



## Enhancing farmers income through farmer field school and Indigenous technical knowledge in groundnut

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### Abstract

This study was carried out in the villages of Nedunkulam and kalaiyar kovil block of Sivagangai district in Tamil Nadu during Rabi season in 2014-2015 for control of insect-pest in groundnut crop. Farmers commonly use the indiscriminate pesticides recommended by the pesticide-traders against chewing and sucking type of insect pests and its leads to increase the farm expenditure and accumulation of residues in the stored products and also harms to human health. Demonstration on Indigenous Technical Knowledge through FFS approach with different extension activities (Mass Medias) during 2013-14 in Rabi season and it was effective tool for transfer technology with analysis of AESA. FFS framers used many techniques for the preparation ITKs through IPM for control insect-pest from time to time. The bio products namely aged cow urine- 5 lit+ Pods of Datura [*Datura sirumarium*]- 1 kg + Seeds of Arali [*Nerium oleander*] -1 kg + Tobacco waste- 1 kg + Lime [diluted calcium Carbonate] 250 g was found to be very effective against the insect pests of groundnut crop . Such type of FFS with ITK was essential because these are the innovative eco-friendly sprays, which are economically viable for small farmer's .The choice of indigenous bio-insecticides has been found to be cost effective and sustainable as well. Further, this will also help in reducing the load of insecticide on the ecosystem.

**Keywords:** Farmers Field School, Different extension activities, Indigenous Technical Knowledge Method, Bio-products.

## **Introduction**

In 2008 to 2009 the major problem of insect pests and diseases in various crops is rampant and raising. The problem attained more prominence with high cost of cultivation due to indiscriminate and excessive use of pesticides resulted into several adverse effects like pest resistance to pesticides, pest resurgence, destruction of natural enemies, ecological imbalance and environmental pollution, besides increased cost of crop production and also the introduction of high yielding crop varieties and the associated increase in consumption of pesticides and fertilizers.

The use of non-chemical methods for pest control and crop protection is already gaining importance in several countries including India. The integrated pest management strategies developed and promoted by the Governments are now based on the use of plants extracts. If an effort is made towards production of Indigenous Technical Knowledge (ITK) based products on cottage scale, it can be an economically viable option for sustainable development of eco-friendly pesticides/insecticides (Anonymous, 2000).

Keeping this in mind, the IPM module was developed in KVK under the funding of ICAR and ATMA Government of India against a number of pests and diseases of major crops. As such, awareness on the use of various insect pest management measures including bio suppressers for different crop ecosystems had been created by high-profile Farmer field school with different extension activity. This had evoked interest among the farmers in adopting the IPM practices include ITKs through Farmers Field School and it was an Effective Tools for Disseminating of ITKs to the Farmers.

## **Materials and Methods**

This present study was carried out in the villages of Nedunkulam and kalaiyar kovil block of Sivagangai district during Rabi season in 2014-2015. The crop ground nut was cultivated in an area of 1,430 ha in Sivagangai district and it was severely infested by sucking insect pests. For Management of insect pest field surveys were conducted in the area of Kalaiyar kovil, Thirupattur, Sakkottai, Kannankudi, Ilaiyankudi and Singapunari blocks of Sivagangai district in Tamil Nadu. Among them KVK have identified severe incidence of insect pest (60%) in groundnut at Nedunkulam village from kalaiyar kovil block. For insect control Farmer's field school and demonstration on Indigenous Technical Knowledge (ITK) based technologies is very effective tool and for this purpose Nedunkulam village was selected with

fixed six number of crop fields @ 1 acre/ trial on which sufficient number of farmers participated in the Farmers Field School. Totally 30 farmers with 5 apprentice officers were identified and one collaborators was selected from respective villages. Our partners include local village students recently graduated from high school to undergraduate and graduate students from universities, extension agents, government agricultural researchers, community leaders involved in our project.

### **Farmers' Field School (FFS)**

Farmers Field School is a school without walls, where in farmers' fields provide the learning experience throughout the crop growing period.

### **Methodology Followed**

The FFS was organised on weekly basis preferably early in the morning for 4-5 hours. On some weeks there may not be any school depending upon the field activity. Every week three type of activities were proposed. These are:  $\frac{3}{4}$  Group Discussion on the structured questions and Presentation.  $\frac{3}{4}$  Field observations and follow up activities.  $\frac{3}{4}$  Hands on Activity on pre determined activity and every day before the start of field activities farmers were asked to make some discussion on structured questions and present the outcome. This whole exercise of structured discussion and presentation should be completed within one hour so that there is ample time for hands on activities and other field observations. Farmers were divided in 4-5 groups of convenient size to make some structured discussion on a topic. At least one farmer in each group was able to read and write to lead the discussion and document the outcome.

