



Opinion

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Alfalfa Endogenous Rhizobia



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Endophyte

Endophytes could be isolated from surface sterilization or inner tissues of a large diversity of plants which do not cause harm and could establish a mutualistic association [1,2]. The plant endophytes gradually cause the attention of people and the scope of the study is gradually expanding due to several major poisoning incidents in modern farming, animal husbandry and food processing. Endophytes have been isolated from a large diversity of plants from algae, ferns to woody and rattan and no tissues devoid of them.

Endogenous Rhizobia

Generally, we think there are two forms of rhizobia, one form is depending on the free life of organic matter in the soil, the other is when rhizobia in soil encountered the host leguminous plant, and the nodules and nitrogen fixation are carried out in the root to form the form of symbiosis. In recent years, it has been found that rhizobia can survive in the form of non-leguminous plants, and evolve into a special ecological niche, thus having a third way of life. Endogenous rhizobium can infect a variety of non-leguminous crops including corn, rice, lettuce and tobacco [3-5] and colonized the epidermal, cortical and vascular cells of the plants [6].

Alfalfa Endogenous Rhizobia

The alfalfa endogenous rhizobia were first found in seeds [7]. Qi [8] found the endogenous alfalfa rhizobia had the ability to secrete acid, alkali, salt and hormone. Inoculated rhizobia to alfalfa could enhance the migration and colonization of them inside plants also the seedling growth [9]. Shi & Zhang [10] also found some rhizobia in alfalfa plant and the seeds had the following distribution dynamics. Most rhizobia distributed in the root. Also could detect in aerial tissues, but mainly depended on the growth stage of plants. Mainly distributed in flower buds in vegetative stage, and mainly distributed in ovary wall of pistils in bud stage and floral stage, when came to pod stage mainly distributed in new born seeds.

We also found the two fluorescent marked rhizobia could infect the root of seedling and enter the stem. After infecting seedlings and field plants, the marked rhizobia could be migrated to root and stem, but could not be migrated upward from inoculation position, or colonized in the pathway between the inoculation position and stem base, and therefore formed a discontinuous distribution of marked rhizobia in the plant tissues. Endogenous marked rhizobium R. GNf could enter the cotyledon of buds, lower leaves of seedlings and upper leaves of field plants, whereas exogenous rhizobium S.12531f could only migrated upward to stems when inoculated alone. Low concentration of LaCl₃, IAA and alien extracellular polysaccharides could inordinately increase the distribution density of marked rhizobia S.12531f and R. GNf existed in the root of host bud seedlings and young seedlings [11].

It should be noted that the different rhizobia may have different migrate and colonization ability in different plant varieties. A rhizobium strain cannot result in the same inoculation effects on all alfalfa varieties, even under the same culture conditions and a strain might be proven beneficial to some varieties, but poor to others [12]. Thus, additional rhizobia strains and alfalfa varieties need to be investigated for a more comprehensive characterization of rhizobia migration and colonization dynamics in alfalfa. Such researches will be important for understanding of plant microbe interaction between endophytic rhizobia and host plants.

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