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Role of Trap Crops in Pest Management

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INTRODUCTION

Trap crops are those crops which are planted along with the main cash crop to protect it from a specific pest or several pests by attracting them for feeding, breeding and survival. Generally, trap crop is used for attracting the insect and pests away from the field that are grown to attract insects or other organisms to protect target crops from pest attack. Protection may be achieved either by preventing the pests from reaching the crop or by concentrating them in certain part of the field where they can economically be destroyed. (Hokkanen, 1991).

PRINCIPLES OF TRAP CROPS

Trap crops will not control all insects and the use of integrated pest management (IPM) is necessary. IPM practices include rotating crops, attracting beneficial insects, and prudently using organic and synthetic chemicals. The principle of trap cropping rests on the fact that virtually all pests show a distinct preference to certain crop stage The two primary techniques utilized in trap cropping are: 1) selection of a more preferred plant species or cultivar grown at the same time as the main crop; 2) planting of the same species and cultivar as the main crop timed to be at the most preferred stage of development before the main crop. Whether using the same or different species, it is essential that the trap crop be more attractive than the main crop.

DIFFERENT TRAP CROPS USE IN PEST MANAGEMENT PRACTICES

1. Alfalfa planted in strips among cotton, to draw away lygus bugs, while castor beans surround the field, or tobacco planted in strips among it, to protect from the budworm *Heliothis.*

2. Marigold (*Tagetes erecta* L.) is potentially useful to maintain arthropod biodiversity, including certain species of Predator thrips (Sampaio et al, 2008) reported that this plant hostages species of *Orius* (Hemiptera: Anthocoridae), which is the main thrips predator globally. Moreover, marigold planted in-between rows of onion crop have shown to promote the reduction of aphid, nematode and whitefly and virus diseased plants (Zavaleta. and Gomez, 1995). They also host other phytophagous species that are alternative prey for entomophagous species. Successful use of marigold as trap crop for management of tomato fruit borer on tomato is on record (Srinivasan, and. Moorthy, 1991) with marigold in 3:1 combination without using any type of insecticide (Hussain and Bilal, 2007) Some organic growers cultivate marigold for its pollen and nectar, which increase natural enemy fecundity and its survival (Baggen,,et al, 1999).

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Table1. Examples of trap cropping practices

Sl No.	Trap crop	Main crop	Method of planting	Pest controlled
1	Alfalfa	Cotton	Strip intercrop	Lygus bug
2	Basil and marigold	Garlic	Border crops	Thrips
3	Castor plant	Cotton	Border crop	*Heliotis sp.*
4	Chervil	Vegetables Ornamentals	Among plants	Slugs
5	Chinese cabbage, mustard, and radish	Cabbage	Planted in every 15 rows of cabbage	Cabbage webworm Flea hopper Mustard aphid
6	Beans and other legumes	Corn	Row intercrop	Leafhopper Leaf beetles Stalk borer Fall armyworm
7	Chick pea	Cotton	Block trap crop at 20 plants/ sq m (Brown, 2002)	*Heliotis sp.*
8	Collards	Cabbage	Border crop	Diamondback moth
9	Corn	Cotton	Row intercrop, planted in every 20 rows of cotton or every 10-15 m	*Heliotis sp.*
10	Cowpea	Cotton	Row intercrop in every 5 rows of cotton	*Heliotis sp.*
11	Green beans	Soybean	Row intercrop	Mexican bean beetle
12	Indian mustard	Cabbage	Strip intercrop in between cabbage plots	Cabbage head caterpillar
13	Marigold	Solanaceous Crucifers Legumes Cucurbits	Row/strip intercrop	Nematodes
14	Napier grass	Corn	Intercrop Border crop	Stem borer
15	Nasturtium	Cabbage	Row intercrop	Aphids Flea beetle Cucumber beetle Squash vine borer
16	Okra	Cotton	Border crop	Flower cotton weevil
17	Onion and garlic	Carrot	Border crops or barrier crops in between plots	Carrot root fly Thrips
18	Radish	Cabbage family	Row intercrop	Flea beetle Root maggot
19	Sesbania	Soybean	Row intercrop at a distance of 15 m apart	Stink bug
20	Soybean	Corn	Row intercrop	*Heliotis sp.*
21	Sunflower	Cotton	Row intercrop in every 5 rows of cotton	*Heliotis sp.*
22	Tomato	Cabbage	Intercrop (Tomato is planted 2 weeks ahead at the plots' borders)	Diamondback moth

