



Biopesticides an Eco-Friendly Alternative Pest Control

Khan NT*

Department of Biotechnology, Balochistan University of Information Technology, Engineering and Management Sciences, Pakistan

***Corresponding author:** Nida Tabassum Khan, Department of Biotechnology, Faculty of Life Sciences & Informatics, Balochistan University of Information Technology, Engineering and Management Sciences, Takatu Campus, Airport Road, Quetta, Balochistan, Pakistan, Email: nidatabassumkhan@yahoo.com

Received Date: November 11, 2021; **Published Date:** November 26, 2021

Abstract

Biopesticides characterize intensifies that are utilized to oversee agrarian nuisances through explicit natural impacts as opposed to as more extensive compound pesticides. It alludes to items containing bio control specialists i.e., regular microbes or substances obtained from microbes, plants, or certain minerals including their qualities or metabolites, for controlling insect pests.

Keywords: Chrysanthemum; Insecticides; Crown Gall; Submerged Fermentation

Abbreviations: BT: Bacillus Thuringiensis; IPM: Integrated Pest Management

Introduction

Biopesticides are synthetics that are extracted from biological entities like plants, microbes, fungi etc and these synthetic substances can be utilized for controlling harmful pests [1]. For instance, canola oil or baking with pesticidal applications is considered as biopesticides [2]. Biopesticide incorporates naturally occurring substances that helps in controlling pests in an eco-friendly, non-toxic manner [3]. Bio pesticides may be derived from numerous biological organisms such as from nematodes, Chrysanthemum, Azadirachta and Bacillus thuringiensis, Trichoderma, nucleopolyhedrosis virus etc [4,5]. Microbial bio controls may incorporate microorganism or natural parasites that attack their specific prey [6]. Biochemical bio controls on the other hand, function by employing various mechanisms such as by repressing pest population by inhibiting its reproduction or multiplication etc [7]. Plant extracts were seemingly the earliest reported agricultural bio control methods, for example was used to control plum beetles in

the early seventeenth century [8]. Another example includes the use of Beauveria bassiana fungus to control silkworm [9]. Later on Bacillus thuringiensis (BT) became the most widely used bio pesticide for bio control [10]. In 1956, the Pacific Yeast Product Company developed BT containing bio pesticides on massive scale using the applications of submerged fermentation [11]. In 1979, U.S. EPA registered the first pheromone employed in mass trapping of Japanese beetles [12]. Another reported example is the use of kaolin clay as a repellent in organic fruit farms [13].

Types of Biopesticides

Following are some various types of bio pesticides:

- **Microbial Pesticides:** Microbial pesticides contains microorganism such as bacteria, fungi organism or protozoan as their active core [14]. Microbial pesticides can control various types of pests but are target specific [15]. For example, there are specific fungal species that can handle explicit weeds and insects [16]. Microbial pesticides include insecticides, fungicides, herbicides and growth regulators having microbial origin [17].
- **Bacillus Thuringiensis:** It controls American bollworm

in cotton and stem drills in rice, when ingested by pest larvae, it releases toxins which harm the mid gut of the pest, in the long run killing it [18].

- **Agrobacterium Radiobacter:** it is utilized in the treatment root crown gall in peaches, grapevine and mostly roses [19]. In addition, they are capable of producing agrocin, an antibiotic that is poisonous to *Agrobacterium tumefaciens* [20].
- **Pseudomonas Fluorescens:** These microorganisms are utilized to control damping off caused by *Pythium* sp., *Rhizoctonia solani*, *Gaeumannomyces graminis* etc [21,22].
- **Trichoderma:** An active fungicide for controlling microbes that causes root rots [23]
- **Metarizium Anisopliae:** It controls spittle bugs, rhinoceros' bugs etc [24].
- **Beauveria Bassiana:** It controls Colorado potato bug [25].
- **Plant-Incorporated-Biopesticides:** Plant-incorporated-pesticides are pesticidal substances which are produced from genetically modified plants such as gene for Bt pesticidal proteins introduced into plants which later on releases the toxin that annihilates the microbe [26].
- **Biochemical Pesticides:** Biochemical pesticides incorporate substances such as pheromones that interfere with insect mating [27].
- **Botanical Pesticides:** Such as employing plants natural properties to control pests such as insect repellent property of Azadirachtin [28]

1.1. Advantages of Biopesticides

- It is inherently not very harmful and there is less environmental load [29].
- Intended to influence a single specific pest or, a couple of targets living beings simultaneously [30].
- When utilized as a segment of Integrated Pest Management (IPM) programs, biopesticides can contribute extraordinarily [31].

Conclusion

Biopesticides are effective microbial biological pest control that are applied in a way like chemical pesticides and is used to control soil borne and seed borne fungal parasitic microbes.

