A Manuscript Microscope 'Sentence Audit' of:

Bacterial-type plant ferroxidases tune local phosphate sensing in root development

What is the Manuscript Microscope Sentence Audit?

The Manuscript Microscope Sentence Audit is a research paper introspection system that parses the text of your manuscript into minimal sentence components for faster, more accurate, enhanced proofreading.

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Manuscript Authors: Christin Naumann, Marcus Heisters, Wolfgang Brandt, Philipp Janitza, Carolin Alfs, Nancy Tang, Alicia Toto Nienguesso, Joerg Ziegler, Richard Imre, Karl Mechtler, Yasin Dagdas, Wolfgang Hoehenwarter, Gary Sawers, Marcel Quint & Steffen Abel

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Features of the Sentence Audit:

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2. Each individual sentence is further parsed into Minimal Sentence Components for a deeper review of the clarity, composition and consistency of the language you used.

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The combined approaches ensure easier, faster, more effective proofreading.

Comments and Caveats:

• The sentence parsing is achieved using a prototype natural language processing pipeline written in Python and may include occasional errors in sentence segmentation.

• Depending on the source of the input text, the Sentence Audit may contain occasional html artefacts that are parsed as sentences (E.g. "Download figure. Open in new tab").

• Always consult the original research paper as the true reference source for the text.

Contact Information:

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All queries, feedback or suggestions are also very welcome.

Research Paper Sections:

The sections of the research paper input text parsed in this audit.

Section No.	Headings	Sentences
Section: 1	Abstract	9
Section: 2	Introduction	18
N/A	--- --- --- --- --- --- ---	0
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The Sentence Audit Of The Research Paper

Title # Bacterial-type plant ferroxidases tune local phosphate sensing in root development

S1 [001] Abstract

S1 [002] Fluctuating bioavailability of inorganic phosphate (Pi), often caused by complex Pi-metal interactions, guide root tip growth and root system architecture for maximizing the foraged soil volume.

Fluctuating bioavailability ...
... of inorganic phosphate ...
... (Pi), ...
... often caused ...
... by complex Pi-metal interactions, ...
... guide root tip growth ...
... and root system architecture ...
... for maximizing the foraged soil volume.

S1 [003] Two interacting genes in Arabidopsis thaliana, PDR2 (P5-type ATPase) and LPR1 (multicopper oxidase), are central to external Pi monitoring by root tips, which is modified by iron (Fe) co-occurrence.

Two interacting genes ...
... in Arabidopsis thaliana, ...
... PDR2 ...
... (P5-type ATPase) ...
... and LPR1 ...
... (multicopper oxidase), ...
... are central ...
... to external Pi monitoring ...
... by root tips, ...
... which is modified ...
... by iron ...
... (Fe) ...
... co-occurrence.

S1 [004] Upon Pi deficiency, the PDR2-LPR1 module facilitates cell type-specific Fe accumulation and cell wall modifications in root meristems, inhibiting intercellular communication and thus root growth.

Upon Pi deficiency, ...
... the PDR2-LPR1 module facilitates cell type-specific Fe accumulation ...
... and cell wall modifications ...
... in root meristems, ...
... inhibiting intercellular communication ...
... and thus root growth.

S1 [005] LPR1 executes local Pi sensing, whereas PDR2 restricts LPR1 function.

LPR1 executes local Pi sensing, ...

... whereas PDR2 restricts LPR1 function.

S1 [006] We show that native LPR1 displays specific ferroxidase activity and requires a conserved acidic triad motif for high-affinity Fe2+ binding and root growth inhibition under limiting Pi.

We show ...

... that native LPR1 displays specific ferroxidase activity ...

... and requires a conserved acidic triad motif ...

... for high-affinity Fe2+ binding ...

... and root growth inhibition ...

... under limiting Pi.

S1 [007] Our data indicate that substrate availability tunes LPR1 function and implicate PDR2 in maintaining Fe homeostasis.

Our data indicate ...

... that substrate availability tunes LPR1 function ...

... and implicate PDR2 ...

... in maintaining Fe homeostasis.

S1 [008] LPR1 represents the prototype of an ancient ferroxidase family, which evolved very early upon bacterial colonization of land.

LPR1 represents the prototype ...

... of an ancient ferroxidase family, ...

... which evolved very early ...

... upon bacterial colonization ...

... of land.

S1 [009] During plant terrestrialization, horizontal gene transfer transmitted LPR1-type ferroxidase from soil bacteria to the common ancestor of Zygnematophyceae algae and embryophytes, a hypothesis supported by homology modeling, phylogenomics, and activity assays of bacterial LPR1-type multicopper oxidases.

During plant terrestrialization, ...

