

イネの根において通気組織形成は窒素欠乏によって誘導される

Enhancement of porosity and aerenchyma formation by nitrogen deficiency in rice roots (*Oryza sativa* L.)

イネの根において、細胞の崩壊による通気組織の形成は窒素栄養の欠乏によって誘導される。酸素欠乏による誘導的通気組織の形成とは異なり、窒素欠乏による誘導的通気組織は根の基部から形成される。イネの根の通気組織は、自発的生成、酸素欠乏による誘導的生成に加え、窒素欠乏による誘導的生成の少なくとも3種の形成機構が存在している。異なる機構で形成される通気組織を調査することで、イネの根の通気組織形成に関わる遺伝子群の機能解明が期待できる。

This is first evidence for enhancement of porosity and aerenchyma formation by nitrogen deficiency in rice roots. It strongly indicates that physiological role of induced aerenchyma by nitrogen deficiency distinct from that by oxygen deficiency, demonstrating the different initiation pattern of aerenchyma between nitrogen and oxygen deficiency. Furthermore, our growth condition established is expected to isolate casual genes associated with aerenchyma formed constitutively and inducible toward developing molecular breeding techniques for conferring tolerant to water logging in field crops in near future.

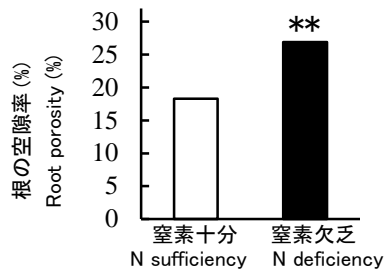
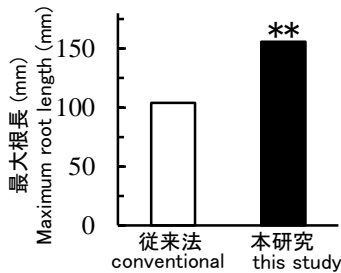
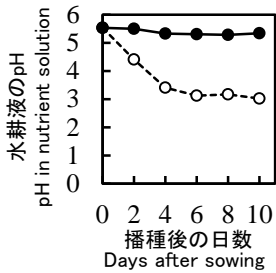


図1 水耕液のpH変化(左)と植物体への生長阻害の解消(右)
 ●は本研究、○は従来法 **は、有意水準1%を示す。
 Fig. 1. pH maintenance of nutrients solution (left) and recovery of root elongation (right) in improved method of this study.
 ●: conventional method, ○: this study. Asterisks represent the significant difference between two methods at 1% level.

図2 窒素欠乏による根全体の通気組織の形成程度を表す空隙率の増加 播種後10日のイネの根を用いている。**は、有意水準1%を示す。
 Fig. 2. Increased root porosity by nitrogen deficiency. Root porosity is size of air space including aerenchyma. Ten-days-old seedlings were used. Asterisks represent the significant difference between two conditions at 1% level.

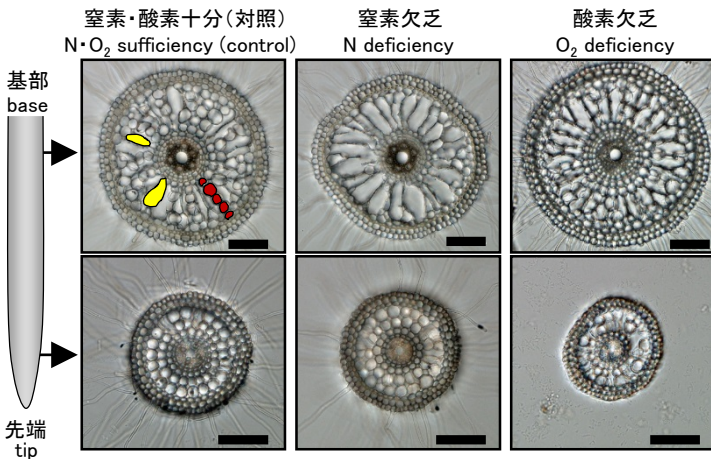


図3 播種後6日のイネの種子根の基部と先端付近における自発的および誘導的通気組織の形成
 赤で示した皮層細胞が崩壊し、黄色で示した通気組織が形成される。バーは100 μmを示す。
 Fig. 3. Root aerenchyma in rice. Increased aerenchyma was formed by nitrogen deficiency or oxygen deficiency. Examples of cortical cell, which are living cells were illustrated with red. Examples of aerenchyma, which are dead cells were illustrated with yellow. Scale bar in individual pictures indicates 100 μm.

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