

Interview with Director Wang Lide

Q: Hello, Director Wang. We understand that you have done some research on biological soil crusts. Can you give us a brief introduction?

A: I heard from you that your project is mainly about microbial crusts. After *Bacillus subtilis* synthesizes extracellular polysaccharides, cyanobacteria bond the sand particles in the soil to make them agglomerate to fix sand. This is a good idea. According to our research, after the land has been converted from farmland for a period of time, 8 years later, if there is no manual intervention, the soil will become desertified; where there is sufficient water, the soil will be salinized. What we are studying now is the changes in soil microorganisms with the change in the number of years of returning farmland. We have a project cooperation with Shanghai Meijie Biological Company to measure the changes of soil microbes in terms of genetic diversity, population diversity, and biological functional diversity as the number of years of farmland conversion changes.

In terms of soil crust, in the seasons with good rain, especially in July, August, and September, especially in September, microorganisms will produce a kind of crust, which is mainly produced by algae.

Q: Yes, in our project, cyanobacteria and *Bacillus subtilis* are used for symbiosis.

A: According to the analysis of the types of microorganisms we have measured, there are a large amount of bacillus, and its number has also increased significantly. Therefore, the feasibility of your project is still great.

Q: What are the difficulties in microbial control and the use of bacterial flora for windbreak and sand fixation, which are different from other common methods? Are there any special considerations?

A: Microbial sand fixation, in our Hexi Corridor, under extreme rainfall conditions, I think the effect will not be obvious. why? Because its rainfall is between 50-100 mm, arid and extremely arid areas. So the survival of microorganisms in arid and extremely arid regions is a major bottleneck problem. If this problem is not resolved well, microbial sand fixation will be very difficult.

If you can cultivate a strain that has strong drought resistance, it can quickly form crusts as long as it rains, and it can achieve the effect of sand control. However, according to our research, there are still very few such strains, and a large number of screenings are needed. If it is screened out and quickly spread into the soil before it rains, the microorganisms can multiply immediately and form a crust in a short

period of time, which can achieve the effect of sand control.

Q: Can you tell us briefly about the law of sand movement? The hardware team of our project needs to make an incubator that simulates the desert environment. Do you have any suggestions?

A: According to our years of research experience, if you do this, you need to do some controls. Then do a wind erosion experiment, basically every 10 meters, about 50 meters, to see if the biological diffusion can achieve the desired effect. Finally, calculate the amount of rain, and if it is windy, whether it is strong or not, weigh it regularly.

Q: Our current idea of designing the incubator is to place soil collected from the desert, and then simulate the temperature and humidity environment in the desert, and then cultivate the flora in the incubator first.

A: This experiment can be done. After that, my idea is that if your technology is mature, you can conduct some small-scale demonstration and promotion. If the demonstration is successful, it can be further developed. Theoretically speaking, this is good and innovative.

Q: There is another question, I would like to ask you, in our current national defense measures, how is the application of biological control technology compared to other traditional technologies?

A: From what I know, at present, the biological sand fixation at home and abroad is just a non-polluting technology, especially some experts have also proposed it in related academic conferences. However, this is only theoretically feasible. In the practical process, if you put it in our Hexi Corridor, it may be very difficult. However, if you put it in places like the first song of the Yellow River, Maqu in Gansu, Luqu in Gansu and so on, where the rainfall is relatively heavy, it may become a little easy, which needs to be viewed according to the actual environment.