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Role of fauna and flora as biological control agents-a review

Rahima Haider[1*]

1. Department of Zoology, Women University of Azad Jammu and Kashmir, Pakistan

***Corresponding author e-mail:** rahimahaiderkhan1@gmail.com

SUMMARY

The use of the fauna and flora as the biological control agents in different crops is the most important substitute which can be utilized instead of the insecticides. This review verifies the significance and importance of the fauna and flora regarding their act as a biocontrol agent against various species. Fauna and flora act as an effective biological agent to control pests in the agro-ecosystem of the pest management. In order to evaluate the impact of fauna and flora on the population of various pests more studies are required. This review also shows the complexity of fauna and flora which can also contribute towards the control of various species.

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INTRODUCTION

The biological controls processes in which we use fungi, animals, or different types of microbes to killed or nourish upon targeted pest species or parasitize. The important of biological control program to prevent the damage which is caused by the productivity of pest, so due to effective bio control programs usually reduce the pest damage, without affecting the pest surplus. It observed that the biological control process is very well tolerated and ecologically friendly process and resistor for pest organisms, because in this process no chemical is used and as a result of which no harmful chemical remain are presents that might be give very injurious outcome on humans as well as other organisms. The biological control processes are well responsible to provide fundamentally stable, extensive control with a very advantageous cost-benefit ratio. Some biological process have main important results, these have persistent harm to untargeted livings and to biological processes. Obviously all biological pest control process have the possible chances to harm non-target local species, resulted the pests can harm to non-target species, if these pest are uncontrolled. Scientists suggested that before releasing agents such as Fungi, animals, or different type of microbes to killed pest species, or using other different methods, it is very necessary to balance or stable it's conceivable help for conservation goals and organization objectives against its prospective to cause harm (Lockwood, 2000; Tu *et al.*, 2001).

TYPES OF BIOLOGICAL CONTROL AGENTS

Weeds

In variety of habitat such as agriculture, forest, rangeland, and in ecosystem, both aquatic and terrestrial, many plants groups turn into pest weeds. In plants 34 families, 116 plants species have been intentions for control by the plants pathogens or invertebrates herbivores. In the weed species a 47% half are involved have been in three families of Cactaceae, Mimosaceae and Asteraceae. Individually some other plant species families have abundant importance in economically, and they have severely focus on effort, in which include Salviniaceae (Salviniamolesta, water fern), Clusiaceae, and Verbenaceae. Grasses have not been a show effect against which control has been generally used, but some requirements exist for management of pest species of grass (Julie, 1992; Crisol *et al.*, 2014)

Invertebrates

When alternative methods used, to start naturally production pesticides, at that point biological control (BC) supports for commercial production of healthy nutritious agricultural, by using different biologically farming methods. This old biological control (BC) method, used by the farmers from 2000 years, here the most oldest example of biological control (BC) Oecophylla weaver ants this creature used in Asian citrus orchards for pest control, but its modern usages dates start at late 1800s (DeBach and Rosen, 1991).

In biological control process different category of methods, used such as conservation Biological control (BC) (i.e., in which promote naturalized agent and native species) and importation of biological control agents (BC).In third type of biological control process (i.e., augmentative biological control; ABC) uses quantity production and shipment of biological control agents release to subsequent field and is applied on approx. According to Heimpel and Mills, (2017), in world typically 10% agriculture land secure agronomy with the help of biological control (BC) but also including some infield yields such as cotton, sugarcane, silviculture and Corn.

Due to high degree responsibility, ABC relies participation in several stakeholders, including government actors, farmers and private enterprises (Bale *et al.*, 2008), and more it's expected that some acknowledged sectors of the general public than other Biological Control (BC) methods that may be applied by organizations and tend to require less farmer contribution (Andrews *et al.*, 1992).

In invertebrates such as spider used a biological agent for controlling pest in diverse fields and it is very useful natural substitute instead of using artificial insecticides and chemical. The most fascinating habitat of spiders for searching prey and extensive variety of host, increasing the polyphagous nature of spiders, and this creates spiders as greatest and admirable bio- suppresser. This assessment demonstrates, biological controlling significant and importance of spiders influence act to control different pests and insects. In pest management spiders play an important and very effective role against to control different type of pest and insects in various agriculture ecosystems. Generally spiders show more predation act against mealy bugs, arthropods and thrips and these are main invaders in orchards. In order to understand the influence of spiders on different population of pests and insects, more evaluation and more research studies required. This type of research display the

spider density which are native can also potentially give towards the control of different crops pests (Saba *et al.*, 2020).

Fishes

Some fishes they prey on some larva stage aquatic mosquitoes, and these fishes act as predators and known as larvivorous fish. Numerous other organisms act as predators of mosquito larvae such as insect larvae, amphibians and tadpole and including other mosquito larvae; whereas, fish considered as most extensively and most habitually considered type of predator, which is used as biological control for mosquitoes (Brodman and Dorton, 2006; Kumar and Hwang, 2006). Mosquito's predation has been noted in many habitations, it including from small plastic ampoule to coastal wetland environments and complex natural ecosystems. In many part of the world the biological control agent such as larvivorous fish have been recognized to help in reducing the population of larval mosquito, from many habitat(Van Dam and Walton, 2007; Griffin and Knight, 2012).

Amphibian

Bambaradeniya *et al.* (2004) assessed that frogs are varied and rich populations of rice fields. It measured that common predators, they nourish up on a different diversity of small vertebrates and invertebrates. Although after a large number studied and evaluation show about the nutritive habits of anurans (Quiroga *et al.*, 2009; Khatiwada *et al.*, 2016), but there is a rareness of studies about frog nourishments in rice fields (Yousaf *et al.*, 2010) and almost no evidence is obtainable from Nepal.. In these groups most of species viewed as notorious rice pests, producing noteworthy losses in rice production (Way and Heong, 1994; Khatiwada *et al.*, 2016).

Mammals

The ecosystem services brought through insectivorous fauna, populating woodlands adjacent macadamia crops may open a more maintainable substitute. In agro-ecosystem research give a very strong proof and suggestions also provide positively supporting the outcomes, which produce by insectivorous micro-bats. The current example indicated the economic profits they can bring: the decreasing the economical vales of coffee berry borer by the birds was valued at US$ 310 ha-1 (Johnson *et al.*, 2010). While such example are capable, but many question remain unanswered in respects to micro-bats could be used as biological control agents (Taylor *et al.*, 2013).

Birds

Birds are best specialization in biological control and in ingestion crushing insects has subsequently taking man's attention, and appeared by names as fly-catcher, fly-eater, Culicicapo (mosquito catcher), bee-eater, apivorous (bee-eating, but used for the honey-buzzard), etc. These birds also have economic values and it has normally discussed, but is far from well assumed in tropical areas such as Indonesia. It would be suitable to consider all insect-eating birds as advantageous. It is estimated that 5000kg of insects prey and consumed, approximately 4.5 million daily by swiftlets, which have been made for Bornean caves. Scientist reported that the purple herons

(*Ardea purpurea*), consumed local grasshopper pest in forest, and prey great number of these insects. However indigenous prey attentions will attract enlarged numbers of insect eaters, it is unclear how large the monitoring outcome in most cases is, and whether the predator's greediness can same with the prey's population growth (which is often fast particularly in monocultures) (SODY, 1955; Harrisson, 1974; Crisol *et al.*, 2014).

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