Effects of Pseudoxanthomonas Combined with Other Beneficial Bacteria Against Pepper Fusarium Wilt

Shen, Yuhang (School: Beijing No. 4 High School)

Pepper Fusarium wilt caused by Fusarium oxysporum f. sp. capsici (FOC), is a serious soil-borne fungal disease causing a severe reduction in pepper production and has no satisfying treatments. In an effort to develop a precautionary microbial control method for pepper Fusarium wilt, we isolated and identified 84 bacterial strains from pepper plant soils and roots. We choose Pseudoxanthomonas sp., Pseudomonas mosselii, Bacillus velezensis, Microbacterium sp., and Stenotrophomonas sp. 5 strains for subsequent experiments. In Phase I, we conducted antifungal assays to estimate the effect of single strain in suppressing FOC, and the result demonstrates the best antifungal rates in Bacillus velezensis, while Pseudoxanthomonas sp. and Stenotrophomonas sp. present unsatisfying results. In Phase II, pepper seeds were placed on agar plates (containing 103 CFU/ml pathogen spores)after soaked into different mixed suspension of bacteria, root length were measured at 6 and 12 days. As a result, Pseudoxanthomonas sp. combined with Pseudomonas mosselii, Bacillus velezensis, and Microbacterium sp. present the best resistance to the pathogen. In Phase III, biological effect of different mixed suspension of bacteria on pepper was investigated in glasshouse experiments. In consistence with Phase II, single Pseudoxanthomonas sp. strain has little inhibitory effect on FOC, but considerably enhance the health condition (based on the data of pepper plant height weekly, disease index, and fresh weight) of seedlings when combined with other bacteria. Overall, although Pseudoxanthomonas sp. has a poor direct inhibitory effect, it may interact with other bacteria and regulate the microbial community, thereby enhance plant health.

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