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# Flowers as natural pest control agents

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**Introduction:**

Farmland biodiversity has sharply declined as a result of the intensification of agricultural production, which has simplified farmland landscapes and drastically decreased non-crop habitat area (Wade et al., 2008). The flowering plants that natural enemies of insects rely on for ecological supplies are a major factor in this loss. Simplified agricultural landscapes eliminate insect pests from this natural mortality factor and reduce the overall activity of natural enemies. The use of ecological engineering techniques to enhance pest control has been suggested as a means of achieving agricultural sustainability. Our surrounding is being enriched with many flowers which are known to possess properties that can attract beneficial insects or keep away detrimental insects. The beneficial insects such as ladybugs, praying mantises etc. prey on damage causing pest population whereas honey bees, butterflies, moths etc. serve as potential agent for effective pollination and fruit set. Exploiting flowers as natural pest control agents not only reduces the work pressure but also cuts down the amount of pesticides to be resorted. Lesser pesticide usage can lead to more beneficial bug population, which in turn assist in keeping the harmful bug population in check (Stakal, 2018). There is a saying that "what comes up well in my garden may not come well in yours". It is because every garden out there, avail a discrete growing climate, soil type and so also typical insect pests. Therefore flowers must be chosen which are native to the particular area in order to attract beneficial insects as they have been already acclimatized with the particular flowers. The goal of ecological engineering in this context is to protect crops from economic damage by strategic use of plant biodiversity to maximize natural mortality of pests. It is possible to alter the non-crop vegetation on and near farms to increase the activity of natural enemies, according to recent studies like Thomson *et al*. (2010). This is significant because, especially in agri-environmental systems where farmers may get payment for creating or maintaining noncrop vegetation, noncrop vegetation is frequently established and managed for

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biodiversity conservation or other purposes unrelated to pest management.

**Methods of using flowers for natural pest control**

**Companion planting**

"Companion planting" is one specific type of polyculture, under which two plant species are grown together that are known, or believed, to synergistically improve one another's growth. That is, plants are brought together because they directly mask the specific chemical cues that one another's pests use to find their hosts, or because they hold and retain particularly effective natural enemies of one another's pests. In this chapter we define companion plants as inter-plantings of one crop (the companion) within another (the protection target), where the companion directly benefits the target through a specific known (or suspected) mechanism. Companion plants have two ways of controlling insect pests: directly by preventing the development of the pest and indirectly by drawing in natural enemies that subsequently eliminate the pest. It is possible to harvest the perfect companion plant, which will benefit the farmer both directly and indirectly by protecting the goal crop. However, when the economic benefit of higher target yield outweighs the expense of producing the companion, "sacrificial" companion plants which by themselves provide no profit can be beneficial.

**Trap cropping**

Trap cropping is an attractive option to reduce dependency on conventional pest management practices through insecticides. Indeed, insecticides are costly and hazardous (even the organic ones), and some insect pests have developed resistance against them An example could be the stink bug (Hemiptera: Pentatomidae), which can further be exacerbated by their long life cycle, high capacity to disperse and polyphagous nature leading to a landscape-wide agro-ecosystem threat. Trap crops have been shown to effectively manage stink bugs (*Halyomorpha halys* Stal (Hemiptera: Pentatomidae)) in conventional and organic crop production systems. An efficient trap crop system should have at least double the pest attraction capacity of the cash crop during its vulnerable stage with an easy management strategy and should cover no more than 2–10% of the total crop area (Holden *et al*., 2012).

**Different flower crop having pest controlling properties**

**Borage (*Borago officinalis*, Boraginaceae)**

Borage is most commonly grown and used in a variety of culinary recipes in Britain. This annual plant yields blue, star-shaped blossoms and works well when used to herbal drinks, tinctures, and leafy green treats. In addition, borage effectively inhibits the growth of cabbage worm (*Pieris rapae*) in cabbage

and tobacco hornworm (*Manduca quinquemaculata*). Additionally, it is said to strengthen plants' defenses against pests and diseases.