References

1. Glare T, Caradus J, Gelernter W, Jackson T, Keyhani N, et al. (2012) Have biopesticides come of age?
2. Trends Biotechnol 30(5): 250-258.
3. Gupta S, Dikshit AK (2010) Biopesticides: An ecofriendly approach for pest control. Journal of Biopesticides 3: 186.
4. Copping LG, Menn JJ (2000) Biopesticides: a review of their action, applications and efficacy. Pest Management Science: Formerly Pesticide Science 56(8): 651-676.
5. Kumar S, Singh A (2015) Biopesticides: present status and the future prospects. J Fertil Pestic 6(2): 100-129.
6. Chandler D, Bailey AS, Tatchell GM, Davidson G, Greaves J, et al. (2011) The development, regulation and use of biopesticides for integrated pest management. Philos Trans R Soc Lond B Biol Sci 366(1573): 1987-1998.
7. Menn JJ, Hall FR (1999) Biopesticides. In Biopesticides: use and delivery. Humana Press, pp: 1-12.
8. Hubbard M, Hynes RK, Erlandson M, Bailey KL (2014) The biochemistry behind biopesticide efficacy. Sustainable Chemical Processes 2(1): 1-8.
9. Regnault-Roger C, Philogene BJ, Vincent C (2005) Biopesticides of Plant Origin. J Nat Prod 68(7): 1138-1139.
10. Hou C, Qin G, Liu T, Geng T, Gao K, et al. (2014) Transcriptome analysis of silkworm, *Bombyx mori*, during early response to *Beauveria bassiana* challenges. PLoS One 9(3): 91189.
11. Sanchis V, Bourguet D (2008) *Bacillus thuringiensis*: applications in agriculture and insect resistance management. A review. Agronomy for sustainable development 28(1): 11-20.
12. Crickmore N (2006) Beyond the spore-past and future developments of *Bacillus thuringiensis* as a biopesticide. Journal of Applied Microbiology 101(3): 616-619.
13. Witzgall P, Kirsch P, Cork A (2010) Sex pheromones and their impact on pest management. J Chem Ecol 36(1): 80-100.
14. Caleca V, Rizzo R (2007) Tests on the effectiveness of kaolin and copper hydroxide in the control of *Bactrocera oleae* (Gmelin). IOBC WPRS Bulletin 39(9): 111-117.
15. Kabaluk JT, Svircev AM, Goettel MS, Woo SG (2010) The use and regulation of microbial pesticides in representative jurisdictions worldwide. International Organization for Biological Control of Noxious Animals and Plants (IOBC), pp: 99.
16. Robertson JL, Preisler HK, Ng SS, Hickie LA, Gelernter WD (1995) Natural variation: a complicating factor

- in bioassays with chemical and microbial pesticides. *Journal of Economic Entomology* 88(1): 1-10.
17. Flexner J, Lighthart B, Croft BA (1986) The effects of microbial pesticides on non-target, beneficial arthropods. *Agriculture, Ecosystems & Environment* 16(3-4): 203-254.
 18. Marrone PG (1999) Microbial pesticides and natural products as alternatives. *Outlook on Agriculture* 28(3): 149-154.
 19. Kaur S (2000) Molecular approaches towards development of novel *Bacillus thuringiensis* biopesticides. *World Journal of Microbiology and Biotechnology* 16(8-9): 781-793.
 20. Bailey KL, Boyetchko SM, Langle T (2010) Social and economic drivers shaping the future of biological control: a Canadian perspective on the factors affecting the development and use of microbial biopesticides. *Biological Control* 52(3): 221-229.
 21. Park KH, Cha JS (2001) Biological control of crown gall disease on rose by *Agrobacterium radiobacter* K84. *The Korean Journal of Pesticide Science* 5(3): 50-53.
 22. Molloy DP, Mayer DA, Gaylo MJ, Morse JT, Presti KT, et al. (2013) *Pseudomonas fluorescens* strain CL145A-A biopesticide for the control of zebra and quagga mussels (*Bivalvia: Dreissenidae*). *Journal of invertebrate pathology* 113(1): 104-114.
 23. Rebecca J, Karunakaran CM, Anbuselvi S (2010) Antifungal activity of *Pseudomonas fluorescens* and its biopesticide effect on plant pathogens. *National Journal on Chembiosis* 1(1): 1.
 24. Kumar G, Maharshi A, Patel J, Mukherjee A, Singh HB, et al. (2017) *Trichoderma*: a potential fungal antagonist to control plant diseases. *SATSA Mukhapatra-Annual Technical Issue* 21: 206-218.
 25. Leemon DM, Jonsson NN (2008) Laboratory studies on Australian isolates of *Metarhizium anisopliae* as a biopesticide for the cattle tick *Boophilus microplus*. *J Invertebr Pathol* 97(1): 40-49.
 26. Padmavathi J, Devi KU, Rao CUM (2003) The optimum and tolerance pH range is correlated to colonial morphology in isolates of the entomopathogenic fungus *Beauveria bassiana*—a potential biopesticide. *World Journal of Microbiology and Biotechnology* 19(5): 469-477.
 27. Singh D (2014) *Advances in plant biopesticides*, Springer.
 28. Sarwar M (2015) Information on activities regarding biochemical pesticides: an ecological friendly plant protection against insects. *International Journal of Engineering and Advanced Research Technology* 1(2): 27-31.
 29. Jacobson M (1989) Botanical pesticides: past, present, and future. *ACS Symposium Series* 387: 1-10.
 30. Kawalekar JS (2013) Role of biofertilizers and biopesticides for sustainable agriculture. *J Bio Innov* 2(3): 73-78.
 31. Deravel J, Krier F, Jacques P (2014) Biopesticides, a complementary and alternative approach to the use of agrochemicals. A review. *Biotechnologie, Agronomie, Societe et Environnement* 18(2): 220-232.
 32. Ramarethinam S (2002) Biopesticides-an overview. *Resources management in plant protection during twenty first centuries, Hyderabad, India* 1: 167-179.