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## **Can Agronomy provide potential eco- friendly pest management options groundnut: a case study**

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Agronomic practices in agriculture have well-established history about their role in insect-pest management. There have been several case studies documenting their positive role as pest reducers,

however quantification of agronomic practices is difficult to substantiate. In the past five decades in India the primary focus was on enhancing crop productivity to meet the food demand of the growing population.

During this process the importance of improved technology including, chemical fertilizers, hybrids, plant protection chemicals has been well established. The results from this phase were excellent and several countries have achieved self-sufficiency in food grains including India. Though this approach brought stability in food production across the world, several disadvantages such as residues in food chain, secondary pest outbreaks, loss in bio-diversity followed by increased cost of inputs with eroded profits (Rao and Rao, 2010) were encountered. Considering the present situation to put agriculture back in to a profitable platform, one has to look into potential alternatives to improve and stabilize the productivity and to sustain the agro-ecosystem.

### METHODOLOGY

In this review propose to provide a broader picture of how agronomic practices influence the strategies associated with pest management.

### RESULTS

Agronomic practices such as sowing date, sowing pattern and plant density, spatial arrangement, tillage, mulching, irrigation, biodiversity (intercrops, companion/trap crops), and several other cultural practices can be manipulated and integrated in pest management to reduce the initial pest populations by making the crop environment unattractive, or creating favourable conditions for natural enemies or by way of enhancing the inherent capacity of the plant to tolerate the damage caused by the biotic stresses.

*Tillage and field sanitation:* Tillage practices affect both subterranean and foliar insect pests. Tillage provides good field sanitation by reducing weeds, mechanical damage by disturbing the insect pest biological rhythm. Removal of stalks or burning of stubbles can be highly

effective in reducing the insect populations. This inhibits the initial infestation in the newly planted crop and allow successful crop establishment.

*Spatial arrangement:* In general early planting help in better crop establishment through escaping insect pests. The push-pull technology involves use of behavior-modifying stimuli to manipulate the distribution and abundance of pests and beneficial insects for management of pests. It is based on in-depth understanding of chemical ecology and agrobiodiversity. Vigorous crop growth is possible when seeds are sown when temperatures are favourable for germination and plant growth as observed in case of winter sown groundnut and thrips damage.

*Intercropping:* Intercropping is the most common agronomic practice in many areas, especially in traditional agricultural systems. Intercropping is effective by modifying the crop microenvironment, which influences the infestation, development and spread of insect-pests and their natural enemies. Intercropping with non-host crops can bring about a considerable reduction in pest population on main crop.

*Plant nutrition:* Plant nutrition is an important factor in determining a plant's resistance or susceptibility to any biotic constraint. It has been established that fertilizers enhance plant nutrition and this often influences the basic biology and damage potential of insects.

*Trap crops:* Growing more than one crop in the same field is a common practice in marginal and subsistence farming in Asia and Africa. Mixed cropping in the traditional agriculture serves as an assurance against risk factor, better utilization of resources and quite often serves to overcome insect menace. Crop diversity provides opportunity for increased colonization, reproduction of parasitoids and predators (Reena *et al.*, 2009).

**Table 1.** Details of potential agronomic operations in the management of groundnut pests

Operations	Pest	Effect
Intercropping groundnut with blackgram/pearlmillet	Leaf miner	Reduced larval population and damage
Pearlmillet	Jassids, Thrips and	Reduced populations and low
Soybean	Leaf miner	Population reduced with increased parasite activity
Sunflower/castor	<i>Spodoptera / Helicoverpa</i>	Reduced damage
Spacing close (30 cm x 40 cm)	Thrips	Low thrips injury and bud necrosis
Planting time early planting	Thrips	Low thrips injury and bud necrosis
Irrigation overhead irrigation	Aphids and mites	Reduced populations
Time of irrigation	<i>Spodoptera</i>	Populations reduced due to activity of birds and other predators during day time
Flooding	White grubs	Population reduced
Mulch	Aphids, Jassids,	Population reduced
Field burning	Spiders	Reduced population

*Irrigation:* Several studies indicated the importance of irrigation in increased yields through the suppression of insect pests. As irrigation methods vary considerably (flood, furrow, drip or sprinkler) the impact on insects also varies. Insect populations can decrease if overhead sprinklers knock off insects from plants or raise microenvironment humidity enough to encourage insect disease caused by bacteria or fungi.

*Mulching:* The use of mulches to protect crops from insects and virus vectors has been known for long time. Living mulch treatments had higher natural enemy populations than synthetic mulch and bare-ground treatments. Polyethylene mulch, extensively used in groundnut and vegetable crops in China particularly meant for preserving the soil temperature and curtailing the weed growth showed profound effect on the plant growth throughout the crop phase which had significant effect on the insect populations (Frank and Liburd, 2005).

#### Groundnut : Case study

There were several success stories of which the severity of white grubs was managed substantially by adopting flood irrigation for couple of seasons in endemic region. Foliar insects such as *Spodoptera*, leafminer were successfully managed by following suitable trap crops and intercrops and sucking pests were easily managed by adopting overhead irrigation. More details are furnished in the table (Ranga Rao and Shanower, 1999)

## CONCLUSION

Many agronomic practices are known to influence insect populations. Most of these practices are simple, less expensive and easily followed by the farmers as part of the field preparation. To achieve maximum effects from these operations community involvement play a critical role. There is great need to intensify systems approach to develop and integrate various aspects of IPM to take advantage of existing agronomic practices. This strategy will enable the farmers to overcome or minimize the pest problem over long run in an environment friendly and economically feasible manner.

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