Support to National Integrated Pest Management Programme in Nepal

(UTF/NEP/055/NEP)

Proceedings of Officer Level Refresher Training of IPM Facilitators

(March 1–12, 2004)

Plant Protection Directorate

Department of Agriculture

&

Food and Agriculture Organization of the United Nations

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1. INTRODUCTION

Insect, disease, and weeds are the major pest regularly affecting the production and productivity of agricultural commodities. Often the population of insect and disease pest grows rapidly and the out break occurs, causing threat to human livelihood. Globally the annual loss of potential yield from insect pest and weed is around 12% 14.5%and 11% respectively. In Nepal the loss in pre harvest is in the range of 15 percent (Joshi et el 1991) and it is 20-30 percent in post harvest system (KcG 1988.)

Nearly 86 percent of the country's total population largely depends on Agriculture for livelihood. But subsistence production and a relatively high population growth rate have a resulted widespread poverty in the rural areas. To cope with the situation government strategically emphasizes on commercialization of agriculture. Introduction of high yielding varieties (HYVs) of rice, wheat and maize since the mid 1960s, and vegetables since the 1980s have also encouraged the indiscriminate use of pesticide and chemicals heavily, causing pest resurgence, and pesticide resistance. Pesticide resistance is seen in more than 500 pests (Marahatta 2003) as well as its stress in environment and human health has alerted to look for alternatives pest management strategies to grow healthy crops.

To combat this precarious situation, sustainable ecological management practices, through educating farmers on IPM as alternative choices, keeping in mind the country's agro-climatic diversity and their adoption has been widely accepted to intensify and enhance production. The Agricultural Perspective Plan (APP) has also identified integrated pest management (IPM) as the specific strategy for plant protection. Both the PRSP and the Tenth Plan have emphasized agro-ecosystem approach as one of the key strategies for promoting agricultural growth. The effective management of the pest and crop depend on their relationship, knowledge, survey and surveillance system. For the widespread use of IPM component there is need to develop trained personnel with updated knowledge and exposure on recent development IPM.

In the above context, The IPM Programme in Nepal was initiated in 1997 and since then, Nepal succeeded in training 104 officers–level trainers in different crops, of which 70 were in Rice, and 34 in Vegetables. Similarly 35 Junior Technicians (JT) and Junior Technical Assistants (JTAs) were trained as trainers. At the farmers' level 301 farmers in 42 districts were trained as trainers. Among them 56 were women farmer trainers. Altogether 633 different farmer field schools (FFS) were organized involving 6 782 female and 9 684 male farmers.

The preliminary results of these efforts indicated that the level of pesticides use in those districts where FFS were organized was reduced by up to 40 percent while the yield of rice increased by up to 20 percent.

Encouraged by these results The Plant Protection Directorate (0PPD), which is under the Department of Agriculture (DOA), Ministry of Agriculture and Co-operatives (MOAC), is responsible for the issues related to management of pre and post-harvest pests along with plant quarantine issues and pesticides management at the operational level. In pursuance of its commitments in various international treaties, it has decided to make IPM as one of the "Pillars of Agriculture " and to expand it throughout the country and cover as many crops as are technically and economically feasible.

IPM solely aims to empower farmers and make them experts in pest management with new crop management skills, including appropriate utilization of indigenous knowledge and make them capable of taking own decisions based on the analysis of the agro-ecosystem and the knowledge generated and felt by conducting studies in their own field in the form of Farmer Field School. The farmer field school (FFS) is an agro- education process of learning by experiments and discovery. It has proven to be very effective farmers to understand the crop ecosystem in a holistic context. As this funeture, it is appearing that with the emphasis on strengthening self-reliance and group interactions among farmers, the sustainability of this approach is in the hands of the farmers rather than the government institution. However, government institutions are expected to continue to deliver services that are in the interest of the farming communities leading to organization of IPM farmers' associations at the district, regional and national levels.

At present the IPM coverage both in area and commodity is low. It is only .32 percent of total household however the demand for FFS is in increasing trend. Thus there is dire need to develop trained personnel, technology package in order to expand the `coverage. Keeping this in mind present training programs was organized.

1.1 A few words

Friends,

Good Morning

I feel privileged to welcome you all to this first TOF program. I am happy to see you all here in time despite all the hurdles you had to cross while coming to this place. Well done. I would like to wish you all success in achieving your expectation from this training.

At the very outset I would like to stress that during this practicum, let's all pin it in mind the "Farmers first concept" and they must be benefited from our deeds. All of us gathered here in this hall are well aware of the ethical principles behind IPM FFS to empower the farmers, enhance their ability to exercise science, facilitate them to improve social, natural, and financial and physical capital and make them the critical thinkers in relation to overall agricultural development. Most importantly make them know their capacity. In the context of effective implementation of IPM program it depends on how critically and judiciously you all are capable of manuovering to put all your more than half a decades field experience into future action. So fullheartedly, evolve experience and enthusiasm and into one for the future look of IPM FFS

Donot hesitate to express your experience good or bad exiciting or dull, we will share it, use it for the benefit of IPM farmers. It is the FFs that keep them in action. Our intention is not only to replicate the past experience rather it is to bring a positive change in farmers' standard of living. Farmers are plowing their field all alone by themselves. Let's break it and facilitate them to discover the hidden energy resting in side the them and bring it out and empower them in terms of :

- having greater control of their lives,
- increased bargaining power,
- capability enhancement, in making science based decision.

I know you must have come here with some expectation I assure you that the management will work hard to achieve to the optimum level. Hope you will also do your best to meet my anticipation, as well. Thank you all once again. In the context of effective implementation of IPM program it.

GANESH K KC

Program Director

2. EXECUTIVE SUMMARY

Officers level Integrated Pest Management (IPM) Trainers training program was jointly organized by plant protection Directorate and Food and agriculture organization (FAO) from March 1-12, 2004. Thirty - four- IPM trainers from different districts participated in the program. The training method used were experience sharing, review of past achievements and report presentation, group discussion, field visit, brain storming, role-play etc. The group revised the pros and cons of IPM program and suggested working guidelines for future improvement.

The group strongly agreed that the technology package for the farmer should be focused on, data generation through conduction of experiments on diseases, insect pests (IPs), natural enemies (NEs) and soil and water management areas. It was also suggested to incorporate post harvest activities as a follow up programs of the FFS. The group also has developed suitable quality indicators for Agro-ecosystem analysis (AeSA) and Participatory Monitoring and Evaluation (PM&E) for future TOFS. Existing norms for daily allowance of IPM facilitators, norms for PM&E were also developed. The revised norms is for farmers field school (FFS) in vegetables, fruits (Banana, citrus etc.) and plantation crops (tea and coffee). Comments, recommendation and proposed action plant on various areas of IPM FFS given in this report is the outcome of 12 days long training program. The experience sharing was found very fruitfull for all the facilitators. This will be the main guiding basis, for future IPM activities.

3. KEY NOTE ADDRESS

3.1 Welcome Address

N.S. Upadhaya

Friends and Seniors,

Good Morning,

It is my pleasure to welcome you in this officer's level IPM training programme. All of you have already worked and acquired experience in IPM. Review of your works and group exercises would contribute to lead this program success and mitigate the constraints experienced during the implementation of the programmes.

In the beginning, there were doubts on the success of the program as there was generalized pre conceived thinking that Govt. Agri. Officer donot work in the field with their own hands. However, it disproved and officers showed their dedication in field work at IPM TOT, Jumka. It was the unexpected good initiation in the IPM programme. Through the conduction of series of FFS and other explorative IPM programme it led to further progress in pest management system with the simultaneous development of trained human resources. IPM trainers of Nepal have also shown their competency in sharing IPM-FFS knowledge in South, East, Asian countries (Bangladesh, Pakistan). The achievement of IPM programme in Nepal is recognized in South, East, Asia. This spirit has to be conserved and more forward doing best.

Thanks,

4. DISCUSSION PAPERS

4.1 National IPM Programme in Nepal

Ganesh K. K.C.

I. BACKGROUND

The Government of the Kingdom of Norway in 2003 agreed to donate a grant to His Majesty's Government of Nepal totaling US$1,284,444 to provide "Support to the National Integrated Pest Management (IPM) Programme" in Nepal.

The main objective of this project is to contribute to sustainable broad-based poverty alleviation and food security while contributing to environmental protection

Specially it aims :

- towards building the skills of farmers to generate knowledge and not be reliant on hearsays.
- improve food security and incomes; through more efficient crop management;
- reduce the use of pesticides, and improve biodiversity and human health;
- empower the farmers to take greater control of their lives, resulting in better response to adversity;
- enhance support from Government and reduce threats from corporate interests and develop community inter-action

II. REVIEW OF IPM ACHIEVEMENTS IN NEPAL (1997-2003)

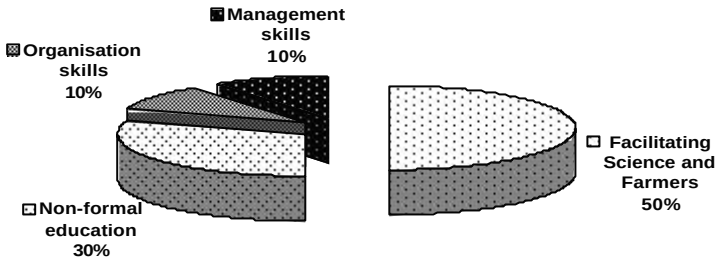
- an important outcome of the FFS approach was the benefits enjoyed by rice farmers in Nepal.
- in a comparative study, the 0.5 ha IPM plot showed a US$40/- gain over a similar plot that followed a pre-FFS practice. An important ingredient towards achieving this efficiency is the knowledge obtained by farmers from their own studies.
- gender sensitivity was well revogized.
- Level of attendance of farmers in FFS and F2FS and from samples of 31 field schools from 1998 and 2001, was in the region of 80% and above.

III. MOVING FROM STRENGTH TO STRENGTH

- Focus should be on facilitating farmers and science. It should involve learning, conserving, efficient input management, leading to organic farming.
- Interest build on the momentum gained in the last five years of implementing IPM in Nepal. It is critical that this project continues to build on the strength of the part.

IV. REDUCED USE OF PESTICIDES, RESULTING IN IMPROVED BIODIVERSITY AND HUMAN HEALTH

- Experiences in implementing FFS showed that an understanding of the agro-ecosystem is the most effective way to reduce use of pesticides.
- Re-evaluation of the curriculum in the Training of Facilitators programme and facilitating science to farmers using a non-formal education approach.



- Farmer field research capability should improve with this project as it has been demonstrated in the last five years the farmers in Nepal are capable of carrying out research.
- It should be remembered that empowerment of farmers must come from farmers themselves and this process should be taught to all IPM Facilitators in ToF and annual practicums.
- FFS Curriculum on monitoring poison symptoms. A study of cholinesterase depression in farmers could be a good exercise.
- Consider a more transparent curriculum for both FFS and ToF that focuses on process and only not on technology. This should start with a clear learning objective for each activity pursued in FFS and ToF. For each activity, quality indicators should be identified by the facilitator and participants to facilitate self evaluation of teaching.
- To upgrade the skills of IPM Facilitators who received training earlier, it is crucial to organize annual workshops or practicums at zonal levels. New methods of efficiently preparing FFS reports enable better monitoring of quality of FFS in the field.

