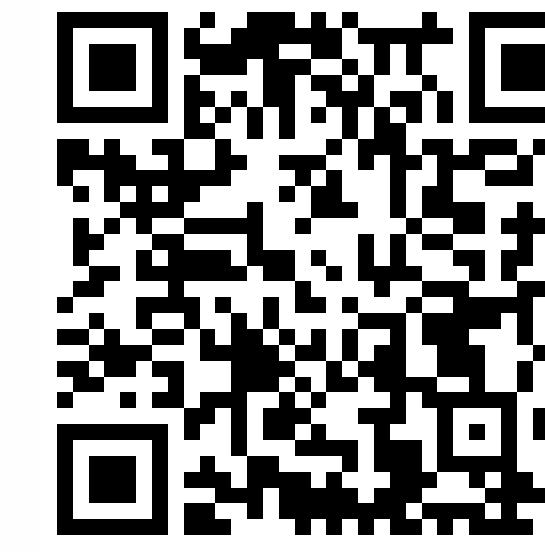


Linking root phosphatase activity to root chemical and morphological traits across species: a global analysis



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1. How do plants balance RPA with diverse P strategies?

Root phosphatase activity (RPA) is a critical root functional trait representing plant's ability to hydrolyze organic P fraction which dominates the soil P pool. Despite the fact that plants employ diverse P-acquisition strategies, it is unclear how plants balance RPA, an overlooked physiological strategy with other strategies. Here we ask:

1. How does RPA differ between plant functional groups?
2. How does RPA correlate with other root functional traits associated with plant nutrient strategies?
3. Where is RPA in the multidimensional global root economics space (RES)?

