Rice allelopathy could be increased by induction of Barnyard grass (Echinochloa crus-galli) root exudates

Zhang Qi*[1], Li Li[1], Li Jia-Yu[1], Yang Xiao-Yan[1], and He Hai-Bin†[1]

[1]College of Life Sciences, Fujian Agriculture and Forestry University – Fuzhou, China

Abstract

The changes of rice allelopathy were investigated by induction of barnyard grass (*Echinochloa crus-galli* L., BYG) root exudates in a hydroponic system. Results showed that after induction by BYG root exudates, the inhibitory rates of allelopathic rice PI312777 leaves extracts were increased from 45.08% to 60.92% on BYG root length, from 41.77% to 62.25% on BYG plant height, and from 44.30% to 64.56% on BYG dry weight, respectively. Similarly, the inhibitory rates of nonallelopathic rice Lemont leaves extracts were increased from 12.74% to 27.11% on BYG root length, from 10.04% to 14.32% on BYG plant height, and from 10.97% to 26.16% on BYG dry weight, respectively. The inhibitory rates of two rice culture solutions had the same trends as their leaves extracts. The levels of phenolic compounds in PI312777 and Lemont culture solutions were 1.54 times and 1.39 times respectively, as high as the control solutions. HPLC analysis showed that the BYG root exudates contained *p*-hydroxybenzoic acid at 19.95 μg/plant, vanillic acid at 18.99 μg/plant, syringic acid at 47.95 μg/plant, cinnamic acid at 76.75 μg/plant, salicylic acid at 1.10 μg/plant, and ferulic acid at 92.51 μg/plant. After induction of the 6 phenolic acids mixtures at the concentration above, the inhibitory rates of PI312777 leaves extracts on BYG root length were 43.41%. These results indicated that in BYG root exudates, phenolic acids may be, but not the only compounds which contributing to the increase of rice allelopathy.

Keywords: Rice (Oryza sativa. L), allelopathy, Induction, Barnyard grass (Echinochloa crus, galli), Root exudates

*Speaker

†Corresponding author: alexhhb@163.com