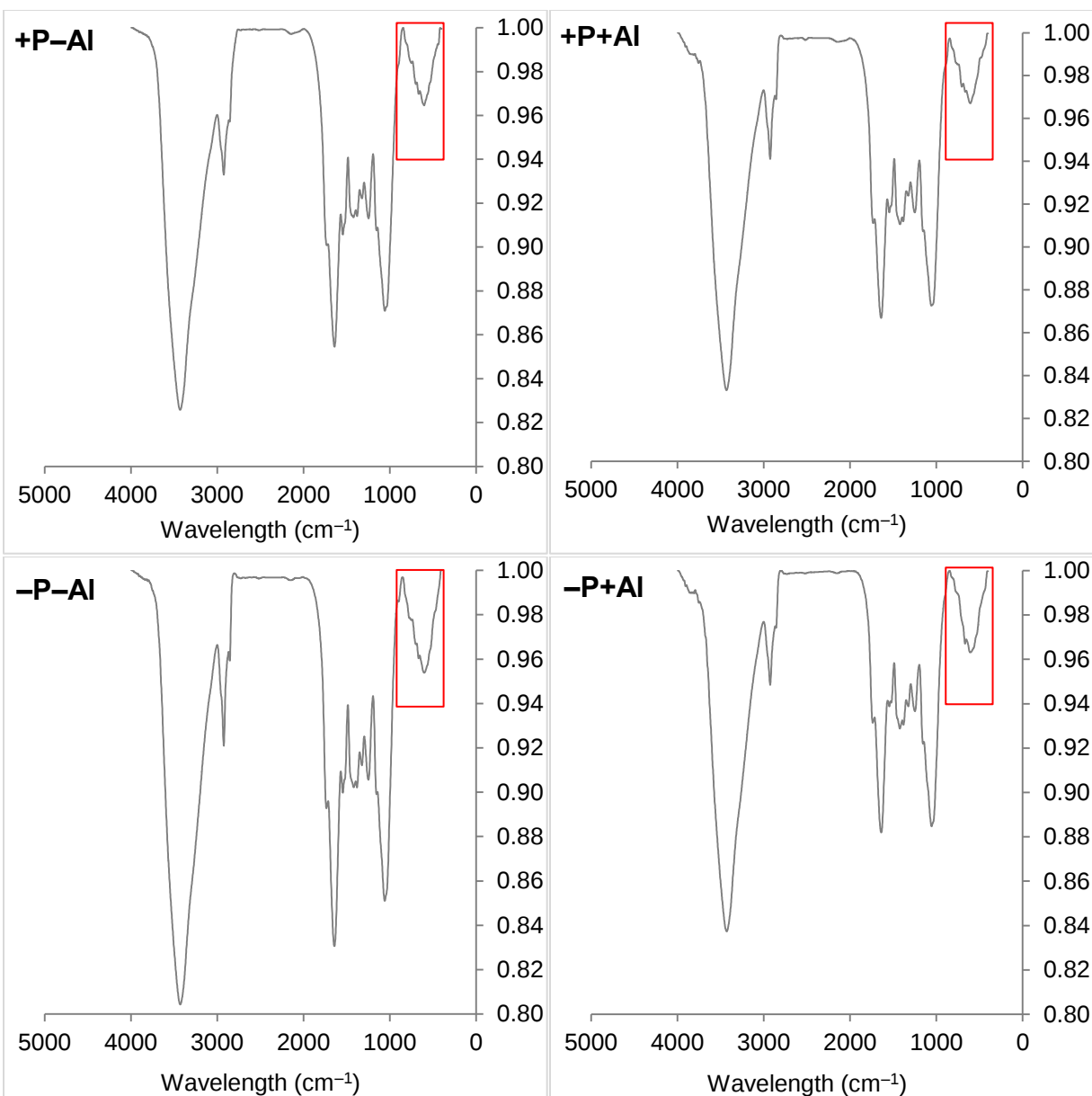


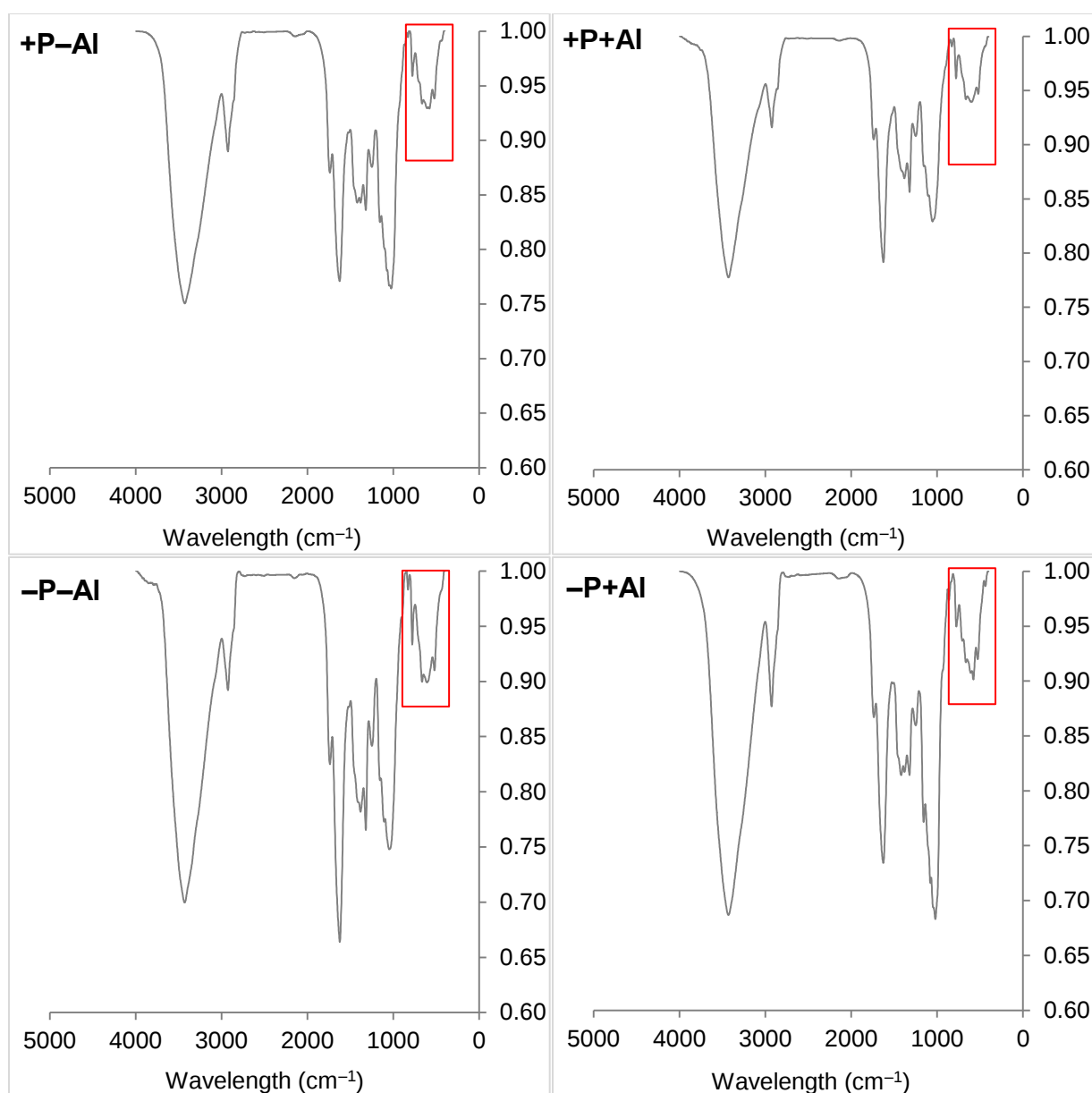
Online Resource 1 The composition of nutrient solution used in this study before starting the Al treatments (pH 5.8)

	+P	-P
	Macronutrients (mM)	
KNO ₃	6.0	6.0
Ca(NO ₃) ₂ ·4H ₂ O	4.0	4.0
NH ₄ H ₂ PO ₄	2.0	---
MgSO ₄	1.0	1.0
NH ₄ Cl	---	2.0
	Micronutrients (μM)	
KCl	50	50
H ₃ BO ₃	25	25
MnSO ₄ ·H ₂ O	2.0	2.0
ZnSO ₄ ·7H ₂ O	2.0	2.0
CuSO ₄ ·5H ₂ O	0.5	0.5
H ₂ MoO ₄	0.5	0.5
Fe-EDTA	20	20