V. FARMERS EMPOWERED TO TAKE GREATER CONTROL OF THEIR LIVES, RESULTING IN BETTER RESPONSE TO ADVERSITY

- develop skills of farmers in carrying out experiments that will lead to critical thinking on their part resulting in a science-informed decision making.

VI. BETTER BARGAINING POSITION, RESULTING IN IMPROVED SUPPORT FROM GOVERNMENT AND REDUCED THREATS FROM CORPORATE INTERESTS

- FFS approach is effective in addressing complex issues such as pest management, food security and even biodiversity conservation. This project provides an opportunity. FFS is compatible with normal extension.

- In respond to criticism that an FFS approach is too expensive for National and Local Governments to support, impact assessments is suggested.

- IPM approach is further need to improve the efficiency of farm production to place farmers in a better bargaining position.

- "Farmers in Action" a target training cost of US$10/- per farmer has been proposed and is reachable.

VII. STRONG COMMUNITY INTER-ACTION

- Annual farmer congresses should be organized to enable empowered farmers to share their experiences. This activity should be complemented by follow up training of farmer facilitators and regular monitoring and coaching by IPM Facilitators.

- Continue support for farmers who have graduated from FFS. Women groups can be set up to set up home improvement activities.

- An analysis of the intensity of FFS in 54 districts over the last five years showed that Farmer Facilitators are present in 31 districts where the intensity of FFS is highest and this should be capitalized.

4.2 Moving From "Strength to Strength"

B.R. Palikhe

Introduction:

Rachel Carson's "Silent spring 1962" of eloquently warned the against continued unrestricted use of chlorinated pesticides and its after effect. Evidence continued to mount the following decades supporting her fundamental points; pest control which ignores ecology not only fails but creates additional problems affecting health and environment.

Alternative approaches IPM and to a lesser extent, Integrated Vector Management (IVM) are increasingly introduced and promoted in agriculture. Alternative approaches many tools are available that are part of integrated management approaches, based on the principles of IPM. The choice of tools will depend on observation and analysis of the situation, possibilities to use them and socio-economic conditions. IPM is not a service provided from "above", a private company, a donor, or a foreign NGO and FFS is an entry point for farmers to take the lead in range of other IPM related activities.

From Strength to Strength:

- Moving from strength to strength related responsible care related to products. That prevents injury to human health and damage to the environment. Collaboration builds strength on sharing of expertise, information, cost-effective. It prevents duplication of efforts and provides a forum for exchanging ideas and solving problems. From strength to strength also provides DE-BUGGING IPM TERMS such as Biological Control (use of predators, parasitoids, pathogens, & other organisms to diminish pest species), IPM (sustainable approach combining the use of biological, cultural, physical, and chemical tactics in a way that minimizes economic, health, & environment risks), Monitoring (scouting) Pesticide Resistance (survival of the fittest), Pheromones of insects (female sex scents), Resistant Varieties (genetically tolerant or resistant to certain diseases, insects), Rotation (the process of planting a field with a different crop than was planted the previous year, interrupts pest cycles) and Thresholds (agricultural producers take action when pest counts reach an economic threshold).

- Field schools give small farmers practical experience in agro-ecosystem analysis providing the tools they need to practice IPM in their own fields. FFS also provide a natural starting point for farmer innovation covering the whole range of issues relating to crop management, from insect balance to plant health from soil to water control and from weed management to varietal selection.

  The successful IPM programs achieved broad and long lasting socio-economic benefits in terms of incomes, good social status, food security, lower production costs compared with the conventional pest control method with its high inputs and enormous savings for government from imports of inputs.

- IPM has been widely accepted as the alternative to pesticide application/control. IPM encourages the most compatible and ecologically sound combination of available pest suppression techniques to keep pest population below a level at which these pests donot cause significant losses. So implementing IPM showed that an understanding of the agro-ecosystem is the most effective way to reduce use of pesticides in the field. The successful IPM programs provided ecological sustainability by conserving natural enemy species, biodiversity and genetic diversity. It also reduced farmer and consumer risks from pesticide poisoning and related hazardous.

- IPM Farmer Field Schools are not an end in themselves, but rather a good starting point for the development of a sustainable agricultural system in a given locality. The FFS provide a first experience with experimentation based on ecological principles, particularly training and non-formal

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education methods. Once this foundation has been laid, farmers are better able to act on their own initiatives and to sharpen observation, research and communicative skills. It should be remembered that empowerment of farmers must come from farmers themselves and this process should be taught to all IPM facilitators in TOF and annual practicums.

- Scientific excellence and adherence to ecological principles provide a strong technical basis for IPM development, and the application of participatory non-formal adult education methods represent a real advance over models based on information dissemination and the delivery of simple message. But these in themselves are not enough, the long-term development of a sustainable small-scale agriculture also requires strong farmer groups and the linkages between these groups and the wider community. Farmer started to organise themselves and have formed farmers or farmer trainers organisation. Several farmers have formed such associations in their district or in clusters of districts. It is likely that this trend will continue in the year to come. One possibility is to focus more on community development via the process of participatory planning.

- Farmers manage often complex agro-ecosystems. IPM is holistic in its approach, which builds on knowledge about the different elements in the system (soil, water, nutrients, plants, pests, natural enemies, diseases, weeds, weather) and their interactions, to arrive at sound management decisions.

Steps and Process in successful IPM programme:

At the field level:

* Improving knowledge and understanding of the ecology of cropping systems.

* Strengthening knowledge and understanding of the impacts of current farmer practices in cropping system.

* Based on this information, identification of opportunities for IPM strategies to be applied in specific cropping systems.

* Development of training curricula on IPM, including field studies on ecology to fine-tune management and using training approaches suitable for adult learning.

* Monitoring and evaluation of pilot training activities.

* Well-planned scaling up of training activities, with a focus on building capacity at local levels.

* Enable farmers to engage in participatory research to develop training curricula for new topics.

At policy level:

* Assessing present policies, and how they support or obstruct IPM activities.

* Accessing information on pesticide policies.

* Identifying changes in policy that would support IPM better.

* Organizing workshops for policy review, adjustment and harmonization.

Conclusion and Recommendations:

Progressive expansion of IPM will need a supportive, enabling policy framework. At the field level, knowledge and understanding of the ecology of agricultural production system is needed to make informed decisions on management. This knowledge needs to be decentralized to local levels. It has to be in the hands

of farmers who are responsible for management of their own systems. Policies, strategies and programms supporting IPM should be put in place and implemented if reliance on pesticides is to be reduced. The conventional IPM should be moved towards Biointensive IPM relating to guidelines and option for the effective management of pests and beneficial organisms in ecological context.

Reference:

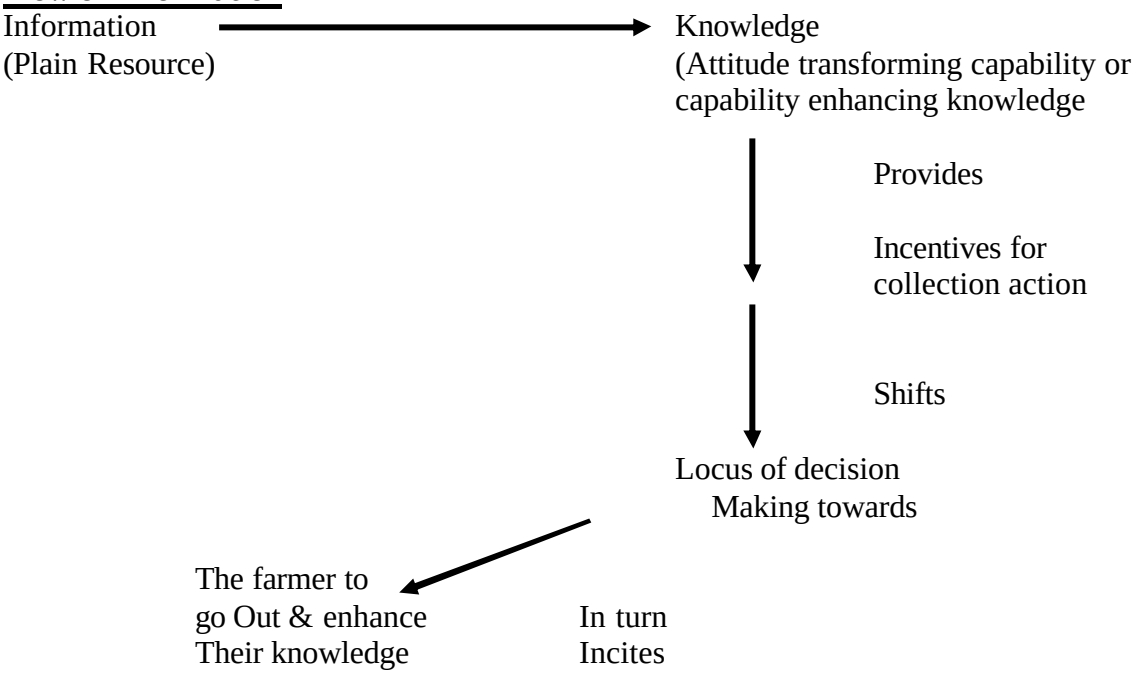
1) *Inception Report 2004 : Support to the National Integrated Pest Management Programme in Nepal,* UTF/NEP/055/NEP.

2) *Palikhe, B.R., 2001: Pesticide Pollution Management in Nepal :* In Harmony with Nature.

3) *Palikhe, B.R., 2001: Pesticide and Environment.*

4) Palikhe, B.R., 2003: Concept of IPM.

Flow of Information



Information and Knowledge Relationship

Information

Self Analysis

Awareness

Confidence

Knowledge

5. IPM FARMERS FIELD SCHOOL (IPM – FFS)

IPM-FFS is a Aro-discovery based adult learning approach. It is a reason long skill based experience translated in farmer's field. FFS emphasizes creative thinking innovativeness and community based group work. A group of farmers attend at least once a week and fect and learn observation and share experiences. It intends testing, validation and adoption of group findings locally.

5.1 Site Selection

The site can be identified through review of district profile, annual implementation program of users community, district appraisal and the available source can be utilized. Site visit can be done if necessary.

Site selection depends as the level of production problem, interest of the community, accessibility, potential area for the commodity and level and quality of production technology in the area.

5.2 Preparatory meeting

After site selection a 3 days meetings are to be conducted before conducting FFS. The objectives of the meetings are firstly to inform the program to farmers, local leader and other concerned stakeholders. Secondly to collect socio-economic data by applying serve of the tools of PRA (Cropping calendar, Gender role analysis matrix. Thirdly, to select the farmer. Fourthly, to identify the production constraints and local problem faced by farmers in the community and lastly to design field trials to overcome local problems and improving tentative curriculum.

5.3 Agro-ecosystem Analysis

In FFS, farmer conduct season long field trials to study different component of integrated pest management and crop management practices. Farmers study the IPM practices & Farmers practices in comparison. Problematic and supportive trials in the field where farmer take observation analyse the crop growth, yield and other relevant parameter. The trial laid in farmers field should be simple and dealing with single factor not be > 5 in numbers.

With the crop growth every week farmer does agro-ecosystem analysis in the trial plots. Agro ecosystem analysis help farmer to understand about component of ecosystem and its interaction. It helps them to design management strategies on the basis of all the components of ecosystem such as climate, weather, soil, environment, crop weeds, pest and natural enemies. Major studies are done on the sample plants which as selected by applying standard sampling procedures.

