

# ソルガム根での難水溶性と水溶性の硝化抑制物質の分泌機構には差異がある

Further insights into underlying mechanisms for the release of biological nitrification inhibitors from sorghum roots

ソルガムは、根から生物的に水溶性と難水溶性およびの2種類に分類される硝化抑制物質を分泌して土壌の硝化を抑制し、植物の窒素吸収量を増加させる(生物的硝化抑制、BNI; Biological Nitrification Inhibition)。水溶性硝化抑制物質の分泌は低い根圏pHで促進され、細胞膜のプロトンATPアーゼの活性が関与する。一方、ソルゴレオンが抑制活性の多くを占める難水溶性硝化抑制物質の分泌は、根圏pHの影響を受けにくい。このことは、ソルゴレオンによるソルガムでのBNI能は、土壌pHの影響を受けにくいので、様々な土壌環境下でも活用でき、遺伝的改良による強化が可能であることを示している。

Sorghum (*Sorghum bicolor*) roots release two types of nitrification inhibitors, hydrophilic and hydrophobic, which suppress soil nitrification resulting in an increase in the amount of nitrogen absorbed by plants (BNI, **B**iological **N**itrification **I**nhibition). Secretion of hydrophilic inhibitors is promoted at low rhizosphere pH and involves the activity of H<sup>+</sup>-ATPase of the cell membrane. On the other hand, the secretion of hydrophobic inhibitors, in which sorgoleone occupies most of the inhibitory activity, is less susceptible to the influence of the rhizosphere pH. This suggests that sorgoleone BNI ability in sorghum is not susceptible to soil pH, thus it can be used in various soil environments and can be strengthened by genetic improvements.

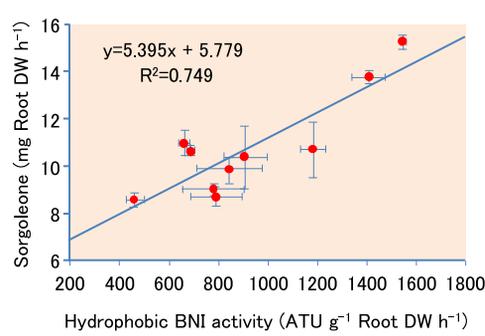


図1 ソルガムの根での難水溶性硝化抑制物質分泌量とソルゴレオン分泌量との関係

Fig. 1. Relationship between hydrophobic-BNI activity and sorgoleone levels

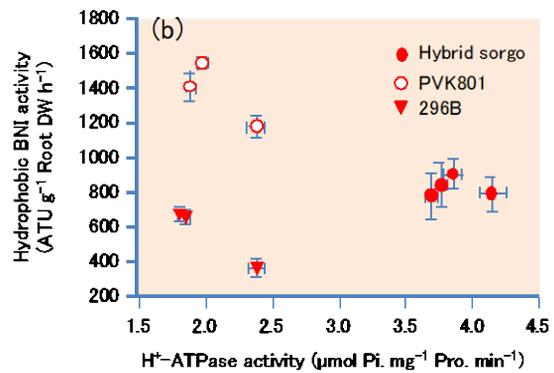
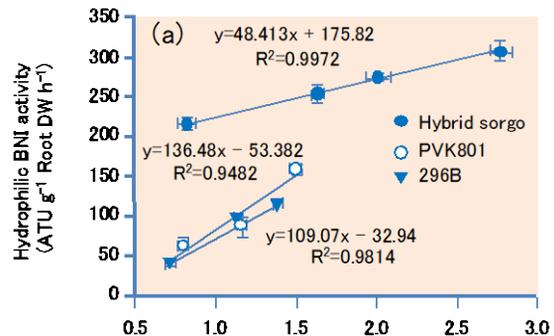


図3 ソルガム根での細胞膜H<sup>+</sup>-ATPアーゼ活性と水溶性硝化抑制物質(a)あるいは難水溶性硝化抑制物質(b)のそれぞれの分泌との関係

Fig. 3. Relationship between PM H<sup>+</sup>-ATPase activity and hydrophilic (a) or hydrophobic (b) BNI activity, respectively, in root systems of sorghum

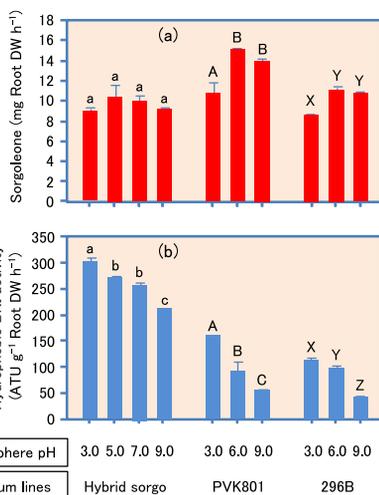


図2 ソルガムの根でのソルゴレオン(a)および水溶性硝化抑制物質(b)のそれぞれの分泌に及ぼす根圏pHの影響

Fig. 2. Rhizosphere pH influence on the release of sorgoleone (a) and hydrophilic nitrification inhibitors (b) from sorghum roots, respectively