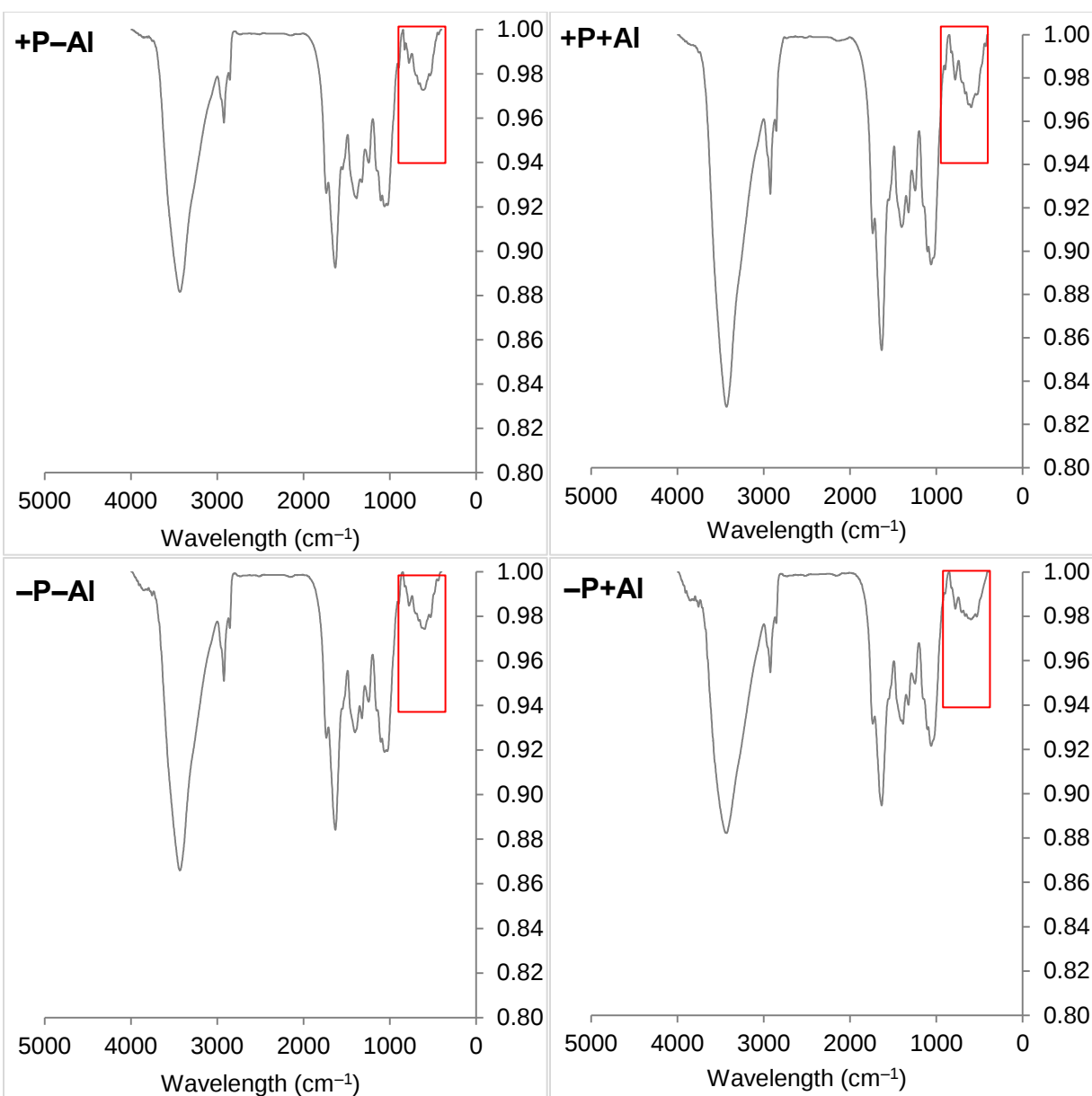
Online Resource 2 The composition of low-strength nutrient solution used in this study during the Al treatments (pH 4.0). The free ion activities were calculated using GEOCHEM-PC



Online Resource 3 The FTIR spectrum (transmittance) obtained for the **(old) leaf** samples in *A. cruentus* grown for two weeks under sufficient (+P) or deficient (-P) supply of phosphorus then were treated without (-Al), or with Al (+Al, 60 μ M free Al³⁺ activity) simultaneous with different P treatments for two weeks. The spectrum in the range of 750-350 cm⁻¹ which has been assigned to PO₄³⁻ was designated with a red color box



Online Resource 4 The FTIR spectrum (transmittance) obtained for the **stem** samples in *A. cruentus* grown for two weeks under sufficient (+P) or deficient (–P) supply of phosphorus then were treated without (–Al), or with Al (+Al, 60 μM free Al^{3+} activity) simultaneous with different P treatments for two weeks. The spectrum in the range of $750\text{--}350\text{ cm}^{-1}$ which has been assigned to PO_4^{3-} was designated with a red color box



Online Resource 5 The FTIR spectrum (transmittance) obtained for the **root** samples in *A. cruentus* grown for two weeks under sufficient (+P) or deficient (-P) supply of phosphorus then were treated without (-Al), or with Al (+Al, 60 μ M free Al³⁺ activity) simultaneous with different P treatments for two weeks. The spectrum in the range of 750-350 cm⁻¹ which has been assigned to PO₄³⁻ was designated with a red color box