



BIOLOGICAL CONTROL OF WEEDS WITH INSECTS: AN ECO-FRIENDLY APPROACH

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ABSTRACT

Weeds are a grave menace in various lands, and even today, millions of acres of valuable lands are lost to weeds. The indiscriminate use of broad-spectrum herbicides has resulted in the outbreak of numerous weeds, the development of resistance to herbicides, herbicides induce resurgence, reduction in the biodiversity of natural enemies and contamination of food and ecosystem. These negative effects of herbicide have led to increasing demand for alternative strategies for controlling weeds. Biological control of weeds can play an important role to minimize the hazards resulting from herbicide residue both on human and animal health and the ecosystem. It includes the cautious usage of target-specific damaging organisms to keep a specific weed population at or below desirable levels without significantly affecting useful and wanted plants.

INTRODUCTION

From the last two decades, new approaches and methods were developed in weed management practices. Besides, in agriculture, new approaches are promoted that control the weed population as weeds are a major constraint to production of the crops in the world. Many insects and small organisms feed on the weed plants and this can be utilized to control the population of a specific weed in a specific area. Therefore, biological weed control is gaining momentum in recent times over mechanical and chemical methods.

WHAT IS A WEED?

A weed can be defined as plant growing out of place. For example, water hyacinth is beautiful in floating gardens but can rapidly clog waterways, making navigation impossible. Similarly, morning glory can destroy a farmer's crop by interweaving corn stalks. Weeds cause losses in many ways like;

- a) Reduction in yield of the crop.
- b) Enhance in cost of cultivation
- c) Injury to animal and human
- d) Value reduction in wildlife
- e) Alternative hosts for harbouring pathogen inoculum

INSECTS AS AGENTS FOR BIOLOGICAL WEED MANAGEMENT

A plant is called as weed when it has no economic benefits on one hand whereas it reduces the yield of the crop plants by competition. There excessive growth of the weed/off type plants occurs due to

disturbance in the agroecosystems which may be natural or due man made interference in natural system. In order to check the excessive growth of these weeds flora the natural enemy or insect which feed on these weeds may be introduced in the target region. By the eating away these weeds the introduced microorganisms play be big role in weed control. Some examples of the insect which successfully released around the globe are:

Coleoptera: Curculionidae, Cerambycidae, Chrysomelidae, Buprestidae, Galeuricidae

Lepidoptera: Phycitidae, Tortricidae

Diptera: Agromyzidae, Trypetidae

Hemiptera: Coreidae, Tingidae, Coccidae

DESIRABLE ATTRIBUTES OF A WEED KILLER

1. The introduced insect species may be target specific in nature.
2. It should be effective to in controlling the target weed species.
3. It must have habit to bore the stem of the plant or may be feeding on the plants internally.
4. It must be quick multiplying or reproduction nature.

Table 1. Successful biocontrol agents used for weed control

Sr. no.	Weed	Biocontrol agent (insects)	Origin
1.	Congress grass or carrot grass (<i>Parthenium hysterophorus</i>)	<i>Zygogramma bicolorata</i> (Chrysomelidae: Coleoptera) <i>Smicronyx lutulentus</i> <i>Epiblema sternuana</i>	Mexico
2.	Crofton weed (<i>Eupatorium adenophorum</i>)	<i>Procecidochares utilis</i> (Tephritidae: Diptera)	Mexico
3.	Lantana weed (<i>Lantana camera</i>)	<i>Ophiomyia lantanae</i> (Agromyzidae: Diptera), <i>Teleonemia scrupulosa</i> (Tingidae: Hemiptera), <i>Aspondylla lantanae</i> (Cecidomyidae: Diptera), <i>Octotoma scabripennis</i> (Chrysomelidae: Coleoptera), <i>Orthezia insignis</i> (Ortheziidae: Hemipetra)	Mexico Australia
4.	Prickly pear (<i>Opuntia dilleni</i> <i>O. vulgaris</i>)	<i>Dactylopius opuntiae</i> (Dactylopiidae: Hemiptera)	USA
5.	Siam weed (<i>Chromolaena odorata</i>)	<i>Pareuchates pseudoinsulata</i> (Arctiidae: Lepidoptera) <i>Apion brunneonigrum</i> (Apionidae: Coleoptera)	West Indies
6.	Waterfern (<i>Salvinia molesta</i>)	<i>Cryptobagus salvinae</i> <i>Cryptobagus singularis</i> (Curculionidae: Coleoptera)	Brazil Australia

7.	Water hyacinth (<i>Eichhornia crassipes</i>)	<i>Neochetina eichhorniae</i> <i>N. bruchi</i> (Curculionidae: Coleoptera) <i>Orthogalumna terebrantis</i> (Orthogalumnidae: Acari)	USA
8.	Alligator weed (<i>Alternanthera philoxeroides</i>)	<i>Agasicles hygrophila</i> (Chrysomelidae: Coleoptera)	South America



Fig 1. Noxious weeds, along with their biocontrol agents

CONCLUSION

Biological control through insects is an efficient approach which doesn't affect environment but supports the conventional approaches for weed control to be more effective to reduce the weed flora. For controlling the weed through biological methods, the evaluation of the native as well as exotic species of biocontrol agent is required. The availability of new bio-control agents of the weeds will reduce the burden on the farmers for utilizing the weedicides thereby reduce the environmental hazards.

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