**Chrysanthemums (*Dendranthema grandiflora*, Asteraceae)**

The big flower heads of chrysanthemum comes in wide array of colour shades viz. white, pink, yellow etc. and can be made useful in terms of controlling pests in garden. Some of its cultivars can be brewed to teas which can be served nematicide for killing root nematodes (*Meloidogyne* spp.) in solanaceous vegetable crops (Morton, 2022) and also useful in repelling Japanese beetles (*Popillia japonica*) in corns, soybeans etc. From the flowers of *Chrysanthemum cinerarifolium*, pyrethrum is extracted, which is an excellent pesticide against various insects and safer for human and animal consumption (Smith, 2020). Despites, the flowers attract many butterflies owing to their fragrance, which not only enhance the aesthetic view of garden but also aid in pollination.

**Dahlias (*Dahlia variebilis*, Asteraceae)**

Dahlias' diverse shapes and color hues make them an excellent choice for gardeners and flower enthusiasts. They are also well-known for their ability to repel nematodes and insects, which makes them both aesthetically pleasing and functional.

**Four O'Clocks (*Mirabilis jalapa*, Nyctaginaceae)**

The flowers are known to possess the power for attracting and killing Japanese beetles (*Popillia japonica*) effectively, making them a perfect trap crop to be place planted in the close vicinity of vegetable and flower garden. However, four o' clock flowers can be poisonous to human and pets, thus care should be taken to select a safer site for growing these plants.

**Marigolds (*Tagetes* sp., Asteraceae)**

Many people have acknowledged that marigold has the ability to repel pests. Whiteflies (*Bemicia* sp.) and dangerous nematodes, especially root knot worms (Meliodogyne incognita), can be controlled with French marigolds (*Tagetes patula*). However, the best usage for African marigold (*Tagetes erecta*) is as an irritant for a variety of harmful pests. Marigold cultivars with fragrances are used to make insect repellents. Marigolds are known to repel a lot of harmful insects, but they also draw some unwanted snails (*Cornu aspersum*) and spider mites (*Tetranychus urticae*).

**Sunflowers (*Helianthus annuus*, Asteraceae)**

Being a hardy plant, it comes well in garden and its large flower head attracts a number of beneficial insects such as pollinators like bees, wasps, butterflies etc.

Besides, sunflowers can also efficiently drive away aphids (*Aphis gossypii*) from other plants.

**Zinnia (*Zinnia elegans*, Asteraceae)**

These beautiful flower plants not only do establish really quick but also stay long in the garden, thereby ensure continuous crop protection from invading pests for a long period of time. Zinnia attracts pollinating agents as well as ladybugs (*Coccinella septempunctata*), which are predominant natural enemies of aphids (*Aphis gossypii* ) and also to some extent can track down some sucking pests like mites (*Tetranychus urticae*), scales (*Pinnaspis aspidistrae*), leaf hoppers (*Circulifer tenellus*), mealy bugs (*Planococcus citri*) etc.

**Benefits of using flower plants as natural pest controller**

- Using natural pest control techniques can effectively cut down on the amount of time needed for pest management.
- A healthier garden in long run can be achieved, as biological pest control ensures negligible residual toxicity by bringing down the pesticide application.
- Reducing the use of pesticides can lower the carbon footprint by reducing the exposure of humans, pets, plants, water, the environment, and soil to chemical toxins.
- As compared to chemical methods, the risk of resistance development in pests towards natural methods is comparatively slow.
- The biological pest control method also makes sure the protection of beneficial pests such as pollinators, as it is target specific.

**Conclusion**

Pest control is crucial for optimizing growth and yield in a garden. By using less pesticides, companion planting with flowers can be a healthy method of keeping pests away. Natural management guarantees the protection of beneficial insects and natural adversaries, in contrast to harmful chemical pesticides. In order to benefit from the blooms mentioned above as soon as possible, they can be swiftly grown in a garden. To keep dangerous insects and bugs away, these flowers can be planted close to the main crop or cultivated in banks around the garden.

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