Felix D. Dakora
Samson B. M. Chimphango
Alex J. Valentine
Claudine Elmerich
William E. Newton
Editors

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Biological Nitrogen Fixation: Towards Poverty Alleviation through Sustainable Agriculture

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ARBUSCULAR MYCORRHIZAL COLONIZATION AND NODULATION IMPROVE FLOODING TOLERANCE IN *PTEROCARPUS OFFICINALIS* JACQ. SEEDLINGS

L. Fougnies[1], S. Renciot[1], F. Muller[1,2,3], C. Plenchette[4], Y. Prin[2], S. M. de Faria[5], J. M. Bouvet[3], S. Nd. Sylla[6], B. Dreyfus[2], I. Ndoye[6] and A. Bâ[1,2]

[1]LBPV, FSEN, UAG, Pte-à-Pitre, Guadeloupe; [2]LSTM, UMR 113 IRD/INRA/AGRO-M/CIRAD/UM2, Montpellier, France; [3]LGF, CIRAD- Forêt, Montpellier, France; [4] INRA, UMR BGA, Dijon, France; [5]CNPAD/EMBRAPA, Seropédica Itaguai, Seropédica, RJ 23890-000, Brazil; [6]LCM ISRA/IRD/UCAD, Dakar, Senegal

P. officinalis is the dominant wetland tree species of the seasonally flooded swamp forests in Guadeloupe, the Lesser Antilles (Muller et al., 2006). The establishment and population maintenance of *P. officinalis* are affected by the variations in salinity and hydrology as well as differences in soil microtopography in swamp forests (Eusse and Aide, 1999). This tree species forms bradyrhizobial nodules and arbuscular mycorrhizas (AMs) on lateral roots of buttresses both above and below the water table (Bâ et al., 2004; Saint-Etienne et al., 2006). We hypothesized that nodulation and AMs could improve the performance of *P. officinalis* seedlings under flooding. Two questions were addressed. First, are *P. officinalis* seedlings adapted to flooding? Second, do AMs and N_2-fixing nodules increase the performance of *P. officinalis* seedlings under flooding?

P. officinalis seedlings in pots were inoculated with *Bradyrhizobium* sp. (UAG 11A) and/or one AM fungus, *Glomus intraradices*. After 13 weeks of flooding, several changes in plant seedlings were observed including formation of hypertrophied lenticels, aerenchyma tissue and adventitious roots on submerged portions of the stem. Flooding induced nodules both on adventitious roots and stems and resulted also in an increase in the total biomass of seedlings, regardless of inoculation. Flooding did not affect root-nodule formation and N_2 fixation. However, there was no additive effect of AMs and nodulation on plant growth and nutrition under either flooding or non-flooding. These results suggest a competitive interaction between endophytes and that *Pterocarpus officinalis* seedlings develop some adaptive mechanisms to flooding.

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