

Biopesticides: a technology awaiting recognition

Opinion

Few things which may not seem beneficial today may hold the future. This is so true for biopesticides. We have been reading and hearing about ill-effects of chemical pesticides. How it has entered our ecosystem; penetrated it so deeply and the multiple ways it is causing damage to our environment and the living beings. There are number of case studies documented which highlight its toxic consequence. Sadly, the fact also remains that we may not completely do away with them. However, we can certainly reduce their use by complementing them with biological substitutes in an Integrated Pest Management (IPM) system. The use of biopesticides is not new but times back to 17th century when extracts of nicotine were sprayed to keep beetles on plums, under check. Since then pesticidal properties of plants belonging to both higher and lower plant kingdom, is being explored. Till date over 1400 biopesticides have been brought into market, world-over. The market is expected to grow at a CAGR of 8.6% till 2023. It stands tall on several accounts, specifically

- i. Insect pests and pathogens affecting crops are developing resistance against chemical pesticides
- ii. Target specificity of biopesticides
- iii. High development cost of new chemical pesticide vis-à-vis biopesticide
- iv. Zero residual effect of biopesticides on natural resources
- v. Stringent import regulation (on agricultural produce) from governments of many countries
- vi. Increased health awareness, high demand for chemical-free crops

The above points are elaborated as under:

The prolonged use of chemical pesticides has led to development of resistance in the crop pathogens. To counter that either new chemical pesticide need to be developed or the increased dose of the existing ones need to be sprayed. In both the cases, the environment including living organisms would get unfavourably affected. This would further escalate the environmental and health concerns. In contrast, biopesticides are highly target-specific. They do not affect other beneficial micro-organisms and at the same time do not induce resistance in the pest/ pathogen.

The residual period of chemical pesticides in soil and water is very high. Unlike them, biopesticides get degraded faster. Hence they do not cause residual pollution. In addition the cost of manufacture of chemical pesticides is much higher than that of biopesticides as the chemical pesticides are industrially manufactured involving high input, processing and labour cost. On the other hand, biopesticides occur naturally and have less production cost.

There has been sudden increase in number of patients getting affected by cancer, respiratory and liver diseases. The prime reason for this surge in number of patients is not only the pollutants released by vehicular or industrial emissions in the ambient environment, but also chemical pesticides sprayed on our crops. With the growing awareness, there is increase in demand of organically-grown crops. In

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fact several countries, chiefly EU, have imposed strict regulations on the crops which are imported from the producer countries. Pesticides, if detected beyond a certain level, leads to the entire consignment getting rejected.

There are certain over-arching, developmental issues pertaining to marketability and recognition of biopesticides, which has impeded the anticipated take-off of the technology. To count a few, these are

- i. Farmers are ignorant about the benefits of biopesticides
- ii. Disinclination to change the existing crop protection practices using chemical pesticides
- iii. Anti-researcher regulatory procedures
- iv. Biopesticides have limited shelf life owing to organic-ness of their composition
- v. Efficacy of biopesticides is affected by the environmental conditions
- vi. Lower efficacy than chemical pesticides
- vii. Require repetitive application for optimal efficacy

With the new technologies in the anvil, such as, RNAi (RNA interference) for crop protection and SSF (solid state fermentation) technology, it is likely that biopesticides would be a much coveted, green technology. RNAi is a natural course which the cells practice to 'switch off' harmful genes. The technology is still at a nascent stage and is being studied to understand its effect on the crop web and ecosystem at-large. It is being developed either as a genetically modified crop having pesticidal properties or as a crop spray. The other technology, SSF, is adopted from pharmaceutical industry and utilizes agricultural residue for production of biopesticides especially from fungi, ensuring reduction in production cost. Therefore, with the emergence of above-mentioned set of technologies and refinement of the existing one, biopesticides have secured a berth in the future most sought-after technologies.

To conclude, biopesticides, though having several limitations, is the technology which would be embraced at a large scale in the future. It is environment-friendly, organic, target-specific, low-cost technology for crop protection. What is currently needed is exhaustive research; farmer and consumer awareness and perseverance to allow this technology attain its desired success.

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Conflict of interest

The author declares no conflict of interest.