**Effects of iron plaque and phosphorus on aluminum tolerance of cell wall**

**in rice root tips**

A hydroponic experiment was carried out to investigate the differences in plant growth, cell wall components in the roots of two rice genotypes that differ with Al tolerance exposed to iron plaque and phosphorus (0, 15, 30 mg·L-1) treatments. Exposure to 50 µmol·L-1 aluminum (Al) significantly decreased biomass of roots and shoots, and that this was accompanied by significant increase in Al content in root tips, content of cell wall pectin, hemicellulose 1 and hemicellulose 2 compared with the control, these effects were more pronounced in Hongliangyou 166. Compared with Al treatment, IP+Al treatment increased the root dry weight of Feiyouduoxi No.1 and Hongliangyou 166 by 27.7% and 12.3%, decreased root tip Al content by 15.6% and 33.3%, and reduced the pectin content by 22.6% and 29.9%, respectively. The hemicellulose 1 and hemicellulose 2 content in root tips also significantly decreased, while Fe content on root surface increased by 434.5% and 265.5%, suggesting IP formation alleviate Al-induced plant growth inhibition by decreasing the content of cell wall pectin, hemicellulose 1 and hemicellulose 2. Accordingly, compared with IP+Al treatment, the addition of phosphorus further significantly decreased content of pectin, hemicellulose 1 and hemicellulose 2 in root tips. Moreover, the relative root length increased and Al content in root tips decreased under the addition of phosphorus, indicating that the effect of phosphorus on the iron-plaque rice induced the decrease of pectin and hemicellulose 1, 2 content in rice root tips, which further reduced the accumulation of Al in the root tip. In summary, the results indicated that phosphorus addition could facilitate the alleviating effect of IP on Al toxicity in root tips, it also provided a technical basis for improving Al tolerance of cell wall by phosphorus incorporation.