5.4 Special Topics :

Every school day/session, group conduct a participatory discussion to understand the special issue(s) come across during the FFS season. This session provides comprehensive knowledge of the issue and its possible way out. The facilitator either should initiate to preplanned based topic or demand of farmer cause after analyzing crop ecosystem together that is relevant to the crop growth stage. Some special topic in other areas such as group mobilizes leadership, gender, communication skill etc. be included in the special topics.

5.5 Group Dynamics

Team building and group dynamics activities are an important feature of the IPM training process in the FFS. Group dynamics encourage interactions, helps developing leadership, decision making skill and value reorientation to the participants.

5.6 Evaluation

The participate takes a test and evaluates their level of knowledge before and after learning in FFS. The pre-test provides the some diagnostic informatics that the facilitator can use to adjust FFS curriculum to the knowledge level of the group. This test need to be taken to measure the knowledge changes from the education programme. Interview, questionnaire, ballot box, spotting are the methods of taking test however ballot box test is found effective if there illiterate farmers.

5.7 Field day

At the end part of FFS, a field day is organized. The purpose of field day in to demonstrate the result of different trials and studies, disseminate the IPM practices is comparing the local practices display the activities done at FFS. The field basically organize to motivate the non-participants farmers local leader and community band organizations for getting their co-operation and commitment is favor of IPM in fultune. Generally in the same time graduation ceremony is organized and awarded certificate to the participants.

5.8 Noticeable Achievement of IPM FFS (1998 – 2003) :

- Before conduction of FFS, pest management was based on the knowledge of ETL or sole dependence on pesticides. Ecological pest management was not brought in practice even in the trainer's level. Now, the ecological concept of pest management has been translated into practice with broad ecological thinking. Use of pesticides has been reduced and diverted toward selective and judicious use.

- Farmers have started make decision on pest management after analyzing agro-ecosystem.

- Hazards of pesticide on human, animal health and environment, and residue in the food being realized.

- Horizontal dissemination of awareness and technology among farmers.

- Leadership development and self reliance of farmer group organizations.

- Woman participation has increased enormously and they are inclined toward other income generating activities.

- Women farmers, after IPM-FFS have shown initiative role in their household decisions.

- Farmers and local government have shown higher enthusiasm in IPM program. NGO/INGO are also involving for the promotion IPM activities through FFS eg., Word Education, RRN, CARE etc.

6. PARTICIPATORY PLANNING :

Participatory planning one of the follow up program after FFS is a process of brining farmer together to share ideas and prepare a workplan for the implementation of their common goal. It creates awareness of farmer toward community approach for solving their farming problems. By this activity farmers ability on planning will be strengthened.

Participatory Planning leads :

→ expose the ideas to the farmer about the program and fit it at implementation level

→ search real solution for real problems

→ create awareness that every person has equal position and access to resources.

→ make everybody to feel the ownership of the program.

→ helps keeping group intact.

A series of meeting (five in number) are enough to deliver/discuss the content of participatory planning. Generally 5 hrs/day is suffice to accomplish the work in five days. The different activities followed during conducting PP programme are as follows.

6.1 Community vision :

Participants vision about the dev. of their village is drawn first. This activity is better to conduct in sub-group in a pectorals form. The facilitator should guide them by pubbing questions as what will be your village after conduction of IPM program for five years ?

6.2 Stakeholders Analysis :

After making vision, participants are allowed to think over their local institution/organizations which are doing what for village development.

In this, they do relationship analysis i.e. what they are giving for the organization and vice-versa. By this exercises, participant vision will be boarded to find out the areas building co ordination and linkage.

6.3 Problem Matrix :

Subsequently after stakeholder analysis, the next step to be carried out is problem tree. Participants individually or in group identify the problem. The problem is better to write in metacard and attach in cardboard at wall so that everybody can look on it. The problem tree will be prepared only after putting metacard in appropriate lever by comparing cause and effect.

6.4 Goal Analysis :

Whatever are the problems (negative sentences) changed into positive that will result goal tree. The metacard arranged into four level or more based on result and action.

The top level's card shows the goal, the 2nd shows the purpose, the 3rd level shows the results and the 4th lower level shows the activities to be implemented.

6.5 Role Analysis :

In role analysis farmer understand organization and potentiality and contributing capability. In the same time, farmers expectation from the organization will be discussed. The constraints remained between partners are also analyzed. By this they can explore the resources.

6.6 Program Matrix :

Whatever are obtained from goal tree are theprogram strategy for implementation. For successful implementation, these all are needed analysis/verify on the basis of indicator of success, tools of evidence and important assumption needed.

6.7 Priority ranking of activities :

All activities appeared in the goal tree are of not of equal importance and can not be implemented. So, these activities are prioritized based on suitable evaluating criteria i.e. capability to to perform of the problem, availability of local resources, contribution to final goal, time duration etc. Those activities get higher score are kept on implementation.

6.8 Need Analysis :

The high prioritized activities are put inaction that is needed further analysis to know : what resources does it need. How to get it and how much money do it needs. In the same time expected fund/resources from diff. organizations are also investigated.

6.9 Program organization :

After need analysis, discussion need to be done on assigners responsibilities with their cross expectation between implementation bodies. In the same time frame is also prepared.

6.10 Valuation :

At last participants feedback about learning on PP are evaluated through going each steps of the PP (The PP steps are put in a … form at the appendices :

7. FARMER AND SCIENCE

7.1 Introduction :

After completion of the FFS, farmers' interest widens and increased the level of confidence due to acquainted skill and knowledge about problems, opportunities and strength of the group towards further learning on the problem through experimentation. Farmers field research capability can be refined through the program "Science by Farmer".

Farmer and science :

Science is not reserved for professional scientists.

Farmers are able to do science and,

Farmers may have been doing science without realizing it.

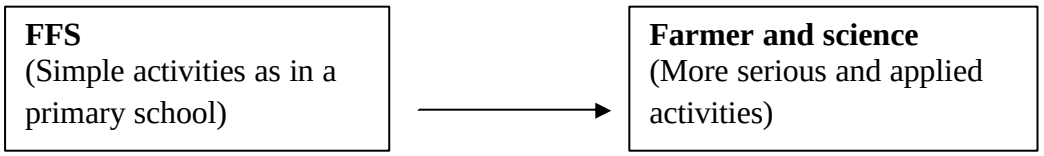
Why Farmer and science? :

Studies conducted by farmers will be a driving force for community IPM.

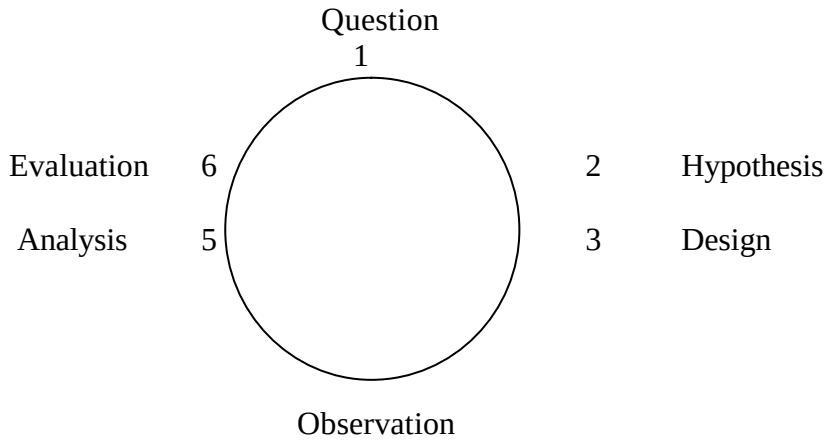
Farmer's studies are sources of innovation.

Farmers are eager to share and distribute their study results for the benefit of others.

As a follow-up activity.



7.2 The learning cycle :



7.3 Questioning :

Related to the questions about our crop ecosystem that requires answer.

This curiosity seems to come

- natural to professional scientists,
- but not to farmers and trainers.
- So, needs more training & experiences.

By doing a study, new questions emerge, which close the learning cycle.

7.4 Topic selection matrix :

To help for the selection of right question.

Agricultural operations are listed, from seed testing through planting till harvest.

Examples of topic selection matrix:

Example 1 (given by Henk van den Berg):

S. N.	Agricultural operation	Current practice	Potential to improve	Constraint	Selected topic
1	Land preparation	Shallow ploughing	Deep ploughing may improve crop growth	Disk plough not available or expensive	
2	Planting	Broadcast seeding	Transplanting may improve yield	Extra labour no available	-
3	Fertilizing	Low use of urea	More urea may improve yield	Probably increases cost	Use of urea
4	Weeding	2 X mechanical weeding	Increased weeding may improve yield	Labour costs	-
5	and on…				

Example 2 (Yadav and Rajbhandari, 2001):

S. N.	Problems/factors causing low yield	Current practice	Potential to improve	Constraint	Selected topic
1	Low quality seed	Farmers own seed	Certified seed may improve yield	Not available	
2	Low yielding variety	Use of local variety	Improved variety may increase the yield	So many improved varieties	Selection of improved varieties
3	Weeds	No weeding or, one weeding	2 to 3 weeding may increase the yield	Labour problem	
4	Low use of fertilizer				
5	and on…				

7.5 Hypothesis :

A hypothesis is a thought or concept which needs to be tested

There may be one or more than one hypotheses.

7.6 The concept matrix :

It avoids single hypothesis.

It should address all possible influences of selected topic on crop, ecosystem or on social and economic aspect.

Examples of concept matrix:

Example 1 (Henk van den Berg):

S. N.	Concept (possible effect of topic)	Source of each concept	What do we think about each topic?
1	Increased use of urea will increase yield of rice	Extension officer	Not convinced; needs to be tested locally
2	Weeds increased with more urea	Other farmers	Probably; need to observe
3	Plant growth and tillering will increase with increased urea	Experience from FFS	Need to observe
4	More urea will be washed out into the canal	Newspaper	Yes, but how to observe?
5	Certain pests might become dominant	One of the participants	Not everyone agree; need to observe
6	Natural enemies might feel more at home in taller plants	Just a thought	Not everyone agree; need to observe
7	More labour and money is required to apply the extra fertilizer	Farmers provisional calculations	Needs to be tested

Example 2 (Yadav & Rajbhandari, 2001):

S. N.	Concept (possible effect of topic)	Source of each concept	What do we think about each topic?
1	Improved varieties give more yield	Radio	Not all varieties are high yielder in our condition. Need to be tested.
2	Improved varieties have more tiller number	One of the farmer	To what extent. Need to know for all varieties.
3	Improved varieties are tall	Just a thought	Not every one agree. Need to verify.
4	The less disease attack in improved varieties.	JTA	Need to observed
5	The less insect pest attack in improved varieties.	JTA	Need to observed
6	NEs population varies in different population	Past experiences	Need to be tested
7	Improved varieties have more straw yield	Just a thought	Need to be tested
8	Improved varieties are fine grain type and fetch more grain price	Researcher	Not everyone agree. Need to be tested.
9	and so on …		

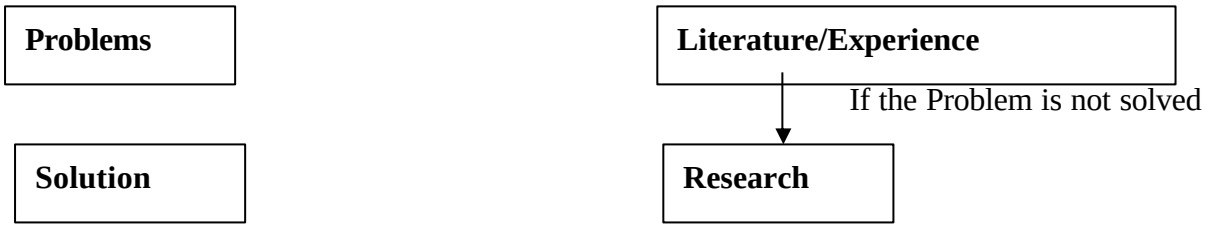
Why concept matrix?

