

BIOLOGICALS IN AGRICULTURE

— AN OPPORTUNITY



Sustainable development in all walks of life is the only way to our future well-being. The same holds true for agriculture to feed the growing population. We have a plethora of technologies available with us to support this endeavour.

No single technology can offer solutions for all crops that we grow in different regions of the country for various agri-businesses and consumer needs. A selection of technologies suitable for a community/ region would be the best way forward towards a sustainable future. In this regard, besides hybrids, GM traits, gene

editing, novel pesticides and innovative agronomic practices, Biologicals are getting a lot of attention. Biologicals for agriculture include naturally occurring beneficial microbes, plant extracts and organisms that can improve growth, stress and disease tolerance of the crop.

There are growing concerns about chemical residues on the produce, soil and water body pollution and also greater consumer awareness. Hence farmers are actively looking into supplemental options for integration into current practices to reduce their dependence on chemicals. This can ensure better growth and protection of their crops, and biologicals can help

them achieve it.

Biological stimulants refer to bacteria, fungi, growth enhancers or plant extracts that increase the availability of soil nutrients and water by increasing soil water holding capacity. They contribute to robustness and vigour of the crop, making it more resilient to adverse climatic conditions while yielding quality produce.

The many benefits

Biological stimulants can complement and enhance the effect of chemical fertilizers in multiple ways. They can increase the germination and root development in early growth of the crop, positively impacting nutrient uptake, transport and efficient energy use. By improving the plant's metabolism, the bio-stimulants can improve the defences and stress-tolerance strategies of the plant to make it healthy, resilient and less prone to disease and environmental stress. They also improve soil fertility by decreasing nutrient runoff, nutrient leaching and growth of complementary soil microorganisms.

The agricultural biological's market was valued at USD 8.8 billion in 2019. It is projected to grow to USD 18.9 billion by 2025. The Indian bio agriculture market was estimated to be worth INR 52,026 in 2019. The cost of developing biological stimulants or pesticides is almost 1/20 of the cost of chemical

based pesticides. As per 2016 data, around 500 biologicals have been registered in India with equal numbers for biological stimulants and bio control agents.

Bio-pesticides

Bio-pesticides that include bacterial, fungal concoctions or plant extracts, are most relevant in fruit and vegetable production. As per 2016 data, globally 80% of the biologicals were utilized by the fruit and vegetable growers. Fruits and vegetables are marketed as fresh produce. Therefore, damaged and unhealthy produce fetches low prices. To keep the produce fresh, farmers tend to spray their fields multiple times with chemicals having different modes of pest control.

Other than the cost of multiple sprays, over-spraying may also lead to pests developing resistance to the chemicals as well as increasing time intervals before the produce can be harvested. This impacts farmers in near and long term. An integrated approach of using bio-pesticides along with chemicals is proposed to be the safe and economical way for growing nutritious crops. Since bio-pesticides degrade quickly, they do not pose any harm to humans, environment and do not impact non-target organisms in the



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Higher adoption needed

Biologicals have been more readily adopted in the developed world than in the third world as the small holding farmers are unwilling to make any changes to their proven cultivation practices. Since the performance of biologicals depends on multiple factors in the field, it can be variable over a period of time and across different fields. Such inconsistencies across time and space can be addressed by better awareness regarding the product and its use in the field. Developers and distributors need to educate the farmers regarding agronomic parameters for using biologicals, their dosage, time and frequency of application along with associated agronomic practices for best results.

field biosphere. Also, their different mode of pest control compared to chemicals could help delay possible development of pest resistance to chemicals, thus contributing to a sustainable long-term pest management strategy.

Widespread acceptance of biologicals in a tropical country like India would depend on several other factors including the prolonged shelf life of the biological, its compatibility with chemicals, easy availability, cost of application and farmer awareness through extension programs to avoid inconsistent results in the field. Since India makes paltry amount of biologicals and imports most of the biologicals in the market, stability and cost remain as issues. The use of biologicals to reduce dependence on chemicals would contribute to sustainability. This requires research and development of products suited for our soils and environment, infrastructure for production and a focussed extension program for educating and training farmers. This road less travelled might lead us to better solutions for our small farms and diverse agro-climatic zones.

