

FusariumPrevent

Innovative approach for Fusarium prevention in agriculture

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Projektbeschreibung

The application of biologic soil additives based on beneficial microbes is an interesting and durable alternative to existing fertilizing methods. The advantages are manifold as demonstrated with the successful commercial product Nourivit Plus. This product induces a higher microbial soil activity resulting in a faster decay of crop debris and more vigorous plant growth. Based on this principle a new mixture of beneficial microbes will be developed, optimized to control the fungal genus Fusarium. Fusarium diseases on small grain cereals (Fusarium head blight, FHB) and on maize (Fusarium ear rot, FER) are one of the most relevant problems in agriculture. FHB and FER induce yield losses but of main concern are quality losses due to contamination of the grain with mycotoxins that are harmful to humans and animals. Maximum toxin content in food is worldwide regulated. Direct economic losses of several hundred million € occur each year worldwide due to yield and quality reduction. Indirect costs due to e.g. mycotoxin monitoring programs and livestock efficiency reduction are estimated to be even higher. To date, no effective control of FHB/FER is possible: an integrated approach with proper soil preparation, crop rotation, use of fungicides and resistant plant varieties is advised but innovative control strategies are urgently needed. Fusarium causing FHB and FER can only survive in intact infected crop debris on which the fungus produces spores in the next spring. The spores can reach the flowering cereal or maize ear where infection can occur. The development of a preventive microbial soil or plant additive reducing the production of spores on crop debris or increasing plant resistance is a promising approach to control Fusarium. By reducing inoculum, infection pressure and probability of toxin contamination will be reduced. We follow 4 complementary strategies to reach our goal. We will select microbes that: 1) are specialised in fast decay of the crop debris. Fusarium cannot survive in the soil and uses colonized crop debris as a refugium. 2) show an antagonistic activity against Fusarium, inhibiting growth and sporulation on the crop debris. 3) induce systemic induced resistance: this strategy activates the natural plant defence mechanisms. 4) We will apply Ca²⁺, Mg²⁺ and Si³⁺. These cations enforce plant wall strength and Mg²⁺ inhibits mycotoxin production. 5) A mixture of microbes acting via mechanism of 1-3 plus 4, resulting in additive effect on Fusarium. To reach our goals we follow an approach of selection of microbes in the lab and greenhouse, in small field plots and in field experiments. The result will be a new product composed of a mixture of several microbes controlling Fusarium via complementary mechanisms. A company will be founded to commercialise the innovative product. The product will reduce the risk for toxin contaminated grains used for food and feed and will in the end contribute to public health.

Projektkoordinator

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