To plan the types of observations required.

7.7 Designing Pragmatic Field Trial and observation parameter :

1. The Problem:

– "Formulation of the problem" - is the first stage in planning an experiment



- After formulation of the problem - a list of treatments will be made

2. Lay Out :

- Generally by the use of 3,4,5, triangel
  - Comparative - Just 2 treatments
  - Problematic - generally 3 treatments (upto 4) and 3 replications
    - "Three by three design" is a good compromise
  - Supportive - Varies
- Plot size - should not be less than 5 m2 (Gomez and Gomez, 1984)
  - 1 m2 in simulation studies.

3. Data Collection :

- Most of the people measures as many parameters as possible, Why ?
  - Just because - "it might be useful" - thinking
  - At last - too many data, but does not know what to do ?
- It is necessary to take those observations, which will help to solve the posed problem
- Let us try to avoid subjective measurements, if possible.
- Data vollection by separate member in separate treatment is not good - so, Let us avoid i.

4. Data recording :

- A dull and boring job, but an essiential part of experiment

5. Points to remember :

- Use of already ruled sheet of paper
- Black ink
- Large and clear hand - writing
- Bag containing plot yield - clearly marked
- If there is no yield from a particular plot - an empty bag should be tagged.
- If there are tow bags having the yield of single plot, then

  (i) plot 3.1 - of 2 (ii) plot 3.2 - of 2

Group Exercise :

Comparative Problematic Supportive (if possible)

- Plot size
- Data collection technique

  (consider - person, treat and block)
- Data collection time
- Any suitable point

Group exercise before starting the session

Questions:

1. *What is natural variation?*
2. *What is bias?*
3. *How to avoid natural variation?*
4. *How to overcome bias?*
5. *What are the most critical things to select replication?*

Ice breaking exercise before starting the session

- *Conduction of "Folding paper game" and relating it with the variation.*

Design

Two important principles:

1. Natural variation
2. Bias

I. Natural variation:

- Found between plots/different parts of a plot/different plants within a plot
- Possible causes:
  - Soil fertility
  - Soil compactness
  - Non-uniform drainage/water supply
  - More weeds and pests along border

How to avoid natural variation?

- *By replicating the treatment*

Distribution of treatments:

- *Random and regular*
- *Regular is recommended in small studies*
- *Regular = plots do not border other plots of the same treatment.*

II. Bias:

- The effect of neighbouring plot
    - Insecticide drift
    - Fertilizer drift
    - Movement of insects
- More bias in smaller plots

How to overcome bias?
- *By increasing the plot size*
- *By considering border/buffer zone*

Treatments:

- Consider 2-4 treatments
- They should differ in only one aspect
- Must include a control treatment (against which other treatments are compared)
- Control = current practice/certain practice was not applied plot

Replication/Block:

- More than one blocks are needed for the replication.
- Three replications are optimum in FFS.
- Placement should be on the basis of natural variation of the field.
    - Minimize the heterogeneity within the block & maximize between the block
    - If a field has stony, wet and good area then prepare 3 blocks in each area separately.
    - If there is definite trend across the site then the blocks are best long and thin.
    - If there is no trend across the site then it should be a square shaped.

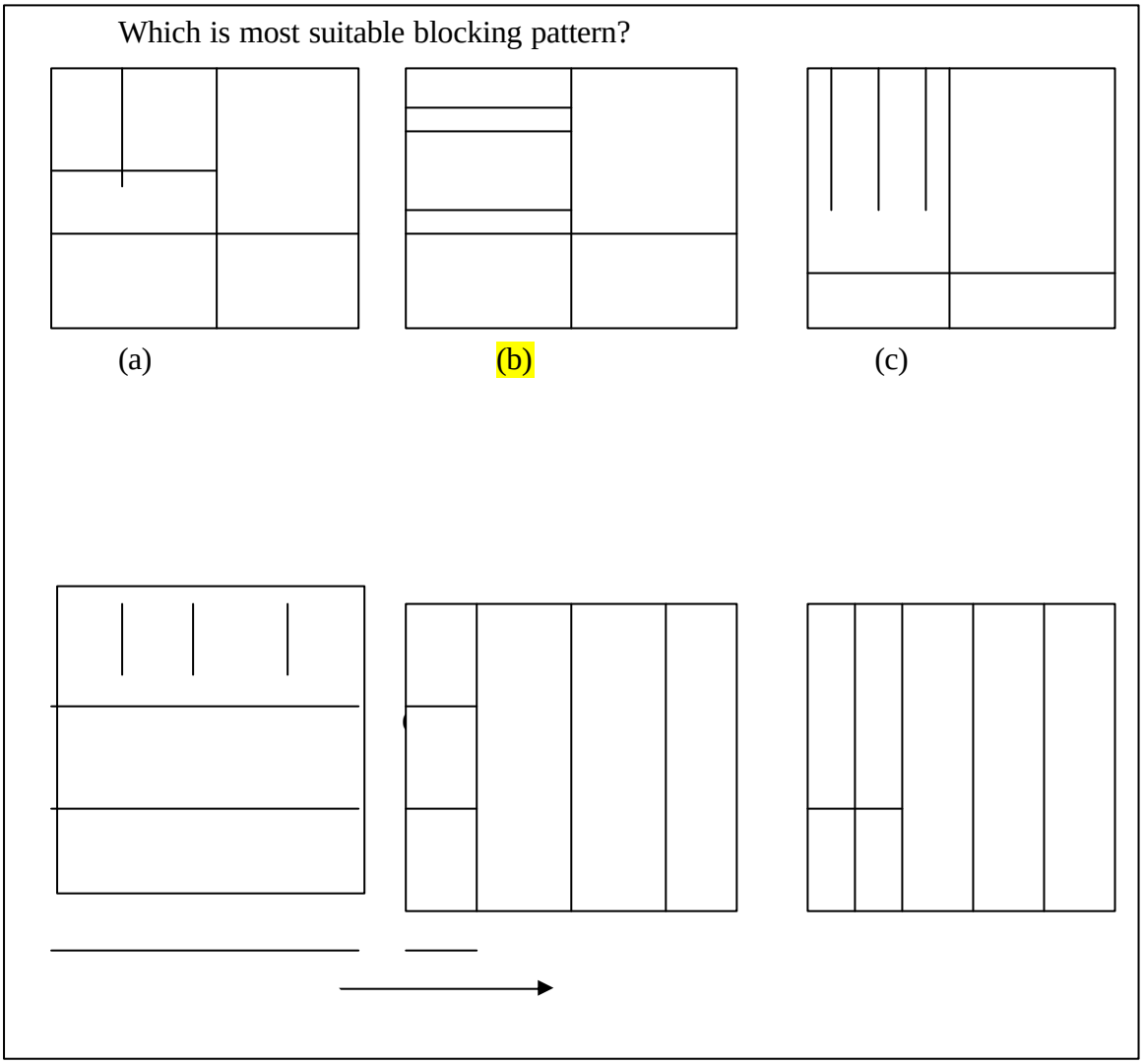
Use of square plots may not be the best shape but neither will it be the worst shape.

Plot size:

- Not less than 1 m^2 for simulation studies (as in rice)
- For other studies it should be 5 m^2 or more.

Lay out:

- Use a 3,4,5 traingle for lay out



Observation:

What to observe?

- Use concept matrix

How to observe?

- There should be 10 plants per treatment for observing
    - Plant height
    - No. of tillers
    - Population dynamics etc.
- For yield
    - Crop cutting from 5 X 5 m area
    - Plot harvesting

When to observe?

Yield – at crop maturity or harvest

Weeds – early crop stage

Insect/disease/plant development – weekly during the entire season

Observation matrix (given by Henk van den Berg):

S.N.	What should be observed	How?	When
1	Yield	5 X 5 m crop cuts	At harvest
2	Plant height	Observe 15 hills per treatment	Weekly
3	Number of tillers	Observe 15 hills per treatment	Weekly
4	Weeds	50 X 50 cm. samples	Weekly during 1st 5 weeks
5	Insects/diseases	Observe 15 hills per treatment	Weekly
6	Natural enemies	Observe 15 hills per treatment	Weekly
7	Inputs	Calculate and record costs	When inputs are made

Group exercise:

Please prepare an observation matrix (based on the already prepared "topic selection matrix" and "concept matrix").

Small group exercise on pragmatic field trial: (Group Rice)

Particulars	**Comparative**	**Problematic**	**Supportive (if possible)**
Plot size	40-50 m^2	1-5m^2 /each	
No. of treatments (max.)	2	3-7	as many as
Data collection technique (consider person, treatment and block)	Same person for same block	Same person for same block	Same person for same treatment
Data collection time	7-8 AM	7-8 AM	As per need
Trials	IPM vs FP	DF/DT/Var./Tillering/Spacing/ Khaira/Weeding/ fertilizer/Disease	Insect Zoo, Cup and Cage study etc.

Rice Group

Components of Rice Ecosystem

Biotic: IPs

NEs

Neutrals

Rice plant

Weeds

Abiotic: Weather

Water

Land

Monitoring parameters/Quality indicators

Parameters	Quality indicators

Field Observation	
Area	1 ropani for Terai, 1 ropani for hill
Sample size/No	10/rep
Replication	4
Selection of sample plants	Random
No. of observer	Min. 3/rep
Time	7:00-8:00 am
Surroundings	
IPs/NEs	Type/No.
Disease	Type/Extent
Sample plant	
IPs/NEs	Type/No.
Disease symptom	Type/Extent
Damage	Type/Extent
Tiller No.	No.
Plant height	Cm.
Whole field	
Disease	Type/Extent
water level	Cm.
weeds	Type/Extent
Weather	Type
Relevance data collection	
As above	As above

Proposed Treatments :

Name of Trial	14 DAT	28 DAT	42 DAT
1. DF (Defoliation)	25%	25%	25%
	50%	50%	
	75%		
	Control		
2. DT (Detillering)	5%	5%	5%
	10%	10%	
	15%		
	Control		

3. Tillers

- 1, 3, 5, 7, 9, 11, 15 and FP

4. Spacing (cm.) :

- 10, 15, 20, 25, 30 and FP

5. Weeding (DAT) :

- 28, 56
- 28
- 56
- No weeding

6. Fertilizer :

- Recommended (Basal + Top Dressing Tillering + Top Dressing Primordial Initiation)
- Top Dressing - at tillering
- Top Dressing at PI
- Top Dressing at tillering + Top Dressing at PI

7. Diseases :

- Seed treatment
- Seedling dip
- Control

8. Varietal :
   - 4 to 5 variety (5m^2 each)
9. Khaira :
   - Zn basal
   - Zn foliar
   - Zn basal + foliar
   - Control

Note : Treatments subject to change according to the situation and problems.

