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Environmental Friendly Bio-pesticides: A Review

Thomson M* and Vijan A[2]

[1]PES College of Pharmacy, Bangalore, India

[2]Chandigarh University, Mohali, Punjab, India

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***For Correspondence**

Thomson M, PES College of Pharmacy, Bangalore. India.

E-mail: mudumala.thomson @gmail.com

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ABSTRACT

Synthetic pesticides and chemical fertilizers which are being used for the agriculture are resulting in residues of chemicals in soil, water, air there by causing a hazardous contamination. By promoting different methods of eco-friendly agriculture like Organic farming, Bio-pesticides global goal of sustainable agriculture can be achieved improving the quality and quantity of food produced globally. This goal of sustainable agriculture can only be achieved by creating awareness among farmers, community and society.

INTRODUCTION

The United Nations predicts that there will be demand for increase in world food production by 70% in order to cope up with the ever increasing demand of food as a result of increase in global population [1]. Food production is the agenda of all the countries, as the global population is predicted to be close to ≈10 billion by 2050. Usage of chemical pesticides has severely affected both the abiotic and biotic components of the environment. Forming degradants and harmful components in the process contaminating soil, air, water, food etc. Also there are reported problems of Phytotoxicity, physiological deformities, diseases, mortality, population changes, genetic disorders, gene erosion, etc. in plant, mammal, avian, insect and other organisms. Chemical pesticides are one of cause for destruction of food chain and their bioaccumulation triggers severe consequences. But when compared to the conventional agriculture most of the weeds, pests, insects and diseases were prevented by usage of natural and sustainable practices such as cultural, mechanical, and physical control strategies.

Sustainable agricultural practices and environmental friendly methods are crucial for survival on the Earth. Bio pesticides may be taken into consideration as one of the components required to protect the environment for sustainable agricultural production [2].

Alternatives for Pesticides:

The efficient standard Package of Practice (SPP) for plants in nursery includes by preparing a primary bed of fertile mixture of jungle soil, Farm Yard Manure (FYM) and sand in the ratio of 6:2:1 [3]. One of the macronutrients essential for plants is Phosphorus. It rapidly gets immobilized when added as a soluble fertilizer [4]. Rock phosphate (RP) is solubilized effectively by fungi than bacteria [5]. Agriculture is also affected by usage of bactericides, fungicides, weeds and insecticides, leading to reduced yield and detoriating the soil with contaminants [6]. Insecticidal properties of DDT were pavement for developing organochlorine and organophosphate insecticides for control of insects damaging yield of crops [7].

In organic farming faeces of animal are replaced as a fertilizer instead of synthetic pesticides [8]. The usage of biopesticides as part of sustainable agriculture process involves creating awareness among farmers and encouraging agro-drugs with reasonable cost is crucial to ensure the economic sustainability and further development [9]. Ill effects of the agrochemicals include resistance to pesticide, resurgence of pest, chemical residues in the soil, air and water there by contaminating environment [10].

Factors such as concentration of substrate, temperature, soil pH etc. also affect the yield of agriculture [11]. Practicing of organic agriculture requires balancing nutritional supplement and eco-friendly pest consequently achieving the quality and quantity of the agricultural outputs [12]. The strategy chalked out by ICM to counteract degrading ecosystem in agriculture as a result of practices of intensive agriculture, this also includes implementing water conservation practices, conservation of biodiversity etc. there by protecting the agro ecosystem [13].

From bio control strains of the genus Trichoderma certain metabolites produced by beneficial fungi have been identified and isolated [14]. Biocontrol agent is capable of reducing the production of toxic metabolites thereby reducing soil contamination [15]. Usage of biopesticides replacing synthetic pesticides may result in slow performance as compared to synthetic pesticides [16]. In 2013 approximately 400 registered products of biopesticide active component and more than 1250 registered biopesticide products were available in the market [17].

Effects:

There are reported cases to establish that exposure to pesticides leads to chronic diseases like different types of cancers, neurodegenerative disorders like Parkinson, Senile dementia, and Lou Gehrig's disease which are characterized by progressive nervous system dysfunction. There are also reported cases of Diabetes, Liver cirrhosis, Sexual disorders and birth defects in new born [18-23]. To assess the potency of toxins in pesticides Allium cepa is generally used [24-28].

Techniques:

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By using synthetic pesticides for cultivation, pesticides protrude into soil and plants thereby drastically affecting them. The agricultural soil is affected by harming useful micro-organisms, beneficial insects, worms. Pant biochemistry and physiology are affecting resulting to reduced immunity of plant [29-39].Microorganisms are deployed as microbial pesticides which can be helpful in preventing the plant fall prey to pests. The subspecies and strains of Bacillus thuringiensis commonly utilized as microbial pesticides which is also eco-friendly [40-44].

Plant-incorporated protectants (PIPs) are plants contain certain strains of genes which are inserted resulting in plants producing a pesticide in its own tissues. For instance, researchers can take the gene containing strain for a particular for Bacillus thuringiensis pesticidal protein, and make the plant develop pest of its own in the process. Plant-incorporated protectants (PIPs) typically controls pest by non-toxic mechanism which does not harm the environment [45-54].

DNA shuffling, synonymous with the name molecular breeding, is a technology where generation of large libraries of novel genes which are resistant can be selected based on functional properties [55-59].

Benefits [60-66]:

- Bio pesticides decompose quickly without contaminating soil and are effective in small quantities.
- They can be deployed to target a certain pests and closely related organisms.
- Conventional pesticides can be replaced with Bio pesticides simultaneously increasing the agricultural production.

Remedy for damage caused by Pesticides:

The actual resolution for damage due to pesticides lays organic farming and non-toxics methods of cultivation in agriculture, sustainable techniques for pest control [67], pest management [68-71] and organic farming [72,73] food production are step to prevent pesticides to reduce the harm to the environment, atmosphere [74-99] and human health.

Conclusion

By the complete examination, we can conclude to preventable cautions for proper usage of pesticides which are environmentally friendly. The proper regulatory system is to be implemented by the government for usage of pesticides. We have to cultivate practices of non-toxic pest management [100-102] programs by creating awareness by educating in public places like parks, schools, roads etc.

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