A structured form was provided to each group to guide the discussion and document the outcome. Each group was presented the outcome of the group discussion and handover the filled structured forms to the facilitator. The facilitator compiled and supplemented the outcome of various groups. Facilitator used this information in finalising the gap analysis exercises to undertaken in the first week of FFS. This session was followed by some field observations on predetermined activity and then some hands on activity. A list of hands-on-activities on specific week was given in Annexure-I. Facilitator may adjust these activities according to local conditions. (Vijayalakshmi *et al*, 2003).

### **Agro Ecosystem Analysis**

14 weekly sessions were held in which AESA (Agro ecosystem analysis) a regular feature was carried out every week in the field with the participation of FFS farmers to analyze the biotic and biotic stress on the plant. The observations (Biometric and Fauna population) recorded in the field (Sub group) were pooled and the subsequent operations and conclusions were arrived by the farmers themselves. In the FFS, farmers compared the IPM strategy with common farmer's practices. They have an IPM and a Farmer's Practice plot (Non-IPM). Farmers become expert in decision making based on agro-ecosystem analysis and identify the pests and defenders.

### **Technology Followed in FFS**

Capacity building and demonstrations in all aspects of crop cultivation viz., suitable varieties for the region, utility of farm implements, land preparation and seed treatment, proper spacing, mulching, furrow irrigation, thinning, scattered sowing of maize, trap crop castor, inter crop pulses, *Trichogramma chilonis* egg card release, micronutrient spray, plant growth regulator spray, NPV application method, preparation and demonstration of different ITKs were imparted to the FFS farmers.

### **Indigenous Technical Knowledge**

ITK is a community based functional knowledge system, developed, preserved and refined by generations of people through continuous interaction, observation and experimentation with their surrounding environment. It is a dynamic system, ever changing, adopting and adjusting to the local situations and has close links with the culture, civilization and religious practices of the communities. (Pushpangadan *et al*, 2002)

Indigenous Technology Knowledge (ITK) refers to the unique traditional local knowledge existing within and developed around the specific conditions by women and men indigenous to a particular geographic area (Grenier, 1998)

### **Methods of ITKs Preparation**

Farmers have used many techniques for the preparation ITKs and to keep the insect pests and diseases of the crops under economic threshold levels. These products were not only eco-friendly but it was cheaply and readily available. These were also essential for sustainable agriculture through their modes of action i.e. knock down effect was sometimes slower in

comparison to chemical pesticides (Vivekananda, 1993). The methods of pest control based on bio-products and eco-friendly practices have been described as follows:

### Management of insect pests through ash (T1)

Sprinkling of *Chula* (a traditionally made fire place for cooking food) ash over and around the plants and in fields is effective against insect pests viz, beetles, leaf defoliating insects, leaf miners, thrips and aphids

### Management of insect pests through cow urine (T2)

Fresh cow urine was kept in an earthen pot in an underground pit for 8-10 days. When cow urine got fermented completely, one glass (500 ml) is mixed with 1: 1 of water and is sprayed over the crop affected by insect pests.

### Management of insect pests through urine + botanicals (T<sub>3</sub>)

**Ingredients:** Pods of Datura [*Datura sirumarium*]-1 kg +Seeds of Arali [*Nerium oleander*]-1 kg+Tobacco waste -1 kg+Lime[*diluted calcium Carbonate*]- 250g+CowUrine - 5 lit+ Mud pot (10 ltr capacity) - 1 No. The pod of Datura was powdered.

**Preparation method:** The seeds of Arali pounded well and The Tobacco waste and lime was added to the above mixture then Added 5 lit of cow urine and put all in a mud pot. The mud pot was covered with a lid and buried inside the manure pit / soil for 7 days. Then the above mixture was filtered and diluted at the rate 1:10 Ltrs of water and sprayed for the control of all pests.

### Management of insect pests through urine + botanicals (T<sub>4</sub>)

**Ingredients:** Rhizomes of (*Gloriosa superba*)-1kg + Pods of Datura- 1kg+Leaves of Ekka (*Calotropis gigantea*)-1kg+Leaves of (Adathoda (*Adathodavasic*)-1kg+Tobacco waste-500g+CowUrine-5 lit+ Mud pot (10 ltr capacity) - 1 No.

