Learning from Nature: Biopesticides for sustainable Agriculture

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There is no doubt that the need to improve agricultural productivity and enhance its sustainability is one of the most significant challenges facing humanity. In order to feed the dramatically growing global population, food production must increase by 70 percent. The damage caused by insect pests is one of the most important factors leading to the reduced production of major crop plant species. With this projection, combined with increasing demand for sustainable agricultural practices, research is required in order to produce more toxicologically and environmentally benign pesticides to sustain future agricultural production and global food security. Synthetic chemicals are generally used to control insect pests, which cause harmful impacts on the environment and non-target living systems including human beings. For these reasons, the use of botanical insecticides have attracted the attention of farming, forestry, and industrial sectors worldwide in part because the public perceives natural products to be safer than synthetic chemicals. To put this in context, the biopesticide segment is currently growing at 16% per year, compared with conventional agrochemicals that are growing at a rate of 5.5% per year. The most important biopesticides on the market in commercial terms are microbial pesticides, pyrethrum, rotenone, neem oil and various essential oils. This chapter details the benefits of biopesticides, offering a full spectrum and review of the process to identify, evaluate, and develop new biopesticides. It describes the range of oil, plant extracts, and fungi that may be used in the biological control of insects, and their modes of action, with special interest in Mexican species. Finally, the chapter describes new opportunities for developing biopesticides.

We think that this chapter could attract significant attention from the chemistry community, farmers, agroindustrial engineers, and industries related to agroindustry. It could help them select the appropriate biopesticides, explore future biopesticides, and help in the careful planning and design of experiments and test for the standardization and quality control of the final product.

Keywords Biopesticides; Botanical pesticides; Fungus; Insect pest management; Crop protection; agriculture; legislation

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