

Consortium of Bacillus Spp. Degrades Cypermethrin Pesticide in Soil of Agricultural Fields and Supports Plant Growth

Being a tropical country, India suffers severe losses in agriculture due to pest infestation which results in low agriculture production. This necessitates the use of pesticides to protect the crops against the attack of different pests. Pesticides are the chemicals that kill/ destroy the pests and support humankind by fulfilling their food demands. But on the other hand, excessive use of pesticides has made the planet unliveable as traces of these chemicals are reported not only in food products and ground water but also in mother's milk. Reports from Kerala, Punjab and Haryana give a bad image about the application of pesticides unjudiciously. Exposure to pesticides often comes from the consumption of food and water but the workers who apply the pesticides in fields are at maximum risk. Pesticides can also be absorbed through the skin and from breathing and may cause several diseases including cancer.

Cypermethrin is a synthetic pyrethroid (SPs), and widely used for insect control in agricultural and urban settings all over the world. Environmental fate of cypermethrin has been studied extensively. Half-life of this chemical varies from 4 to 65 days in soil. Exposure of cypermethrin causes irritation in skin and eyes, tingling, itching, burning sensation, loss of bladder control, in coordination, seizures and possible death. Therefore removal/ reduction of this pesticide from the environment (soil/water/dumping site) is required urgently. As compared to other methods, bioremediation of pesticides using microbial system is best suited. A successful bioremediation technique requires potent strains to degrade largest pollutant to a minimum level in shortest time.

Advantages:

1. Bacterial consortium has fast growth rate and simple nutritional requirement and showed high tolerance (450ppm) for cypermethrin.
2. Bacterial consortium is effective for complete degradation of the pesticide within short period of time.
3. Presence of laccase and esterase makes this consortium most prominent for biodegradation because these enzymes play key role in pollutant degradation.
4. Presence of major plant growth hormone, siderophore and IAA hormone enables this consortium an effective biofertilizer and could be used for enhanced crop production.
5. Biodegradation and plant growth promotory ability of the consortium with no toxic byproducts reveals the potential of the consortium as an effective biological agent for the remediation of soil, water or crops contaminated with cypermethrin and plant growth. It is cheaper and easy technique for degradation of cypermethrin.