Plant symbiosis

Certain plants are capable of producing their own fertiliser through symbiosis with bacteria. Understanding this process opens up the possibility of improving it, using it and possibly transferring it to other species.

Nodosités de niébé, Sénégal.

Legumes (soybeans, peanuts, beans) produce seeds which contain up to 30% protein, which makes them nutritionally attractive. This is not their only benefit as they are also capable of enriching nutrient-poor soils. How? Through natural symbiosis with bacteria which, in exchange for carbonaceous sugars, produce nitrogen for the plant.

In Asia and South America, farmers have long been familiar with this property, as they inoculate their legume fields with empirically selected bacteria. This practice does not exist in Africa, even though many legumes such as peanuts, soybeans or cowpeas are grown and fertilised with costly chemical fertilisers. Hence the idea of developing these practices on the African continent and helping select bacteria adapted to African crops.

In other contexts, this symbiosis has also been used to fertilise nutrient-poor soil, for example in Thailand where legumes/bacteria combinations have helped enrich rice fields. As some bacteria help plants adapt to certain toxic substances, they are used for the revegetation of polluted soil, notably in New Caledonia on nickel contaminated land.

Researchers also examined molecular mechanisms which allow the plant to incorporate foreign bacteria. Since the 1990s, it had been believed that there was only one recognition mechanism to accomplish this symbiosis. A "key lock" system believed to be universal… until 2007 when a team of researchers discovered, in an African legume, a far simpler process which could be transferred to non-leguminous plants such as rice, wheat or maize. This is one of the avenues currently being pursued by researchers.

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