TYPES OF TRAP CROPPING

There are several types of trap cropping:

1. Conventional trap cropping places an attractive low value crop next to a high value crop. Examples of conventional trap cropping are planting collards near cabbages to provide protection from the diamondback moth, installing frequently mowed alfalfa near cotton plants to protect against lygus bugs, and planting mustard between rows of broccoli to lure flea beetles away.

2. Perimeter trap cropping occurs when an attractant plant is grown around the perimeter of a cash crop, surrounding it completely. This barrier interrupts pests before they ever reach the high value crop. One popular perimeter trap crop is the use of hot cherry peppers planted around bell peppers.

3. Sequential trap cropping installs attractive plants before high value crops; similar to nurse crops. Strawberries are protected against wireworms when wheat is planted in the same bed 8 days ahead of time.

4. Multiple trap cropping uses several species to lure pests throughout a valuable crop's lifecycle. For example, flea beetles have been repelled when bunching green onions, dill, and marigolds are planted nearby, and stink

bug and leaf-footed bug control is provided when a cash crop is surrounded with triticale, sorghum, millet, buckwheat, and sunflowers.

5. Push-pull trap cropping surrounds a cash crop with an attractant, and intercrops it with a repellant. One highly effective combination, for growing corn, is to surround a field with fountain grasses (Pennisetum), and to intercrop with tick clover (Desmodium).

6. Dead-end trap cropping lures pests away from cash crops, but then fails to provide sustenance to the larval forms of the pests. Cowpeas and soybeans can be protected against bean pod borers by planting brown hemp (*Crotalaria juncae*, not the other hemp) nearby.

7. Semi-chemically assisted trap cropping uses kairomones, chemicals emitted by plants that attract pests, to lure pests into areas where they can be destroyed. This method is outside the home garden scenario.

8. Biological control assisted trap cropping lures beneficial predators to attractive perimeter crops, where they can then feed on the pests. For example, cotton fields may be surrounded with plantings of sorghum, providing protection against cotton bollworms.

9. Genetically modified trap cropping uses genetically modified plants to make it possible to start growing earlier in the season, thereby avoiding infestation at vulnerable growth stages. In other cases, pests and disease resistance is built into the plant.

ADVANTAGES OF TRAP CROPPING

- Lessens the use of pesticide
- Lowers the pesticide cost
- Preserves the indigenous natural enemies
- Improves the crop's quality
- Helps conserve the soil and the environment
- Reduce damage to cash crops
- Attract beneficial organisms
- Decrease the use of external inputs (e.g., insecticides, herbicides, fungicides)
- Enhance biodiversity and Increase productivity

DISADVANTAGE

- Trap cropping is only beneficial when fields are likely to be invaded with high numbers of pests. Improper management of pests on trap crops may create "pest nurseries," facilitating a more rapid or widespread pest outbreak than may otherwise have occurred.
- Treatment of trap crops with insecticide may lead to increased evolution of pesticide resistance and destruction of natural enemies.
- Application may be limited for certain crops.

CONCLUSION

Trap cropping is a best practice in controlling the pest in different agro-ecosystems. It gives significant economic and environmental benefits, and its use can be achieved integrated with other cultural, biological, and chemical control methods. In present scenario, trap cropping is the also successful in gaining the rational and economically favorable. Technical development and adoption of biological methods in fields such as the identification, implementation, and removal of harmful residues from crop ecosystem like allele-chemicals, and proper application of methods. It is an alternative to indiscriminate use of chemical pesticides and insect ides shall increases gradually with the compact tendencies on chemicals in crop ecosystem.

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