Data processing & analysis	
Biotic	
Total Figure	
IPs/NEs	Type/No./Trend
Average Figure	
Agronomic character	
Height	Cm/trend
Tiller	No./trend
Subjective/General	
Disease	Type/extent
Weeds	Type/extent
Abitotic	
Average water level	
Weather	Cm/trend
Permanent figure	Type/trend
Variety	
DOS	Name
DOT	Date
Fertilizer dose	Date
Cultural practices (subsequently)	Kg/Unit area Type/Date
Presentation	Presenting the trends of the analyzed data
Decision making	Group discussion/added facilitation

7.8 Pragmatic Trial Design and Observation Module for Cauliflower

Particulars	**Comparative**	**Problematic**	**Supportive (if possible)**
Plot size	1/2 +1/2 = 1 Ropani	7 m2	1 m2
No. of treatments (max.)	2	1-5	
Data Collection Technique (Consider person, treatments & blocks)	gr/sub/ plot	group/block	group
Data collection time	Morning	Morning	Anytime

eg. 1. Club root management Treatments

- Based on problem T1 - lime

- Treatment no. 2 to 5 — T2 Trichoderma
- Problem club root — T3 Bevistin
- Treatment no 4 — T4 control
- Replication - 3 — Spacing 60 X 45 (cm.)
- Plot size - 7 m2
- No of plants/treatment = 20

T1 20 plants	T2	T3	T4	R1
T4	T1	T2	T3	R2
T1	T4	T3	T2	R3

Cauliflower Group

Q. What are the components of cauliflower agro-ecosystem?

Abiotic

- Temperature
- Humidity
- Sunlight
- Moisture status
- Rainfall
- Fertilizer/nutrients

Biotic

- No. of plants per unit area
- Crop variety
- Growing stage
- Insect pest/vertebrate pest
- Natural enemies
- Weeds
- Pathogens
- Soil organisms

Illustrate the monitoring parameters

☞ General parameters

- Condition of weather
- Moisture level
- Crop age/growth stage
- Variety of crop
- Soil fertility
- Fertilizer dose/compost
- Agronomic parameters

What	When	How
1. no. of IPs	weekly	counting
2. no. of NEs	weekly	counting
3. no. of leaves	weekly	counting
4. Curd weight	at last	measurement
5. Plant height	weekly	measurement
Disease/weeds/disorders	weekly	coring population with species severity (L,M,H)

Q. What should be the quality indicators of an AESA?

AESA quality matrix

Steps	Quality indicator
Field observation	No. of attendants involved in the field observation
Participation	No. of attendants actively working
Trial design	Area of the field trial - 500 m^2
	No. of study plots - 10
	No. of sample plants (5% of the total plants).
No. of study plots	Min. 2 study
Field of study	
* Variety, micronutrients, spacing, liming, manuring, fertilizer dose, defoliation study as per need.	
Treatments	3-5 replication

Data collection for monitoring parameters :

- Format, design according to monitoring parameters
- Materials (scale, plastic pots etc.)
- Observation skill/procedure.

Data Processing and Analysis :

Information: **-General parameters**
-Agronomic parameters
-Facts and figures
-Conclusions
-Suggestion
-Comparison

Data Organization: -Previous data record
-No. of individual insect (IPs/NEs)
-Average plant height

Figures -IPs/NEs
-Growth stage

Processing -Participation
-Time
-Provide the paper for next week
-Live specimen

Presentation -Weekly data collection
-No. of women involved in presentation
-Presentation skill

Group Discussion :

and Decision Making

- Participation
- Relation to field data record

Tomato Group

What are the components of tomato ecosystem?

LIVING COMPONENTS

☞ **Soil**

- Micro-organism
  -Trichoderma
  -Actinomycetes
- Weed

☞ **Insect Pests**

- Aphid
- Helicoverpa
- Leaf Minor
- Nematode
- White Grub
- Cut worm
- White fly
- spodoptera

☞ **Natural Enemies**

- Mirid Bug
- LBB
- Spider
- Earthworm
- carabid beetle
- lace wing
- ear wing
- fire beetle
- wasp
- tricograma

☞ **Disease**

- Fungal- Late, Early blight
- Bacterial- wilt
- Viral-TMV/LCV

NON-LIVING COMPONENT

- Light/Sun
- Temperature
- Air

- Moisture/RH
- Rainfall
- Cloud
- Wind
- Fog
- Hailstone

ILLUSTRATE THE MONITORING PARAMETERS

What to Observe	When	How to Observe
Weather: Rainy/cloudy sunshine	8.00-9.00AM	visual/feeling/ use of instruments
soil moisture	,,	feeling with hard/ use of moisture meter
IP/NE population	,,	visual, counting and data collection, sample collection
Disease Incidence	,,	

Correction ug{pkoQm bl/Psf](Group discussion jf6)

Agronomic Parameter

Vegetative Phase :

- Plant Height
- No. of Compound leaf
- No. of Branches

Reproductive Phase :

- No. of flowers bunch
- No. of fruit bunch
- No. of fruit/bunch
- Wt. per harvest
- Weather condition
- Relate general observation

Quality of Indicators of an AESA

* Weather
* Presence of NE/IP/Identification
* Active Participation
* Methodology of deli collection/ processing and presentation
* Valuable decision making

Steps	Quality Indicator

Field Observation * selection of sample	randomly
* **representation of field**	study plots should be same
* **plot size**	200 sq.m. for IPM & FFS each & 100 sq.m. for others – active & equal participation – simple format &measuring tools
Relevant Data collection * important data collection	weather, information, of IP & NE & agronomic characters
* **observation**	Time
* Monitoring	crop stage-wise
Data Processing & Analysis * Information & data	update records, simple format
* **Drawing of AESA**	simple, real situation reflection
Presentation and Decision Making * Use of appropriate data	field representation
* **Discussion**	Participatory

Presentation and Decision Making :

- Participatory presentation
- (Partially guidance)
- Less directive and more supportive
- Final decision by big group

7.9 Pragmatic Trial Design and Observation mode for Citrus :

Particulars	Comparative	Problematic	Supportive
Plot size	2 Ropani (30 plants)	3 plants/treatment	
No. of treatment	Two (IPM VS FP)	3 for diseases (foot & root rot) • T1 B.P., B.M. nechuki inter cropping • T2 B.P. and intercrop • T3 Control **3 for insects (L.M. & S.I.)** • T1 mineral oil • T2 Applaud • T3 control	
Data collection technique	• Sub group • Use scale to measure wound healing • Insects count.	• Special task group • As it is.	
Data collection time	Day time fortnightly	Day time fortnightly	

Q. 1 What are the components of citrus ecosystem?

A. Abiotic Factor

- Altitude - 800m to 1500m for orchard, 1000m to 1,400m for nursery.
- Topographical facing (north-east).
- Soil properties (fertility, depth, moisture, PH, texture).
- Exposure to sunlight.

B. Biotic Factors

- Age and source of sapling.
- Quality of sapling (rootstock, scion, seed, variety, grafting).
- Age of tree.
- IPs (leaf miner, scale, bug, borer, aphid, fruit fly, citrus psylla, Lemon citrus dog etc.)
- Diseases (powdery mildew, foot rot, root rot, shooty mold, citrus greening, canker, pink disease, CTV).
- Parasitic plant.
- Weeds,
- Inter crops.
- NEs (spiders, LBB, wasps, ant, praying mantid).

Q. 2 Illustrate the Motitoring Parmeters What to Observe ?

- Stage of the plant
- Number of Leaf on sample tertiary branch
- Appearance (Leaf colour, New flushes)
- Length and canopy of tertiary sample branch
- Number of flower and fruits on tertiary S. branch
- Soil moisture
- Weeds and parasite plants
- Inter Crops
- IPS, NEs and diseases.

What to observe ?

- Day time (10 am to 4 pm)
- Fortnight
- At least one year
- From Poush to Mansir

How to observe ?

- Orchard area - 2 Ropanies (30 trees)
- Sample tree - 10
- No. of sample tree 10 _Tertiary)
- Use of tags for sampling of branch
- Use of ladder for observation
- use of lens
- Establish new orchard side by side

What should be the quality indicators of on AESA ?

(a) Field Observation

Steps ***Quality Indicator***

– Participatory rotation on observation (Recording, measuring of counting,

collecting IPS, NEs and supporting ladder etc.

(b) **Relevant data collection :** – Weather, Soil moisture, IPS, NEs, Disease, No. of leaves, flower, fruits canopy area, appearance etc.

(c) **Date Processing and analysis** : – Draw the picture of sample branch, cultural practices information, weather crop stage, no. of IPS NEs disease, weeds, parasitic plants.

(d) Presentation and Decision Making：

- Participatory Presentation
- Participatory presentation
- Less directive and more supportive
- Final decision by big group

7.10 Pragmatic Trial Design and Observation for Banana

Comparative Study :

F.P. - 500 sqm. IPM - 500 sqm

- Treatment : 2 Sub Group 2
- Sample plant : 5

Data Collection Technique :

Both Group in F.P. and IPM

Data Collection Time : 700 - 1200 (in other)

10.00 - 3.00 (in winter)

Problematic Study :

Plot size : 40 sqm per treatment.

Sample plant : 2 plant/treatment

- Fruit scaring beetle management.
- of treatment : 3 (chemical, Botanical, Control)
- Intercultural Trial :
- of treatment : 3 (Ginger/Turmeric, Potato, Control)
- Banana Weevil management
- of treatment : 3 (chemical, Trap, Control)

Data collection Technique :

Selected Farmers collect data and present in whole group.

- Fertilizer response Trial :
- of treatment : 2 (NPK, NK)
- of Replication : 3

Data Collection Technique :

- Formation of 3 sub group
- 1 Sub group collect data in 1 block.

500 sq.m. 500 sq.m

FP IPM

1st group	
2nd group	

R1 R2 R3

NPK			
NK			

40 sq.m.

Observation Parameter :

Component's of Banana Ecosystem:-

Biotic	Abiotic
*Plants	* Soil
*Weeds	*Moisture
*Insects	*Air
*Disease (Pathogen)	*Temp.
	*Plant nutrients
	*Hailstone
	*Frost
	*Wind

2. Monitoring Parameters

What to Observe ?

- Rhizome/stem weevil

- Wilt-Panama
- Banana Fruit Scaring
- Anthracnose
- Rhizome rot
- Nutrient factor- N & K, Enzymes.
- Moisture factor-
- Physiological factor- cold injury, height

When to Observe

1. Vegetative Stage

- # of leaves
- Girth size
- Height. (upto 6 month)
- Insect/Disease
- Tem./Moisture
- Management

} 15 days Interval

2. Bunch Initiation stage

- # of leaves
- Insect/Disease
- Tem./Moisture
- Weed Management

} 15 days Interval

3. Maturing /Ripening State

- # of Comb
- # of Fruit
- Weight (kg)
- Physical appearance/smoothness
- Temp.
- Insect Disease

} 15 days Interval

How to Observe

- Plot size- 3 kattha (1000 Sq.m.)
- # of sub group-2
- # of sample 5/group
- canopy, stem & soil-canopy area.