**Preparation method:** The Rhizomes of *Gloriosa superba* was finely chopped. The pods of Datura, the leaves of Ekka and the leaves of Adathoda to be nicely grounded and added the Tobacco waste to the above mixers. Then Added 5 lit of cow urine and transfer into a mud pot. The mud pot was covered with a lid and buried inside the manure pit / soil for 7 days. Then the above mixture is filtered and diluted at the rate 1:10 lit of water

**Insect pests management and soil fertility up gradation through application of cattle litter:** (T<sub>5</sub>). It was a common practice (called KEDAI) during off season to shift farm cattle from one farm site / location to another after every 2 to 3 days. The cattle litter (dung + urine) gathered during these days added enough plant nutrients to soil to raise 2 to 3 bumper crops

### **Garlic and Marigold Mixture (T<sub>6</sub>)**

Take 3-4 cloves of garlic, 2 handfuls of marigold leaves, 2-3 onions, 2-3 small peppers. Added water and bring mixture to a boil. Let cool. Diluted with 4-5 times quantity of water. Stir constantly. Sprayed as needed. Best used in 1-2 days ([www.angoc.org.in](http://www.angoc.org.in))

### **Sampling method**

- In the FFS and non FFS fields 10 plants were selected and observed at random for pests and diseases. Weekly observations made for the insects and diseases.
- Where the sucking insect pest count the number of nymphs and adults present in top 3 open leaves of one plant in the selected spot.
- Defoliators: Count the number of live larvae on one plant in a spot. Solitary larvae: Count the number of solitary larvae on all 10 plants in a spot (Look at the base of the plants and also on soil surface, while recording solitary larvae).
- Count number of red hairy caterpillar larvae on all the 10 plants in each selected spot and recorded.
- Count the number all immature stages (grubs and pupae) plus adults present on one plant per spot and record.
- Count the number of all stages of spiders across species present on one plant per spot and recorded.
- Count the number of peanut mottle virus infected plants out of 10 plants in a spot and recorded
- Count the number of collar rot infected plants out of 10 plants in a spot and recorded
- Count the number of Extension activity, yield parameters and cost of cultivation in FFS and non FFS field recorded (Bambawale, 2011)

### Disease severity rating for leaf spots and rust

S. No	Rating	Description of Disease severity rating
1	1	No disease
2	2	1-5 % leaf area of lower leaves affected
3	3	6-10 % leaf area of lower and middle leaves affected
4	4	11-20 % leaf area of lower and middle leaves affected
5	5	21-30% leaf area of all lower and middle leaves affected
6	6	31-40% leaf area of all lower and middle leaves affected
7	7	41-60% leaf area of lower and middle leaves affected
8	8	61-80% damage to lower and middle leaves
9	9	81-100% leaf area affected, almost all leaves withered and bare stem seen

#### ➤ B. Scale of aphid severity

S. No	Rating	Approximate number of aphids in one of the maximum infested plants among 10 plants in the spot on
1	0	Nil
2	1	1-25
3	2	26-50
4	3	>50

### Results and Discussion

Management of insect pests in groundnut through different ITKs of ash, cow urine, cow urine+botanicals, application of cattle litter and Garlic+Marigold mixture was sprayed in farmer's field school and the status of incidence was recorded based on weekly AESA. Minimum population of insect pest, diseases and maximum population of natural enemies was recorded in FFS Field Whereas maximum population of insect pest, diseases and minimum population of natural enemies was recorded in non FFS Field. These records were depicted in Annexure-II.

The results of this study revealed that the population of leaf defoliating insects, *Spodoptera*, Red hairy caterpillar, Leaf miner was 1.0, 0.0, 0.0, No/m<sup>2</sup>, Sucking insect pests, Jassids. Whitefly, Thrips. aphid was 0.0, 1.8, 0.6, 0, No/3 leaves and the natural enemies of *Coccinellid*. *Chrysoperla*, Spiders was 5.2, 3.1, 5.2, No /plant, Collar rot, Root rot, Rust, Leaf spot diseases, Virus infected plant/ m<sup>2</sup> was zero level incidence in farmer filed school under

ITKs mixture of Pods of Datura [*Datura sirumarium*]-1 kg+Seeds of Arali [*Nerium oleander*]-1 kg+Tobacco waste -1 kg+Lime [*diluted calcium Carbonate*]- 250g+CowUrine - 5 lit was very effective against other ITKs Whereas the population of leaf defoliating insects, *Spodaptera*, Red hairy caterpillar, Leaf miner was 2.2,3.2,13.2, No/m<sup>2</sup>, Sucking insect pests, Jassids. Whitefly, Thrips.aphid was 9.0,17.0,16.2,3, No/3 leaves and the natural enemies of *Cocinellid*. *Chrysoperla*, Spiders was 2.7,1.2,0.4, No /plant, Collar rot, Root rot, Rust, Leaf spot diseases, Virus infected plant was 5.0,3.6, No/plant ,5,3(rating) and 2.0, No /plant / m<sup>2</sup> was recorded in non farmer filed school and also conducted 105 extension activities and 3042 farmers ,260 extension functionary were benefited from FFS. The yield was increased up to 32.22% in FFS field.