2. We compiled paired root trait data for 258 species

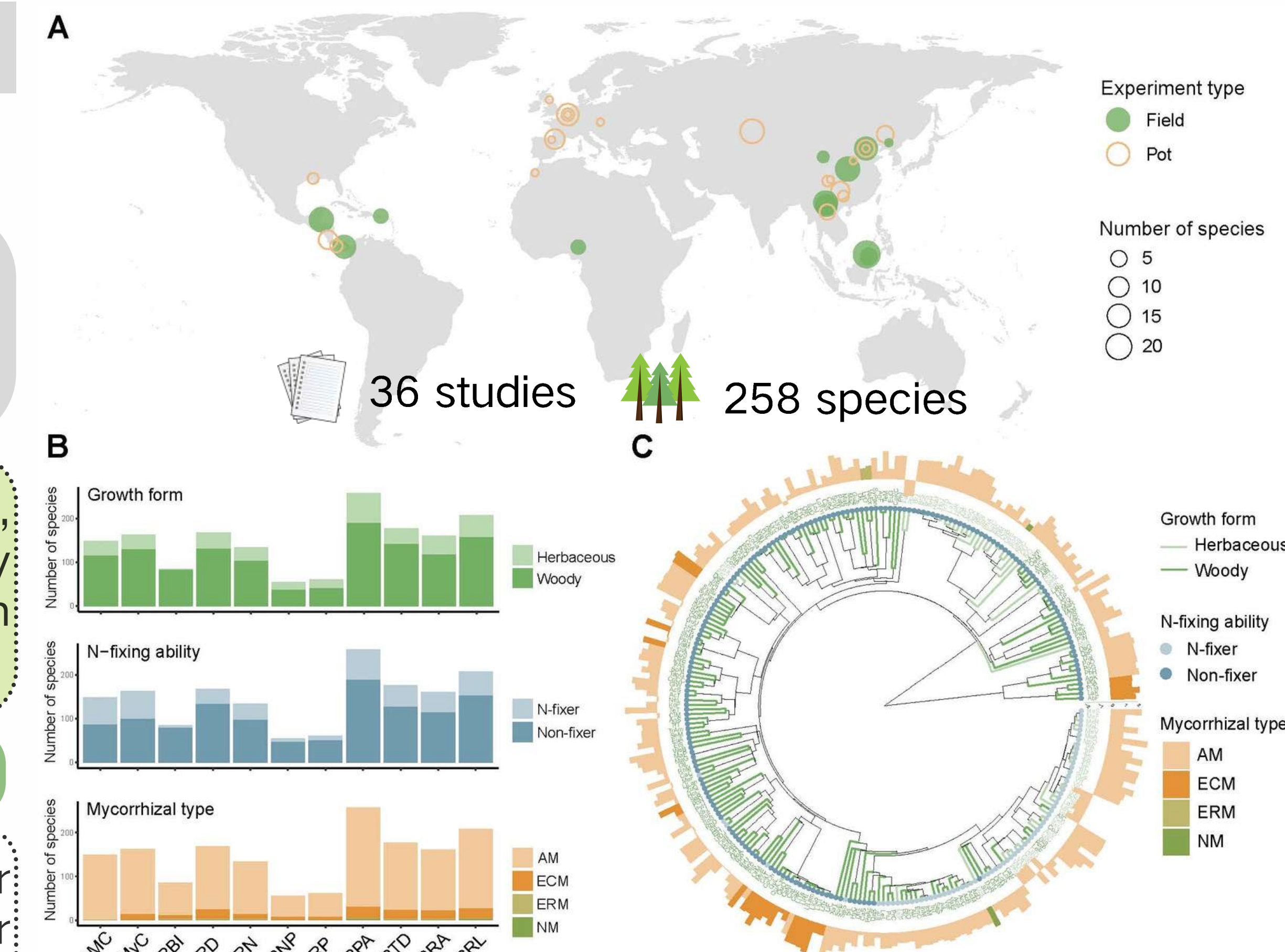
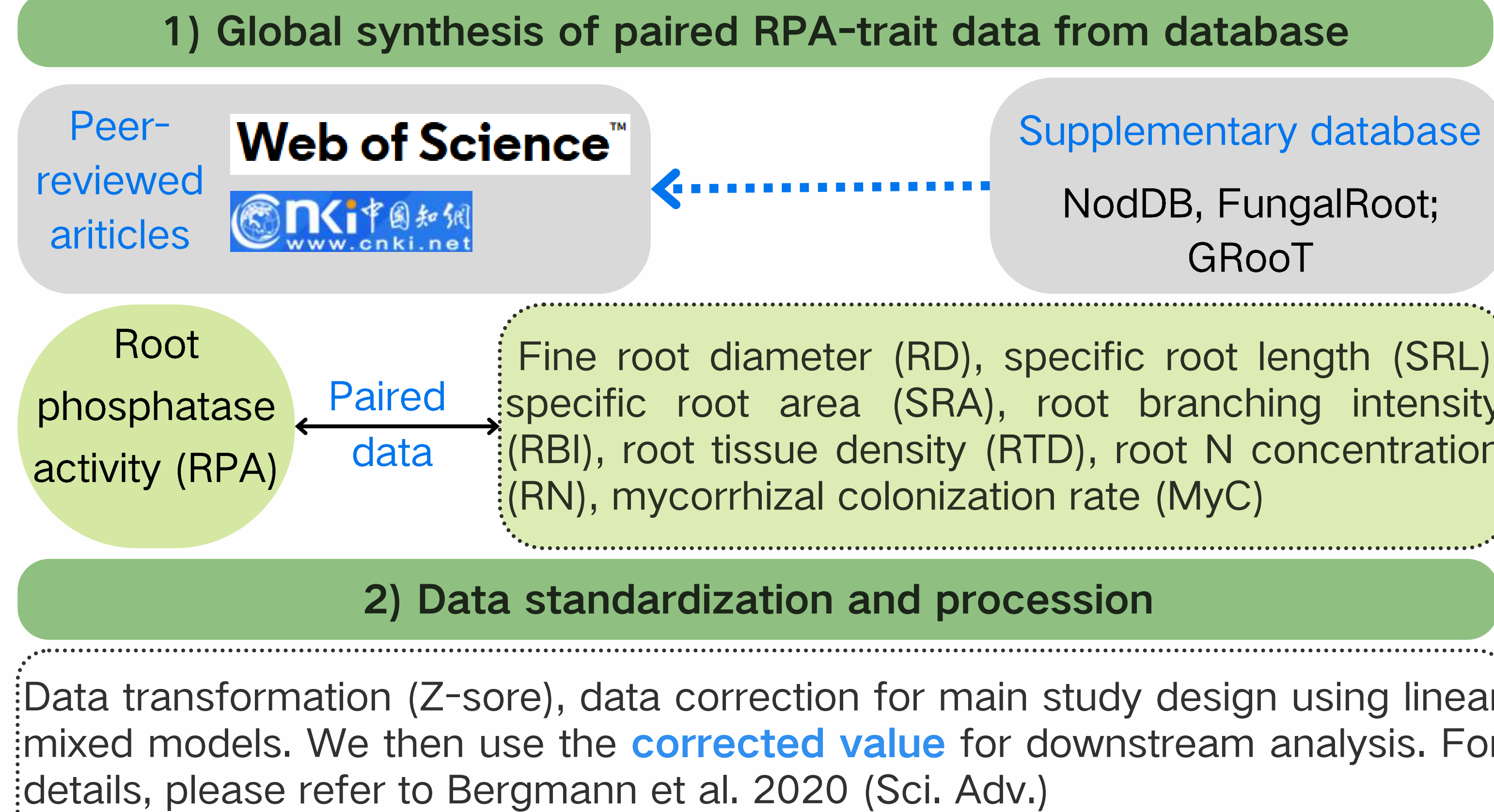


