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Getting rid of pesticides

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With the annual pesticide consumption having increased by 54 per cent in the last five decades, there is a serious threat to the ecosystem. And bioremediation of pesticide contaminated ecosystem comes as an effective solution.

The National Institute of Advanced Studies (NIAS), Bangalore has done collaborative research in association with the Indian Institute of Science, Bangalore, and Bhabha Atomic Research Centre (BARC), Mumbai, and identified the microbial strain that degrades the most commonly used pesticides both at home and abroad.

Among the various groups of pesticides, the s-triazine herbicide, atrazine, and the cyclidiene insecticide, endosulfan, are extensively used in India and other parts of the world.

The bioremediation of these chemicals is important because of their persistence in nature, potential carcinogenecity and also their effect on non-target organisms including human beings.

Atrazine is used to control the broad-leafed weeds of maize, sorghum, sugarcane and also in irrigated cotton crops. As a result of its widespread use for over 30 years, atrazine residues have been detected in ground and surface waters in several countries.

It is also found to be relatively persistent in the soil and aquifer sediments with varying half lives of a few days to several months.

Endosulfan is a chlorinated cyclodiene used to control aphids, shoots and fruit borers of egg plant and also pests of cotton, tea and coffee plantations.

It occupies the second position among the insecticides used in India. It is extensively used in agriculture and public health programmes since the ban in use of other organochlorine insecticides such as DDT, aldrin and dieldrin.

The concern regarding contamination of endosulfan in the environment is due to its frequent detection in food, feed, fruits and vegetables in appreciable quantities.

Efforts have been made by P.K. Shetty (NIAS), K.M. Madhyasta (IISc) and Mr N.B.K. Murthy and Mr K. Raghu (both BARC) to isolate efficient strains of micro-organisms capable of degrading these pesticides.

The study shows that none of the fungal strains isolated from the enrichment technique (where the soil samples are enriched by spraying commercial grade of atrazine or endosulfan) degraded the two molecules at the concentrations of 30 to 50 ppm levels.

However, a particular strain, Mucor thermo-hyalospora, transforms endosulfan in carbon deficient conditions, indicating the utilisation of endosulfan as a source of carbon.

The study thus raises the possibility of the use of this fungal strain for bioremediation of the environment contaminated by enosulfan molecules.