Based on the insect pest management ITKs data when AESA famers were got idea immediately for management of insect pest in their field and it was dissemination through Farmer field school approach with different extension activities. All the different extension activities viz: Advisory services. Mobil message, Agri mobile clinic, Awareness Campaign Diagnostic Visits, Exhibition, Exposure Visits, Farmers rally, Film Show, Group discussion, Group meeting, Method Demonstration, Scientists' visit to farmers field, Seminar, Soil health Camp, Workshop, Books, Electronic media, Extension Literature, News letter, News paper coverage, Popular articles, Radio Talks, TV talks and Field Day conducted under FFS. It was a very good effective tool for dissemination technology.

## Discussion

- Management of insect pests through ash to prevent it was the cheapest practice for small farmers. Ash acts as a detergent. Chewing and sucking type of insects, find it difficult to chew plant parts due to deposition of ash. It is simple and easy to apply, cheap and effective method for insect pests but its adoption on large scale is difficult. It can, however, be useful for small farmers only ( Bose *et al*,1997)
- Cow urine + Botanicals mixture was considered very effective. It was eco-friendly, technically feasible, compatible with existing farming system and internal resources of the household and it enhances crop productivity( Bose *et al*,1997)
- Insect pests management and soil fertility up gradation through application of cattle litter. It was eco-friendly and also repels the insect pests and thus reduces their incidence in the crops, no risk is involved and widely accepted.

- Garlic and marigold Mixture. This mixture was considered effective against lepidopteron pest and sucking pest. It is eco-friendly, technically feasible, compatible with existing farming system
- This practice needs to be assessed on all the important crops against the relevant insect pests and should be incorporated in the package of practices of the different crops so that all the farmers get benefited. In view of the results obtained, it was felt that there is need to exploit the potential of indigenous eco-friendly agents having insecticidal properties for their eventual use in the control of the arthropods, as they are safe, biodegradable and eco-friendly as compared to modern insecticides. However, while there is much to admire about traditional agriculture, there is no reason to assume that cultural evolution leads to an optional adaptation any more than biological evolution does (Bentley, 1993). Contribution from scientists and farmers is still required to meet the challenges posed by increasing populations and deteriorating natural environment (Cleveland *et al*, 1989)

## Conclusion

These indigenous techniques can minimize the harmful and expensive synthetic chemical insecticides. Although, the effectiveness of this indigenous technical knowledge (ITK) is quite high in the test crops for insect pest management, these need to be worked out for other crops. Ingredients of these insecticides need to be separated and analyzed at bio-chemical level for a better insight into their insecticidal properties and for working out better management strategies in the future.

Farmer field school is a very effective tool along with different extension activity for systematically to convince and disseminate the IPM practices along with ITKs to the farming community and also KVK could successfully change the attitude of the farmers towards FFS on IPM methods of crop protection. KVK not only trained the farmers but also the extension functionaries of the Department of Agriculture who in turn trained farmers in their respective jurisdictions through Farmers' Field School.

## References

ANGOC, Botanical alternatives In Plant Protection. Nature has provided a Pest control system, 6 Jul 2010 by Asian NGO Coalition for Agrarian Reform and Rural Development Anonymous, *Guidelines and format for obtaining information on indigenous technical*

*knowledge, ICAR: Indian Council of Agricultural Research, Mission Unit, A Collection, Developmental and Validation of Indigenous Technical Knowledge, (NATP, Hand out, ICAR, Jabalpur), 2000*

Bose K, Blancy K, Ghani O, Hossain A F M E, Mridha N N and Sharma P N, ed Draft Compilation of Indigenous Technology Knowledge, for Upland Watershed Management in Bangladesh, *FAO Publication Field documents 14*, 1997, 1-62

Bentley J, *Agriculture and Human Values*, II (2&3), (1993), 140-150

Bambawale, B. Venkateswaralu J.B. Mishra, NICRA team of Groundnut Pest Surveillance, 2011. Manual for Groundnut Pest Surveillance. Jointly published by National Centre for Integrated Pest Management, New Delhi, Central Research Institute for Dryland Agriculture, Hyderabad and Directorate of Groundnut Research, Gujarat. 29 pp

Cleveland D A and Soleri D, Diversity and the green revolution, *Diversity*, 5 (283), (1989), 24-25

Davis M S H and Wail A, Indigenous land manure and tropical forest management in Latin America, *Ambio*, 23(8) (1996), 485-490

Davis M, Indigenous Peoples and Intellectual Property Rights, *Research paper no. 20, Information and Research Services, Department of the Parliamentary Library, Canberra*, 1997

Vivekananda P, Alternatives to Pesticides Farmer Wisdom, *Proc Cong Traditional Sci Technol India*, 1993

Grenier L, Working with Indigenous Knowledge, *Int Dev Res Centre, Canada*, 1998

Pushpangadan, P., S. Rajasekharan and V. George 2002 Indigenous knowledge and benefit sharing. ATBGRI experiment In IK strategies for Kerala. NSE Publication, Thiruvananthapuram

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