Fig. 1 Global distribution of studies included (A), sample sizes (B), and the phylogenetic coverage of our dataset (C).

3. Results

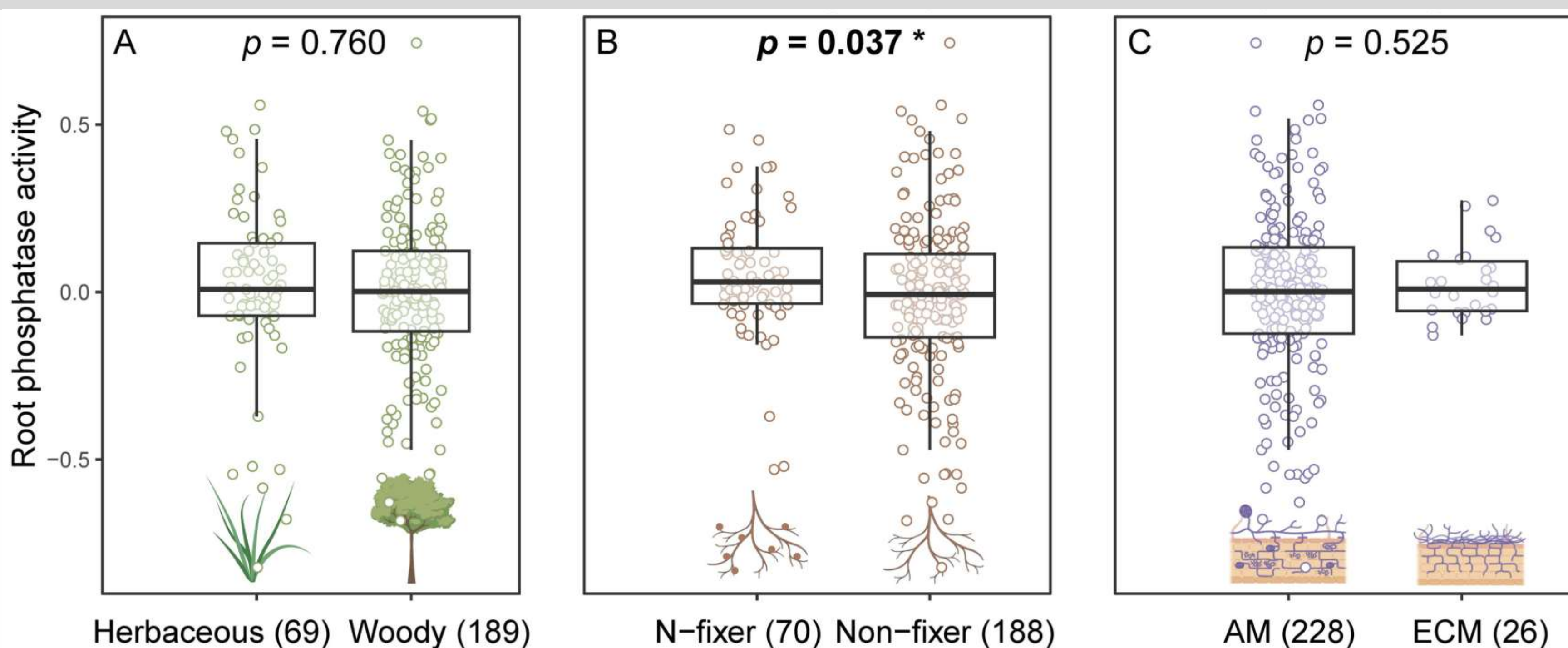


Fig. 2 N-fixing species show higher P-mining ability from organic P than non-fixers, whereas there are no differences in RPA between other functional groups.

