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Manuscript title: Role of mycorrhizal symbiosis in aluminum and phosphorus interactions in relation to aluminum tolerance in soybean

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Table S1. Results of the statistical analysis (shown as F values of a three-way ANOVA): Effect of phosphorus (P), aluminum (Al) or mycorrhizal treatments (M) or their interactions (P×Al, P×M, Al×M, P×Al×M) on soybean growth parameters and AM colonization. Statistical significant effects are indicated by asterisks: *, p < 0.05; **, 0.001 < p < 0.01; ***, p < 0.001; ns: not significant.

<table>
<thead>
<tr>
<th>F values for</th>
<th>P</th>
<th>Al</th>
<th>M</th>
<th>P×Al</th>
<th>P×M</th>
<th>Al×M</th>
<th>P×Al×M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoot biomass</td>
<td>3818.21***</td>
<td>132.54***</td>
<td>47.15***</td>
<td>82.16***</td>
<td>22.22***</td>
<td>3.42*</td>
<td>4.87**</td>
</tr>
<tr>
<td>Root biomass</td>
<td>697.19***</td>
<td>17.89***</td>
<td>0.35ns</td>
<td>4.32*</td>
<td>2.28ns</td>
<td>4.68**</td>
<td>4.14*</td>
</tr>
<tr>
<td>Root Al concentration</td>
<td>41.30***</td>
<td>129.50***</td>
<td>28.67***</td>
<td>102.81***</td>
<td>10.41***</td>
<td>3.59*</td>
<td>9.21***</td>
</tr>
<tr>
<td>Root P concentration</td>
<td>400.97***</td>
<td>3.63ns</td>
<td>1.02ns</td>
<td>5.70*</td>
<td>5.00**</td>
<td>3.93*</td>
<td>7.07***</td>
</tr>
<tr>
<td>Taproot length</td>
<td>27.35***</td>
<td>58.51***</td>
<td>40.51***</td>
<td>0.55ns</td>
<td>3.16*</td>
<td>24.37***</td>
<td>5.324**</td>
</tr>
<tr>
<td>Malate concentration</td>
<td>216.91***</td>
<td>31.00***</td>
<td>1.66ns</td>
<td>11.21**</td>
<td>2.97*</td>
<td>2.07ns</td>
<td>2.12ns</td>
</tr>
<tr>
<td>AM colonization</td>
<td>156.75***</td>
<td>838.90***</td>
<td>27.29***</td>
<td>95.83***</td>
<td>7.72*</td>
<td>95.42***</td>
<td>8.55***</td>
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<tr>
<td>Arbuscule abundance</td>
<td>0.647ns</td>
<td>167.96***</td>
<td>94.85***</td>
<td>36.19***</td>
<td>2.40ns</td>
<td>115.44***</td>
<td>7.204**</td>
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<tr>
<td>Vesicle abundance</td>
<td>43.68***</td>
<td>447.00***</td>
<td>2678.12***</td>
<td>71.68***</td>
<td>72.01***</td>
<td>268.92***</td>
<td>31.15***</td>
</tr>
<tr>
<td>Intraradical hypha abundance</td>
<td>37.10***</td>
<td>333.64***</td>
<td>105.88***</td>
<td>19.59***</td>
<td>16.12***</td>
<td>99.10***</td>
<td>11.46***</td>
</tr>
</tbody>
</table>
Fig. S1 Effects of Al treatments on soybean growth and root Al concentration. Plants were cultivated in different Al treatments (0, 200, 400, 600, 800 or 1000 µM AlCl₃) with low P (25 µM P added as KH₂PO₄), and harvested after six weeks. (a) Soybean growth. (b) Root Al concentration. Data in the figure are the mean of four biological replicates with standard error. Different letters indicate significant differences among Al treatments (Duncan multiple range test, $P < 0.05$).
Fig. S2 Effects of Al and AM treatments on soybean growth parameters and vesicle abundance.

Plants were cultivated in different Al treatments (0, 600 or 1000 µM AlCl₃) with low P (25 µM P added as KH₂PO₄), and harvested six weeks initiation of AM treatments. (a) Shoot biomass. (b) Total P content. (c) Relative taproot length. (d) Vesicle abundance. Mycorrhizal fungal treatments are as follows. Gim, Gigaspora margarita. Ri, Rhizophagus irregularis. Ge, Glomus etunicatum. Gc, Glomus claroideum. Data in the figure are the mean of four biological replicates with standard error. Different letters indicate significant differences among AM treatments within one Al level (Duncan multiple range test, P < 0.05). Asterisks indicate significant differences between no Al and 600 or 1000 µM Al levels within one AM treatment (Student’s t-test, P < 0.05).
Fig. S3 Effects of Al, P and AM treatments on total P content in soybean.
Plants were cultivated in different Al concentrations (0 or 600 µM AlCl₃) combined
with different P concentrations (25 or 500 µM P added as KH₂PO₄), and harvested six
weeks after initiation of AM treatments. (a) Total P content in low P. (b) Total P
content in high P. Mycorrhizal fungal treatments are as follows. NM, non-mycorrhizal.
Data in the figure are the mean of four biological replicates with standard error.
Different letters indicate significant differences among AM treatments within one Al
and P level (Duncan multiple range test, *P* < 0.05).
Fig. S4 Effects of Al, P and AM treatments on mycorrhizal phosphorus response in soybean.

Plants were cultivated in different Al concentrations (0 or 600 µM AlCl₃) combined with different P concentrations (25 or 500 µM P added as KH₂PO₄), and harvested six weeks after initiation of AM treatments. Mycorrhizal fungal treatments are as follows. NM, non-mycorrhizal. Gim, *Gigaspora margarita*. Ri, *Rhizophagus irregularis*. Gc, *Glomus claroideum*. Data in the figure are the mean of four biological replicates with standard error. Different letters indicate significant differences among AM treatments within one Al and P level (Duncan multiple range test, *P* < 0.05).