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ROOT-BACTERIA INTERACTION AND ITS POSSIBLE ROLE IN
ESTABLISHING A BENEFICIAL ASSOCIATION

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Association between bacteria of the genus Azospirillum and roots of various cereals may improve plant growth and yield. When A. brasilense was inoculated onto wheat rhizosphere only a part of the root systems was colonized. Colonization is plant-age-dependent: roots of fully grown seedlings (three leaves) were colonized to a lesser extent than those of very young seedlings. The positive effects of bacteria on plant growth was more prominent when bacteria were applied to young seedlings. Fully grown wheat plants were poorly colonized and only slightly affected by this bacteria. A. brasilense is influenced by competition of other naturally occurring rhizosphere bacteria on the roots. Inhibition of these competitive populations increased wheat root colonization by Azospirillum.

Azospirillum interaction with wheat roots was observed by two different modes of colonization: on root surfaces and within internal tissues. On the surface, the bacteria formed large aggregates, weakly bound to epidermal cells. Fibrillar material extruding from the bacterial cell towards the plant was present on the epidermal cells. Most of this population was easily removed by washing. Killing the bacteria, either before their interaction with the roots, or afterwards, eliminated the adsorbed bacteria from the root surface. This adsorption of Azospirillum to wheat roots can be defined as a weak active process. Within the root cortex, massive population of non-aggregated Azospirillum cells was detected in the intercellular spaces, from the epidermal layer inward but absent in the endodermis and in the vascular system. Bacteria were located mainly in defined zones of the roots, possibly indicating attachment to specific binding sites. Multiplication of bacteria in intercellular spaces was unaffected by the plant tissue, presumably indicating positive association between the two participants. Mutual recognition factors, such as agglutinins and lectins may participate in this interaction.