



Biopesticides: An Eco-Friendly Alternative to Synthetic Pesticides Value Added Product

(*Suchibrata Chamuah¹, Sudarshana Bhujel², Gyan Sirohi³, Rasmiranjan Moharana⁴
and Ishwar Sharma⁴)

¹College of Horticulture and Forestry, CAU (Imphal), Pasighat, Arunachal Pradesh, 791102

²Ph.D. (Fruit Science), BCKV, Nadia, West Bengal

³Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut

⁴School of Agricultural Sciences, Nagaland University

*Corresponding Author's email: suchibratachamuah260996@gmail.com

Abstract

Agriculture is negatively impacted by a multitude of pests such as insects, weeds, plant diseases, and nematodes, resulting in decreased crop output and worse quality of the harvest. Biopesticides provide effective means to develop a new breed of sustainable agricultural goods and perhaps replace some of the most troublesome, environmentally harmful, and cancer-causing chemical pesticides now used. These formulations use living organisms (such as fungus, bacteria, and viruses) and their metabolites to control pests in agriculture. The current focus on the advancement and utilisation of biopesticides stems from the drawbacks linked to chemical pesticides. On a global scale, their use is continuously growing at an annual rate of 10%. Microbial pesticides, which belong to one of the three types of biopesticides, were among the first to be created and are now extensively used. Approximately 90% of biopesticides are generated from a single entomopathogenic bacteria known as Bt, which produces endospores and belongs to the Gram-positive group. India has significant potential for biopesticides; nonetheless, these products now account for just 2.8% of the total pesticide market. Although biopesticides show enormous potential, they have not yet reached the needed level to replace the domination of chemical pesticides. Given the worldwide importance of environmental safety, it is crucial to raise awareness among farmers, government agencies, policy makers, manufacturers, and the general public about the necessity to transition to biopesticides for pest control purposes.

Introduction

Agriculture has long been plagued by various pests such as insects, weeds, plant diseases, and nematodes, resulting in significant agricultural losses. These losses are estimated to be roughly 45% of total crops, totaling to around 290 billion every year. While traditional chemical pesticides have indeed increased food production, they have also had detrimental effects on the ecosystem and non-target creatures. Furthermore, the presence of unstable pesticide residues sometimes causes food safety concerns among local customers and creates obstacles for the exportation of products. Biopesticides are formulations made from natural materials such as bacteria, animals, plants, and minerals, as well as live creatures like fungus, bacteria, and viruses. These ecofriendly tools have the potential to develop a new generation of sustainable agricultural goods. On a global scale, the use of biopesticides is seeing a consistent annual growth rate of 10%. The global output of biopesticides exceeds 3000 tonnes

annually, and India has significant potential for both the production and consumption of biopesticides (Gupta and Dixit, 2010; Al-Zaidi, 2011).

Biopesticides may be categorised into three main classes: microbial pesticides, plant pesticides (also known as botanical pesticides), and biochemical pesticides. Curiously, almost 90% of microbial insecticides are derived from a single kind of bacteria called an entomopathogenic endospore producer (Kumar and Singh, 2015). Considering the extensive microbial variety, there are several possibilities for discovering or altering biopesticides with potential to protect the environment from the harmful impact of agrochemicals on non-target creatures, including humans.

Advantages of biopesticides

1. Environmentally Friendly:

- ✓ Biopesticides possess a lower intrinsic toxicity to the environment in comparison to traditional chemical pesticides.
- ✓ They decompose organically, minimising the likelihood of long-lasting remnants in soil, water, and food.
- ✓ Biopesticides have a role in promoting a more robust environment by reducing pollutants.

2. Low Toxicity:

- ✓ Biopesticides provide negligible hazards to human health, animals, and beneficial insects.
- ✓ Biopesticides have the advantage of selectively targeting pests without causing damage to non-target species, unlike broad-spectrum conventional pesticides.
- ✓ This level of selectivity guarantees the use of safer methods for controlling pests.

3. Targeted Action:

- ✓ Biopesticides specifically target the desired pests.
- ✓ They have no detrimental effect on helpful insects (such as pollinators) or other non-target creatures.
- ✓ Biopesticides help maintain ecological equilibrium by preserving natural predators of pests.

4. Sustainable:

- ✓ Locally-produced biopesticides may minimise the need for long-distance transportation and the subsequent energy usage.
- ✓ Their manufacture often depends on sustainable resources, which encourages independence.
- ✓ Through the use of biopesticides, farmers actively promote sustainable agricultural practices and diminish reliance on artificial chemicals.

Value-Added Agriculture

Beyond pest control, value-added agriculture plays a crucial role in sustainable practices. It involves transforming raw agricultural products into higher-value goods. Examples include:

1. **Garlic Braids:** Garlic braids provide a practical purpose and are also visually appealing. They construct attractive braids by interweaving fresh garlic bulbs with their stems. By converting ordinary garlic bulbs into aesthetically pleasing braids, growers may demand higher prices in marketplaces or directly sell them to customers as distinctive kitchen ornaments.
2. **Bagged Salad Mix:** Bagged salad mixes often consist of a diverse assortment of crisp leafy greens, including lettuce, spinach, rocket and kale. These pre-washed and pre-cut greens are prepared and suitable for immediate eating. Farmers meet the needs of busy customers looking for nutritious and time-saving choices by packing salad greens in compact bags. The enhanced convenience enhances the value of the product.
3. **Artisan Bread:** Artisan bread is meticulously prepared by hand utilising traditional techniques, premium ingredients, and extended fermentation periods. It often showcases

rough textures, distinctive tastes, and crispy exteriors. Artisan bread distinguishes itself from mass-produced loaves. Consumers value the genuine nature, intricate taste, and meticulous effort invested in its creation, elevating it to a high-quality product.

4. **Lavender Soaps:** Lavender soaps are crafted with lavender essential oil derived from the fragrant lavender plant. These soaps have a calming effect, a pleasant scent derived from natural sources, and the possibility of improving the condition of the skin. By integrating lavender oil, producers produce specialised soaps that attract health-conscious customers in search of natural skincare goods. The calming attributes of lavender enhance their worth.
5. **Sausages:** Sausages are a kind of processed meat that is created by grinding and flavouring meat, often pig, beef, or chicken, and then filling it into casings. They are available in a wide range of flavours and styles. Sausages convert ordinary beef chunks into savoury, pre-cooked goods. Sausages, whether smoked, spiced, or flavoured with herbs, provide a convenient and versatile option for cooking.

Conclusion

The use of synthetic chemicals has prompted significant apprehensions owing to their adverse impacts on the environment, human well-being, natural predators, and the equilibrium of ecosystems. Certain active components of artificial pesticides have been shown to have carcinogenic properties, hence endangering human health. Biopesticides provide a superior alternative to synthetic pesticides owing to their little toxicity, capacity to biodegrade, and low persistence in the environment. The synergy between biopesticides and value-added agriculture is crucial for promoting a more environmentally sustainable future. By implementing these measures, we safeguard our ecosystem, improve food security, and advance the cause of sustainable agriculture.

References

1. Gupta, S. and Dikshit, A. K. 2010. Biopesticides: An ecofriendly approach for pest control Journal of Biopesticides (1 Special Issue): 186 - 188.
2. Al-Zaidi, A. A., Elhag, E. A., Al-Otaibi, S. H. and Baig, M. B. 2011. Negative effects of pesticides on the environment and the farmer's awareness in Saudi Arabia: a case study (3):605- 611
3. Kumar, S. and Singh, A. 2015. Biopesticides: Present status and the future prospects. (2): 1000e129