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Editorial

Are Mycopesticides the Future of Locust Control?

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Locusts are a very serious problem for agriculture and for the livelihoods of populations around the world. Many lessons have been learned from decades of controlling these pests [1]. After the intensive use of chemical insecticides, new perspectives that are more respectful of people and the environment have emerged over the last twenty years. Protozoa, such as *Nosema locustae*, have been used and have many benefits; however, some limitations still need to be overcome [2]. Currently, entomopathogenic fungi are the most promising alternative, at least partially, to traditional chemical insecticides. The article from Wakil et al. [3] in this Special Issue dedicated to locust management is the first field study to test the efficacy of four different entomopathogenic fungal formulations together—*Metarhizium acridum* (Green Muscle® and Green Guard®), *Metarhizium anisopliae*, and *Beauveria bassiana*—against nymphs and adults of the desert locust *Schistocerca gregaria*. The study shows that all of these formulations have the potential to control locusts under field conditions. In addition, there are sublethal effects on their reproductive ability and behavior, with reductions in diet consumption, frass production, and weight observed. The authors conclude that future research needs to explore the combination of fungus with other control agents—including chemical insecticides, microsporidia, and botanical extracts—as a means of integrated pest management of locusts in the field.

Chemical pesticides have many side effects, and these have been increasingly elucidated, including their impact on human health, the environment, nontarget organisms, and biodiversity [4]. They have been shown to contribute to insect decline worldwide [5]. In addressing this issue, the use of biopesticides as a possible important component of locust management programs is a most significant recent development [6]. The benefits of using biopesticides include specificity to locusts and grasshoppers and the preservation of natural enemies [7]. The credibility of biopesticides as part of locust management programs is increasingly recognized, and programs that have included biopesticides have found them invaluable for treating locusts and grasshoppers wherever they occur [8]. As restrictions on the use of chemical pesticides rightly increase, treatment programs in the future will need to ensure their effectiveness by including biopesticides and by putting mechanisms in place to facilitate their use. Research and development supported by governments and donors will be critical in providing pathways to navigate logistical challenges such as manufacturing, storing, applications, and environmental limitations, especially the low temperature range over which locust mycopesticides are effective. It seems that we are at a turning point in locust control and that substitutes to chemical insecticides—notably mycopesticides—will become increasingly important in the future, not only in prevention—as originally thought—but also in periods of invasion, as shown by the mycopesticide-based treatments carried out during the last desert locust invasion in 2019–2020 [9–11]. *Metarhizium anisopliae* has already been listed for some years as one of the few products recommended by the Locust Pesticide Referee Group of the FAO to control the desert locust and any other locust species [12].

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