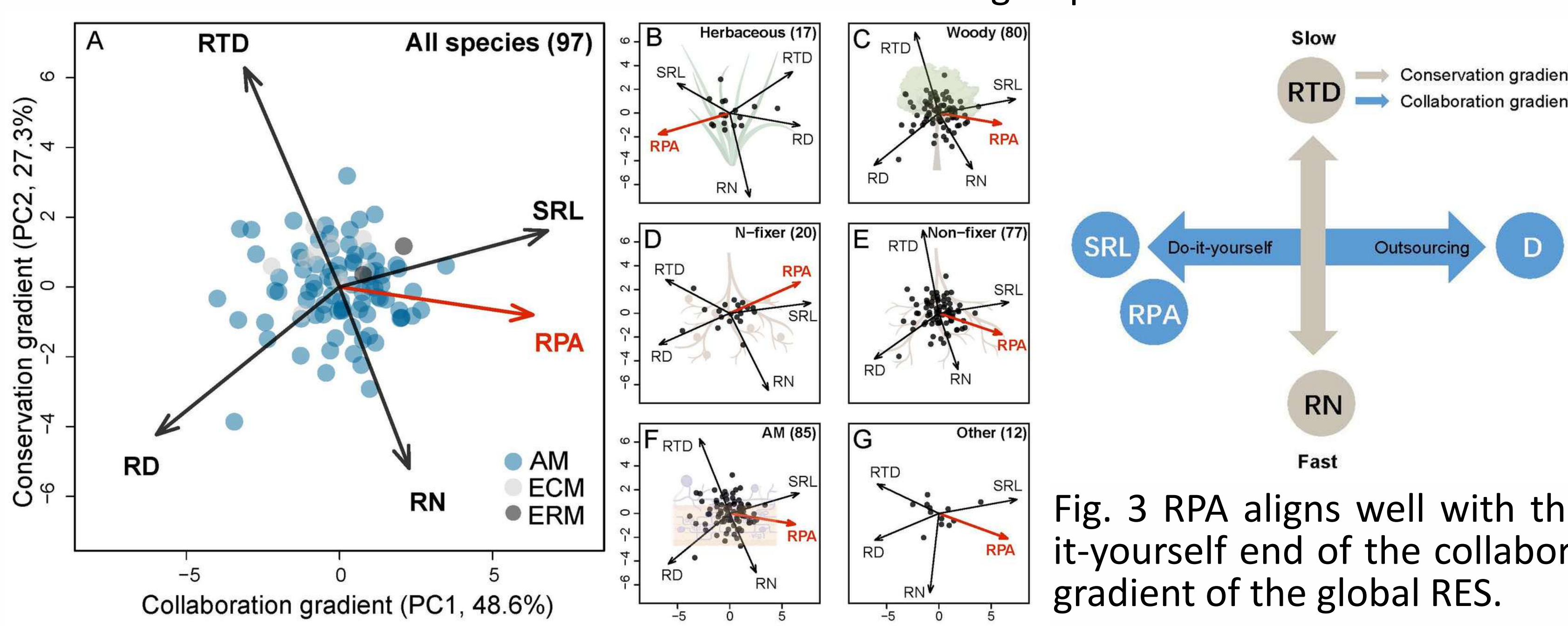


Fig. 3 RPA aligns well with the do-it-yourself end of the collaboration gradient of the global RES.