AESA-Quality Indicator

- observation-canopy, stem, soil
- Random sample selection
- uniform site selection
- More participant observation
- data collection-

#of leaves, height, girth. IP_s/NE_s, disease, weeds, weather condition, plant age, fertilizer dose

Processing & Analysis

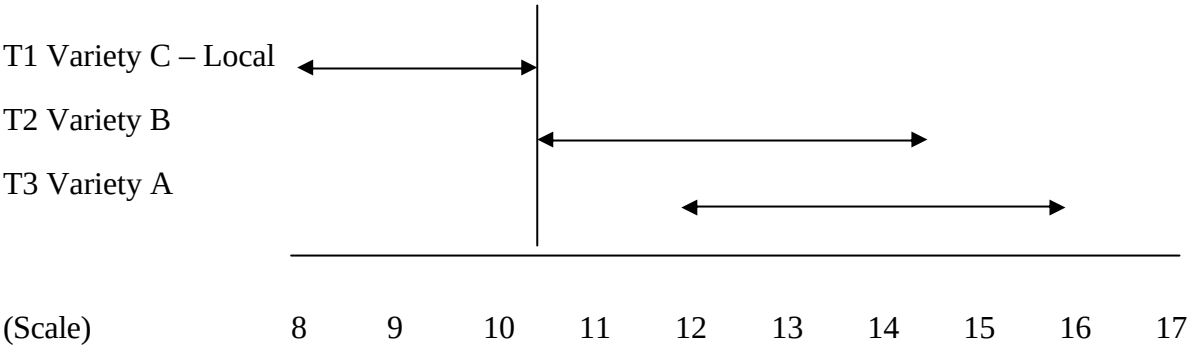
sample plant #	plant Height	Girth	# of leaf	# of comb	# of fruit	Severity of Insect			Severity of Disease			# of NE_s
						L	M	H	L	M	H	

7.11 Analysis :

7.11.1 Simplified statistics:

Please see the example (given by Henk van den Berg):

Treatment	Replication 1	Replication 2	Replication 3	Average
Variety C	8	10	9	(9 kg)
Variety B	11	15	13	(13 kg)
Variety A	13	17	15	(15 kg)



Here, we found that,

- Treatment C is not overlapping with treatment B and A (significantly different)
- Treatment B and A are overlapping (non-significant)
- It does not prove that 100 kg urea produces higher yield than 50 kg urea. It may be due to natural variation in the field.

Note that:

- Simplified statistics resembles with conventional statistical methods (F-test at $P<0.05$) for three replications.
- In four or more replications the test is less accurate and should not be used.

7.11.2 Consistency:

- It is used in case of distinct blocks to know whether a treatment is consistently better or worse than others.
- It is less accurate than simplified statistics
- Here, we consider the "loosing treatment" and "winning treatment"

Please see the example (given by Henk van den Berg):

Treatment	**Block 1**	**Block 2**	**Block 3**	**(Average)**
0 kg urea	6	12	9	(10 kg)
50 kg urea	8	15	16	(13 kg)
100 kg urea	11	19	16	(15 kg)

- Treatment 1 is 'loser'. So, it is worse than other treatments.
- Here, none of the treatment is consistent 'winner' (T-3 is winner in block 1 and block 2, but not in block 3).

Result:

- Urea clearly increases the yield, but there is no clear difference between 50 and 100 kg urea.

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PsLs[t zqhLj Joj:yfkg sfo{s|dn] s[fs kf7zfnf dfkm{t s[fsx? jLrdf ;xefuLtfTds 5nkmn u/fO{ lgwf{Lt nIo k|Kt u/L gof k|jlwx?sf] ;Gb]z km}nfpg] k/Dk/f j;fn]sf] s'f lgjL{fb 5 . o;} cjwf/0ffsf] cg';/0f u/] PsLs[t cGg e08f/0f Joj:yfkg sfo{s|d ;+fng ug{z? u/LPsf] xf]. To;}n] of] sfo{s|dnfO{ cfO=lk=Pd= sf{cg';/0f -Follow up) sf]?kdf lng'j]z xG5 .

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k|jlwx? aLrdf thgfTds cWoog ug{ ;lsg] vfnsf] xg' k5{. cWoog :yfkgf ubf{ s[fsx?sf] ;d:ofdf cfwf/Lt ePsf]xgkb5{ .

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%_ ;snLt gdgfx?nfO{ljZnljf0f u/L kmf/fd g=#-#_ cg';f/ tof/ u/L ;dxdf k|tt u/L 5nkmn u/LG5 .

^_ **kl/lf0f :yfkgf**

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&_ **lflt ljZnljf0f**

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%_ e08f/0f ;u+ ;DalGwt ljz]if sIffx? ;xefuLtfTds 5nkmn (participatery discussion) ljlw4f/f ;+rfng ul/g]5 .

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kf7zfnfsf]bkgs sfo{tflnsf

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Cup study

- Moisture % level km/s kf/L e08f/0f ug{-;'sfP/ / g;'sfP/ e08f/0f ug{ .
- sL/fx?sf]hLjg rs|x{g[
- ljleGg 3/]h' t/Lsf tyf h8Lj8Lsf]kþfþ u/L thgf ug{.
- ljiffbLx?sf]kþfþ u/] / gu/] e08f/0f ug{-s[fsx?n]kþfþ ug{u/]sf ljiffbLx
- e08f/0f ug{7fp, bLzf, km/s kf/] ug{
- Disinfected u/] / gu/] e08f/0f ug{
- bfn afnldf t]hsf]kþfþ

- v/fgL sf]kþfÆ
- cGo .

Demonstration

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- d';fdfg{ vf/ /fVg]
- d';fdfg{ ljleGg ljiffbLx?, ln ;f] k]6 kþfÆ ug{÷Trapping ug{
- lr:ofg 36j9 xG]kþf
- ljiffbL kþfÆ ug{ t/Lsf
- d';fdfg{ ljleGg ljiffbLx?

cfj:os kg{;fdfu|x?

!_ tfksd lng]-Thermometer)
@_ cfb|tf gfKg]-Hygro meter)
#_ lr:ofg gfKg]-Moisture meter)
$_ gdgf lng](Sampler)
%_ Knfli6s jf sf+sf l8Jafx?
^_ rfNgfx? -Sieves_

Cup study and demonstration

o:tf vfnsf]Supporting studies df /fVg ;lsg]sxL pbfx/0fx? o; k|sf/ 5g .

!_ lr:ofg k|jfx kþz{g

cfgfhn] jftfj/0fjf6 kfgL ;f]; ln0{lr:ofg a9g]k|s[fnf0{bz{fpg of]kþz{gn] ;xofÆ k'Ýfpb5 . o;df xfjf aGb sf+÷Knfli6ssf]l8Aafx?df a/fa/ dfqfdf cgfh /fvL ;fgf] vfnsf] Measuring cylinder !) ld=ln= sf] df km/s km/s n]ndf kfgL /fVg]. kf7zfnf ;+fng ePsf] k[o{ lbgdf kfgLsf] n]n / cgfhsf] lr:ofg gfKg]/ To;sf]/{8{lng] tyf /fVg]. cgfhdf ePsf]lr:ofgsf] 36j9jf6 lr:ofg k|fxsf] jf/]df 5nkmn u/L :ki6 kfg{;lsG5 .

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:yflgo:t/df kf0g]/ k|ngdf eO/xs]f ljleGg jg:kltx? ljleGg dfqfdf ÷b/df /fvL pkoSt tl/sf cg';f/ kþfÆu/L cWoog ug{. o;sf]flu sf+sf]l8Jaf kþfÆ ug{/fdf]xG5 . sf/0f sf+af6 sL/fx?sf]s[fsnfk aflx/}f6 cjnf]sg ug{ ;lsG5 . o;/L /fvLPsf]cWoogdf sL/fx? gb|vPdf sL/fx?nf0{kl5 klg cWoogdf /fVg ;lsG5 .

9. LIVING SOIL

Soil is natural body made by nature. It consists mainly minerals and a very little organic matter which is formed from the disintegration and decomposition of rock and mineral. Under ideal condition a recognizable soil profile may develop in about 200 years. Soil forming process particularly depends on parent material, mineral composition, influence of time, microbiological activities, topographic position etc. Soil is living because it contains plants microorganism and other live bodies and growth of these line depends on soil.

Physical Properties of Soil

I. Soil Texture – sand, silt and clay
   Sandy soil having < 15% clay particle
   Clay soil having at least 35% clay particle
   Loamy soil having at least 20% clay particle
   Loamy soil have 40% sand, 40% silt 20% clay particle

II. Soil structure – platy, blocky, granular, prismatic

III. Soil Density

   → Generally density of soil particle weighed is 2.65 g/cu cm

   → If we add OM, the density will be decreased.

IV. Soil Probity

   → Soil must contain 50% air and 50% solid.

   → Sandy soil have less porous and clay soil contain more porous.

V. Soil colour – Soil color differs from soil to soil because of competition of parent material OM. The soil colour also reflects the condition of soil.

VI. Soil Temperature :

   → Soil temperature govern the plant growth and the activities of microorganism. In high and very low temp the microbial activities will be ceased.

VII. Soil Moisture :

   → Soil moisture needed for photosynthesis, balancing soil temperature, needed for make physical and chemical reaction in the soil by microorganism.

Chemical Properties of soil :

a) Particle of soil – Kaolinite, Montmorillonite, Hydrous clay, vermiculite, sesquioxide clay, chloride clay.

b) Climate – Some mineral are high soluble in nature and others are low soluble. Soil mineralization is low in dry climate. Similarly leaching is low. However leaching loss is high in humid climate.

c) Soil organic matter : Soil organic matter content shows the soil fertility condition of the soil. OM soil is productive. OM reach soil root only major nutrient but also add micronutrient in the soil. It also improve the soil physical condition of soil. The C:N ratio also reflect the level of mineralization in the soil. The wider range of C & N reflect the mineralization rate of the soil that will be slow. The C : N ratio 20.1 – 30.1 shows high decomposition of matters. 30.1% shows the microorganism takes time to decompose the dry matter.

d) Soil pH : The availability of soil nutrient related will soil pH. Major basic element are not available in acidic soil. Mostly about neutral soil pH is needed to have a good plant growth.

Needs for organic farming :

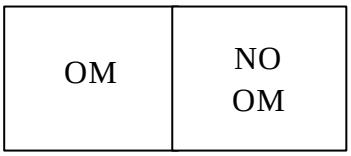
In Nepal, the soil fertility depletion is a serious matter of concern. Low use of organic manure, soil erosion, imbalance use of chemical fertilizer are the root cause of soil fertility decline. To improve the condition, modern farming should be changed into organic farming.