... horizontal gene transfer transmitted LPR1-type ferroxidase ...

... from soil bacteria ...

... to the common ancestor ...

... of Zygnematophyceae algae ...

... and embryophytes, ...

... a hypothesis supported ...

... by homology modeling, ...

... phylogenomics, ...

... and activity assays ...

... of bacterial LPR1-type multicopper oxidases.

S2 [010] Introduction

S2 [011] Optimal plant growth exquisitely depends on edaphic resources.

Optimal plant growth exquisitely depends ...

... on edaphic resources.

S2 [012] The pivotal role of inorganic phosphate (H2PO4- or Pi) in metabolism, paired with its scarce bioavailability, render the mineral nutrient a strongly restrictive factor in terrestrial primary production (Lopez-Arredondo et al., 2014; Crombez et al., 2019).

The pivotal role ...

... of inorganic phosphate ...

... (H2PO4- ...

... or Pi) ...

... in metabolism, ...

... paired ...

... with its scarce bioavailability, ...

... render the mineral nutrient a strongly restrictive factor ...

... in terrestrial primary production ...

... (Lopez-Arredondo et al., 2014; ...

... Crombez et al., 2019).

S2 [013] Insolubility of Pi salts and immobility of Pi complexed on clay or metal oxide minerals severely restrict P accessibility.

Insolubility ...

... of Pi salts ...

... and immobility ...

... of Pi complexed ...

... on clay ...

... or metal oxide minerals severely restrict P accessibility.

S2 [014] Thus, plants actively seek and mine this crucial macroelement, but must concurrently navigate Pi-associated metal toxicities (Al, Fe) by adjusting root system architecture and modifying rhizosphere chemistry (Kochian et al., 2015; Abel, 2017; Gutierrez-Alanis et al., 2018).

Thus, ...

... plants actively seek ...

... and mine this crucial macroelement, ...

... but must concurrently navigate Pi-associated metal toxicities ...

... (Al, ...

... Fe) ...

... by adjusting root system architecture ...

... and modifying rhizosphere chemistry ...

... (Kochian et al., 2015; ...

... Abel, 2017; ...

... Gutierrez-Alanis et al., 2018).

S2 [015] When challenged by Pi limitation, most dicotyledonous plants attenuate primary root extension and stimulate lateral root development for increasing the soil volume foraged by multiple root tips, which are the hotspots for Pi capture (Kanno et al., 2016).

When challenged ...

... by Pi limitation, ...

... most dicotyledonous plants attenuate primary root extension ...

... and stimulate lateral root development ...

... for increasing the soil volume foraged ...

... by multiple root tips, ...

... which are the hotspots ...

... for Pi capture ...

... (Kanno et al., 2016).

S2 [016] Root tips monitor heterogeneous Pi distribution (local Pi sensing) for guiding root development (Peret et al., 2014; Abel, 2017).

Root tips monitor heterogeneous Pi distribution ...

... (local Pi sensing) ...

... for guiding root development ...

... (Peret et al., 2014; ...

... Abel, 2017).

S2 [017] In Arabidopsis thaliana, Pi deprivation rapidly attenuates root cell elongation (<2 h) in the transition zone and progressively inhibits cell division (<2 days) in the root apical meristem (RAM) (Müller et al., 2015; Balzergue et al., 2017).

In Arabidopsis thaliana, ...

... Pi deprivation rapidly attenuates root cell elongation ...

... (<2 h) ...

... in the transition zone ...

... and progressively inhibits cell division ...

... (<2 days) ...

... in the root apical meristem ...

... (RAM) ...

... (Müller et al., 2015; ...

... Balzergue et al., 2017).

S2 [018] Persistent Pi starvation corrupts the stem-cell niche (SCN), which is followed by root growth arrest (Sanchez-Calderon et al., 2005; Ticconi et al., 2009).

Persistent Pi starvation corrupts the stem-cell niche ...

... (SCN), ...

... which is followed by root growth arrest ...

... (Sanchez-Calderon et al., 2005; ...

... Ticconi et al., 2009).

S2 [019] Notably, local Pi sensing depends on external Fe availability, which points to antagonistic biologic Fe-Pi interactions (Svistoonoff et al., 2007; Ticconi et al., 2009; Müller et al., 2015; Hoehenwarter et al., 2016; Balzergue et al., 2017; Dong et al., 2017; Godon et al., 2019; Wang et al., 2019).

Notably, ...

... local Pi sensing depends ...

... on external Fe availability, ...

... which points ...

... to antagonistic biologic Fe-Pi interactions ...

... (Svistoonoff et al., 2007; ...

... Ticconi et al., 2009; ...

... Müller et al., 2015; ...

End of Sample Audit

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