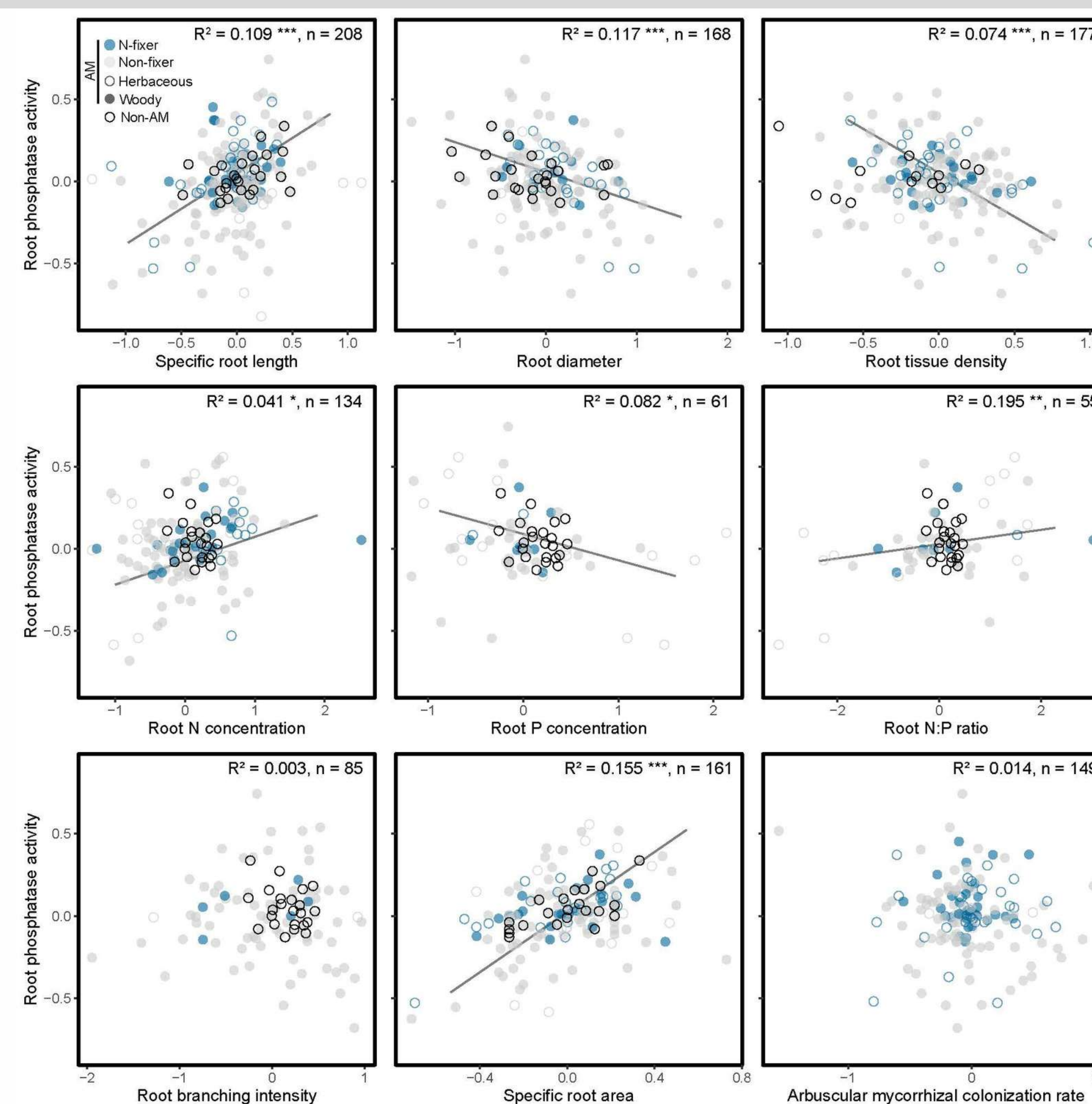


Fig. 4 Relationships between RPA and other root traits across 258 global species.

1. N-fixing species show higher P acquisition ability than non-fixing species.
2. Plants efficiently balance RPA with root morphological strategies for optimal root economy, while RPA is largely independent with mycorrhizal association and root architecture.
3. RPA is a do-it-yourself strategy aligning with the collaboration gradient of the global root economics space.

Plant group	SRL	RD	RTD	RN	RP	RNP	RBI	SRA	MyC
All	+	-	-	+	-	+	+	+	+
Woody	+	-	-	+	+	+	+	+	-
Herbaceous	+	-	-	+	-	+	+	+	+
N-fixer	+	-	-	+	+	+	+	+	+
Non-fixer	+	-	-	+	-	+	+	+	-
AM	+	-	-	+	-	+	+	+	+
ECM	+	-	-	+	-	+	+	+	-

Fig. 5 Summary of the relationships between RPA and other traits.