Field Experiments that can be included in FFS curriculum (suggested by group)

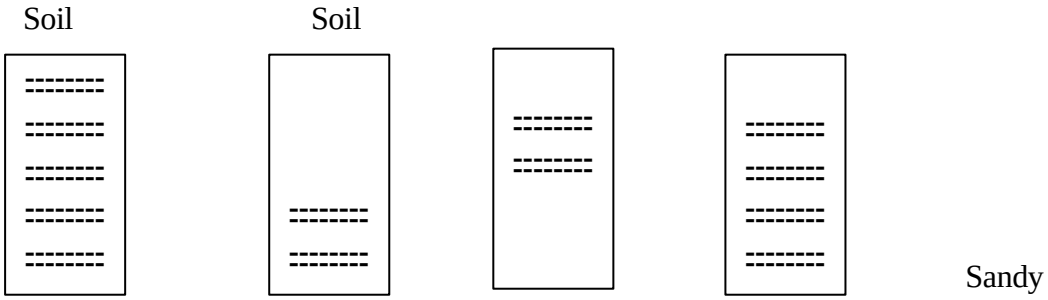
1) Soil Texture
   (a) Ribbon method
   (b) Ball method

   (Ball not form – sand
   Ball just break – silt
   Ball not break –clay)

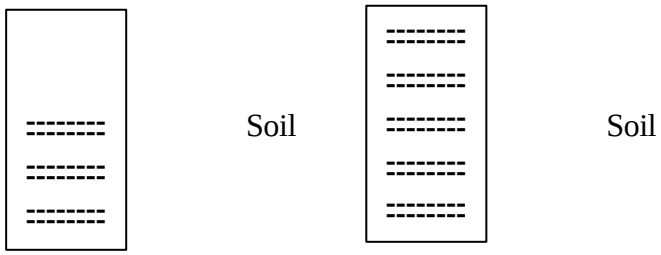
   (c) Infiltration Method
   - Keep equally treated of soil sample in a mineral water bottle
   - Time taken in infiltration
2) Organic matter
3) 2m



Focus on Biodiversity
   (a) Earth worm preference trial
   (b) Demonstrating soil profile
   (c) Hydrogen Peroxide test (strong effervescence)
   (d) Color comparison
4) Water holding capacity of soil
   (a) $^{A}/_{C}$ Texture



   (b) According to organic Matter content



OM + Soil
($^{1}/_{2}$) + ($^{1}/_{2}$)

<u>Exercise on Soil p^{H} in FFS</u>

A. Acidic soil is difficult to plough dig
B. Big clods formation which are difficult to break
C. p^{H} determination using litmus paper

<u>Procedure:</u>

- Soil sampling
- Pour distil water and make solution

- Cover the solution with filter paper
- Place the litmus paper on the filter paper
- Compare the color with chart.
- Red color indicates acidic reaction
- Blue color indicates basic reaction

D. Use of p^H meter
E. Laboratory test
F. Use of indicator plant.

What is organic farming :

Organic agriculture is an agricultural system that promotes environmentally, socially and economically sound production of food, fiber, timber etc. Working with the natural properties of plants, animals and the landscape, organic farmers aim to optimize quality in all aspects of agriculture and the environment. Organic agriculture significantly reduces external inputs by avoiding the use of chemo-synthetic fertilizers, pesticides and pharmaceuticals. Organic agriculture also includes social considerations in its holistic approach recognizing that people are as important as the organic system. Organic agriculture adheres to globally accepted principles which are implemented in specific social, economic, gec-climatic and cultural contexts. The principle aims of organic production and processing are outlined in the IFOAM Basic Standards. These set out an international framework for organic production and processing.

- ***International Federation of Organic Agriculture Movements*** **(IFOAM)**

National policy:

- In tenth plan (2002-2007), Govt. has endorsed organic farming as one of the important program
- To reduce the use of pesticide, to protect environment and to enhance the organic manure based agricultural farming. *(Page 126, Tenth Plan document NPC)*
- Organic farming is inspired, appreciated and guided by the project "support to IPM programme in Nepal " for the development of sustainable agriculture.

Scope and Importance :

- Organic farming is compatible with IPM, since the fundamental principles of IPM are more or less similar with organic farming.
- Very close to the nature (than IPM)
- Considers the men as important component of system
- Restricts the use of synthetic pesticides, and chemicals and allopathic medicines
- Promotes the conservation and promotion of ecosystem and bio-diversity and environment.

Hence, There is need to develop to:

- organic farming guidelines
- norms and standard for the different component of organic produce and farming techniques.

Guiding principles organic farming

- Beneficial relationships
- Natural system
- Diversity
- Use of local resources
- Energy use of recycling
- Biological systems
- Energy efficient planning
- Appropriate technology
- Attitude
- Respects the holistic system
- Repairs damaged system
- Allow earth health and protect natural structure
- Reduce cost of production
- Sustainability

Organic Agriculture as :

- Ecological farming
- Agro ecology
- Organic farming
- Natural farming
- Agro forestry
- Sustainable agriculture
- Regenerative agriculture
- Bio-dynamic farming
- Permaculture

Where to focus our effort :

- Since farmers have got knowledge on ecology and crop management practice accordingly through FFSs
- Whether we can start organic farming as a follow up activity in FFS, or not.
- Another thought would be conduction of FFS in organic farming
- Initiation of organic agriculture and market development (for example -establishment of farmer cooperative, collection center, etc.)
- Infrastructure development (involvement of VDC and DDC and local NGO,s)
- Strategy formulation for successful program implementation.

- Specified zonation for organic farming.
- Consumer sensitization program.
- Estd. of accreditation mechanism
- Domestic and international trade network.
- Share the experiences between stakeholders and develop the roadmap.

In the context of Nepal :

Mostly there are the involvement of NGOs in this sector

- INSAN
- Triple A
- Permaculture group
- SSMP
- Many local NGOs

From Govt. level especially DADO supported program

- Kathmandu
- Bhaktapur

The Principal Aims of Organic Production and Processing :

The principles include :

- work compatibly with natural cycles and living systems through the soil, plants and animals in the entire production system and produce sufficient quantities of high quality food, fiber and other products.
- maintain and increase long-term fertility and biological activity of soils using locally adopted cultural, biological and mechanical methods as opposed to reliance on inputs.
- main and encourage agricultural and natural bio-diversity on the farm and surrounds through the use of sustainable production systems and the protection of plant and wildlife habitats.
- maintain and conserve genetic diversity through attention to on-farm management of genetic resources.
- promote the responsible use and conservation of water and all life therein.
- use, as far as possible, renewable resources in production and processing systems and avoid pollution and waste.
- foster local and regional production and distribution.
- create a harmonious balance between crop production and animal husbandry.
- utilize biodegradable, recyclable and recycled packaging materials.
- support the establishment of an entire production, processing and distribution chain with is both socially just and ecologically responsible.
- recognize the importance of, and protect and learn from, indigenous knowledge and traditional farming systems.

Field Visit :

Organic Farming

What is observed ?

- Home use - organized way
- Marketing - personal basis (contact)

IPM - OPM - OF

- Target group – foreigners only
- Producer - not satisfied with his profession

Triple A (Appropriate, Agriculture, Alternatives)

What we observed :

- Marketing is done on the basis of personal contact. Where there is foreigner/residence areas like sanepa, Budhanikantha, Maharajgunj
- Previously it was training centre resource centre but now it is living as subsistence level.
- The owner has no satisfaction with his profession because of not in organized way.
- His suggestion for organic farming is at first should go to the IPM than organic pest management and the only after organic farming should be adopted.

Field visit of IPNS :

- What observed ?

Wheat cropping

- Farmers had good knowledge on a need for compost cover and need for soil testing using nutrient

But they were :

- Negligent on insect pest and disease occurrence and its damage enfestation and ear cockle of wheat and rust disease.
- Wheat sowing spacing not uniform
- Site selection was very poor (inter-cropping with citrus decline overbold)
- No visible difference observed between IPNs filed VS farmer practice field. Level of understating was found low is participant farmers.
- Information on AESA report was lacking.
- Irrigation schedule not fixed

IPNS activity is effective only in follow up program after completion of FFS

10. GENDER SENSITIVITY THROUGH IPM FFS; a case study of Banke District

Basu Dev Sharma Pokhrel
APPO
DADO, BANE

I. Economic Benefits

The introduction of IPM FFS program provided welfare benefit particularly when time and money spent by women on field crop protection and management got reduced. Potential economic benefit from the time and money saved through IPM program is closely related to the extent of women's involvement in the domestic economic and community development works. In many rural areas women are actively involved in agriculture particularly crop production, processing and animal care. Women are also the main users of kitchen garden for household economy, food and nutrition, for example, in vegetable gardening, animal husbandry, etc.

II. Social Benefits

IPM is found an ecofriendly cultural practice. It discourages use of pesticide. The IPM FFS was a community based program that promoted many social mobilization programs, i.e. NFE, leadership, power building, self decision making power were improved in the group. They solved their problem by using local knowledge and resources. In same areas when time permitted, women made the largest contribution to community self-help projects. Lack of time is often a major constraint to their participation in non-formal education, kitchen garden, water and sanitation. The use of botanical pesticide and judicial use of pesticide in crop protection and safe method of pesticide was used adequately considering the personal and food hygiene by all participants members in the community. That has led to significant reduction in these diseases and their treatment for individual households.

III. Projects Benefits

Women's traditional role describes the obvious rationale for involvement of women in the introduction of integrated pest management for operating farmer field school and awareness program.

We know that many cases of rejection and problems in the functioning and use can be explained either partially or fully, by insufficient attention to the traditional roles and position of women and that the women had sound reason for non-use facilities. The project focuses on providing the means for rural villagers and specially for women to take the lead in decision making at critical stages in implementing their decision and collective sharing of benefits . As prime beneficiaries, women have promoted the interest and willingness of men to contribute to improving community IPM program.

IV. Environmental Changes

Around 85% of the farmers who participated in FFS claimed to have observed changes in their environment. But no clear answers were given when asked about the sort of changes. But some examples were put, i.e. eco-friendly pest management, bee keeping and fishery in rice-field were possible. However, the following quotes illustrate the nature of changes:

"All farmers are cultivating crop based on seasons, so greenery can be seen everywhere. We now have a clean environment around us because we have given up the use of pesticides. Now fewer calves are still born since we stopped spraying rice and feed them clean straw." (Translated by the Trainer)

V. Empowerment

a. Increase in Self- confidence

Around 95% of the IPM farmers felt an increased self-confidence related to rice cultivation after they received FFS training. But least farmer said that they didn't experience such increase in confidence

b. Increased Understanding of Agro-ecosystem

The majority of farmers, ie. 96%, who participated in FFS reported an increase in the understanding of agro-ecosystem. Reduction of the pesticide was the main topic farmers learned followed by their increased capacity to identify insects and diseases.

The following quotes illustrate none other than their understanding increased

> "There is no need to use pesticides regularly, some of the insects are equally important to us."
>
> "We should not destroy our environment using pesticide carelessly. By protecting the useful insects we could conserve the environment."
>
> "All living organisms play a vital role in the balance of nature."
>
> "Careless use of pesticides to kill insects will also kill useful organisms like earthworms, which help to increase the fertility of the soil."
>
> "IPM training has helped us to produce mover crops with less investment."
>
> "After our whole village stopped using pesticides, the standard of our village ecosystem has increased."
>
> "Use pesticides only if it is necessary. Only if biological methods do not work, we can use pesticides."
>
> "We need to educate neighbouring farmers also not to spray."
>
> (Translated by the Trainer)

VI. Changes in Society

A total of 70% of the non-IPM farmers saw changes in society by working in farmers' groups. Similarly 79% of the IPM farmers saw positive changes in society after FFS.

Examples of the changes are given below in their own words:

> "Being a member of higher caste family I recently have had a meal in the house of one of my friends who belonged to a lower caste (*damai*)."
>
> "Women are also taking part in training and have started distinguishing between harmful and useful organisms."
>
> "Since, we all do similar work in the group, we all co-operate without thinking about caste and gender discrimination. So a change has come."
>
> "All people of our group are now educated so a great change is brought about in society."
>
> "People of all castes and gender gather in the same place and they are treated equally."
>
> "In the past there was caste discrimination like, we could not stay together or talk with whomever we like, but nowadays it is just the opposite."
>
> "We revitalized an existing farmers' group. Activities and discussion are now based on our felt needs."

VII. Change in Health

With the application of IPM methods in rice farming, 83% of IPM farmers agreed to a better health condition. Other 79% also agreed that their costs for doctors and medicines had come down.

VIII. Major Achievements

The programs had changed the general status of women due to training, exposure, provision of knowledge and skills and by enabling them participate in the formal process of development especially through physical involvement in IPM FFS.

The women member and women user committee members' responsibility to make fellow women and men aware of IPM FFS issues showed that women could do something, more than just farming and household activities. The women of Banke are becoming increasingly familiar with the FFS and conducting FFS themselves to participate in IPM program, decision making, presentation, to make conclusion of the problem and planning process by making themselves involved in such activities.

Awareness of the health implication of improperly handled pesticide was found increased among most women and men, even among those lacking access to knowledge of IPM. Due to familiarity with facial/oral transmission of disease, more people are using IPM technology for their farming system.

The positive result of the new IPM FFS in the area with community participation and women involvement has created a realization that the sustainability agriculture development could be ensured by IPM FFS. They realised that they used their indigenous knowledge and local resources. DADO, Banke have realized their self-respect and confidence. Before, IPM-FFS, there were no such attempt, which voiced women's need regarding integrated pest management. Among farmers committee/group are raising fund from the village themselves as welfare fund. It is understood that women have been playing an important part in the formulation, implementation, awareness and policies issues. The women have also participated voluntarily in transportation of local materials. Thus this reflects gender involvement in community participation.

IX. Change in the Way of Thinking

Before the commissioning of IPM FFS the women thought that pest infestation was due to high pesticide use. They never believed it to be because of heavy and haphazard use of pesticides. They were unknown about pesticide effects to the human body and environment. So many diseases like vomiting, diarrhoea, irritation, allergy, etc were the effects caused by pesticide. They did not know about waiting period of pesticide, which was the main problem.

All the participants were found aware of pesticide residues and its effects on environment as well as human being after the introduction of IPM-FFS. They knew that pesticide was not only the pest control device but also different methods were used as pest management for the sustainable agriculture development. Resurgence power of insects was build by used chemical pesticides, which were known by the farmers.

X. Ownership Feeling

Previous experiences have demonstrated that IPM FFS launched without peoples' participation have failed in comparison to projects launched with community participation

In the completion of this IPM FFS program the farmer of village have been involved from the very initial (stages, from the pre - IPM FFS phase to the post IPM FFS program). The IPM FFS program had been accompanied by women farmer participants, those involved in agriculture activities and the local women had gained knowledge on health education, farm management, kitchen garden management, decision making power, speaking power among the mass people, drawing pictures and, writings about the problems.

They knew about environment and environment was not confined to small area thus the pest management was the problem of all the villagers or cluster so that they cooperated with all the villagers and solved their problem. They had to know that single farmer could not solve the problem so all the farmers were feeling

ownership to manage their problem. They had already faced many problems to manage the pest. DADO office, Agriculture Service Center and others GO's/NGO's supported them.

XI. Gender awareness

From IPM FFS program, the women had knew the importance of group. Community development feeling between different genders was found highly increased. The male members had realized that IPM FFS belonged to women in this situation so the involvement of women in FFS was crucial. The women members who imparted the ……..hygiene education to the local women were seen to be very effective. The women member properly used IPM method to the field and the pest management was itself eco-friendly. Previously women were not involved in agriculture group, and most of the FFS did not sustain. But, now women were involved in IPM FFS in different forms such as, as agriculture users committee members, volunteers, etc.

XII. Community feeling

Now the people have realised that community participation plays a key role for the development of their village or cluster. The best three definition of community development in advanced sociological literature, discovered basic consensus on only three definitional elements: social interaction between people, one or more shared ties, and an area context. Through community participation farmers managed their farms well, reduced the pesticide use in term it frequency and quantity as well as hazardous pesticide use. The agriculture extension policy emphasized on the change through individual and group approach system. Group or community approach was found sustained, collective behavior were emphasized. Thus, the farmer had developed a we-feeling when they involved in the IPM FFS.

XIII. Impact of women's involvement in FFS

Most of the women felt that it was very useful to involve women in the FFS program from the formulation stage of FFS to the graduation. The local women could communicate more easily to the women of FFS group, because local method/local resource related activities are mostly the concern of women. In the villages, women were shy to talk freely, directly to the Extensionist (Technician) about defecting habits for the farm management a well as their livelihood.

After IPM-FFS was launched, the local villagers, uneducated women, felt unrestricted to give their opinions and discuss the best possible hygiene and sanitation option for local women, women workers generally understood more intuitively the problems and issues faced by other women farmers and communicate more openly with other women. The women farmers observed that only a women could tell another village women how to keep her farm managed with local recourses and local methods and, her cluster and her family fresh/non-polluted, as well as to take care of the hygiene, food and environment.

XIV. Involvement of the Women in Decision-making

Involvement of women in decision-making was found increased. All the women participants admitted that their decision was heard and recognized. It was women whose decision-making had been heard for a new FFS. Now the women looked more confident in decision-making activities than before.

The districts office consulted women for the design of location along with farmers' group member; they gave the villagers the ideas of transplantation, managing, composting, weeding, water management, other casual intercultural activities. They scheduled their farm activities.

11. PARTICIPATORY MONITORS AND EVALUATION (PM& E)

11.1 FFS Approach

Monitoring and Evaluation (PM & E)

- ❖ Monitoring refers to a systematic and continuous process of getting information and acting on changes caused by the implementation of an activity.
- ❖ Evaluation is the identification of the broader positive and negative outcome of an activity in terms of overall value achievement of objectives.
- ❖ Systematic monitoring and evaluation of FFS is an activity which is done to make adjustment before being late, learn from experience and justify the investment of the project.

11.2 Importance : why

- Right tracking the project
- Output/adjustment/impact shortfall
- Evaluate performance
- Improve and adjust activities
- Moe efficient resource allocation
- future program planning

11.3 Process Monitoring Indicators

Set of activities to be monitored	Quantitative and Qualitative indicator
1. **Pre-FFS Activities**	
a. Site selection	Problematic, pocket area, accessibility (?) ,
b. Preparatory meeting	3 preparatory meetings, presence of local stakeholders/officials, participation according to norms, balance participation, collection of socio-economic information, cropping calendar ,GRAM, tentative curriculum preparation, learning contract
2. **During FFS Activities**	
a. Lesson Plan	
b. Attendance	
c. Pre –test	
d. Minuting and record keeping	
e. Recapitulation	
f. Group work	
g. Agro-ecosystem Analysis/Field Observation	
h. Supporting activities	
i. Analysis of data	
J. Presentation	
k. Decision making	
l. Special topic	
m. Group dynamic	
n. Planning for next week	
o. Post –test	
p. Field day	
q. Yield comparison and cost of production	
3. **Post FFS Activity**	

a. Awareness increment	
b. Pesticide transaction	
c. Capacity of facilitator	
d. Documentation	

11.4 Evaluation :

- Dimension
- FFS Plot
- FFS Farmer
- FFS Farmer Field
- Non FFS Farmer
- Non FFS Farmers Field
- FFS Approach

11.5 Level of Monitoring

- Central level – Central level IPM Co-ordination/PPD committee (once on a year)
- Regional level – Regional IPM Co-ordination committee (once on a year)
- District level – District IPM co-ordination committee conduct at least three times
  - at trial design
  - during 1st AESA
  - Harvesting time/After Harvesting/Field day

11.6 Shortcomings observed in M & E

- Irregular visits
- Correct judegement
- Lack of transparency
- Lack of participatory monitoring and evaluation methods
- System of self - M & E lacking.

12. PLANNING :

12.1 Review of Norms (Group Final)

Norms to be adjusts/reviewed

- DSA rate
  - NRs. 500 for IPM Trainers (Officers)
  - NRs. 300 for Non- Officers Trainers
  - Nrs. 200 for Farmer Trainers
- Report writing
  - NRs. 3000/-
- Monitoring
  - A separate norms is needed
- Specific equipments
  - Citrus - ladder, lens
  - Banana - Sucker/transport
  - Seed, fertilizer
  - Certificate
- No. of FFS day increase
  - rice 16 + 3
  - Veg 16 + 3
  - Banana 18 + 3
  - Citrus 24 + 3
- Refreshment for trainers = Co-trainers
  - 25 + 3 = 28 persons x Rs. @% =
  - Fuel/TA
  - Guest Trainer - 5 person x Rs. 500 = 25000
  - Travel allowance for farmer trainer Rs. 50/person/day

12.2 Checklist :

Keep the checklist that already in practice

12.3 Planning for Coming Year

- FFS by IPM Trainer - 76
- FFS by Farmer Trainer - 172
- Participatory Planning - 68
- Farmer and Science - 71
- Farmer TOT (Persons) - 49
- JT/JTA TOT (Persons) - 29
- Farmer TOT (Refreshers) - 30
- District Level IPM Forum (No) - 1

13. REPORT PREPARATION :

Through we have lot of information but unable to analyse and report it properly. This was felt in IPM trainers training. So, the group suggested the following reporting format :

Reporting of FFS and related activities :

a. Abstract

a. Summary information about the activity/study

b. Three to five key words

b. Introduction

a. Background

b. Justification/Rationale

c. Objectives

d. Limitations of the study

c. Review of Literature

d. Methodology

a. Materials and methods used in activity/study

e. Results and Discussions

a. Presentation of analyzed results data

b. Discussions on key issues

f. Conclusions

a. Indication of the results

g. Recommendations

a. Suggestions on concerned field

b. Suggestions for the planners

h. References

i. Annexes

14. REVIEW OF DISTRICT IPM/FFS ACHIEVEMENT REPORTS

The reports from various district shows :

a. increased in women participation in IPM and related activities

b. increased in the use of local resources like different botanicals and indigenous technologies and human resources.

c. increased in knowledge skill and practice of FFS participants in better crop husbandry

d. increased in crop yield.

e. positive impact on environment, reduced in pesticide use natural enemies conservation.

f. availability and quality indicators for conducting AESA in different crops (cauliflower, citrus, tomato, banana and rice) were developed.

g. imparted knowledge on participatory planning – as a follow up activity of FFS.

h. guidelines for the conduction of FFS in different crops (cauliflower, banana, citrus and tomato) was developed.

i. "science and the farmers" concept and knowledge shared, Potential areas making hypothesis, designing field trials, data collection technique, analyzing the results developed.

j. different group dynamics, icebreaking and brain storming exercises relevant to the field condition were shared.

The 12 days long facilitators training program was successfully completed. This report is the output the training. Comments recommendations and activities outlined in their report will be used in future training programs as basic guidelines. Especially the sharing of experiences has helped the trainers to widen their thinking on IPM FFS and it has cleared many of their confusions.

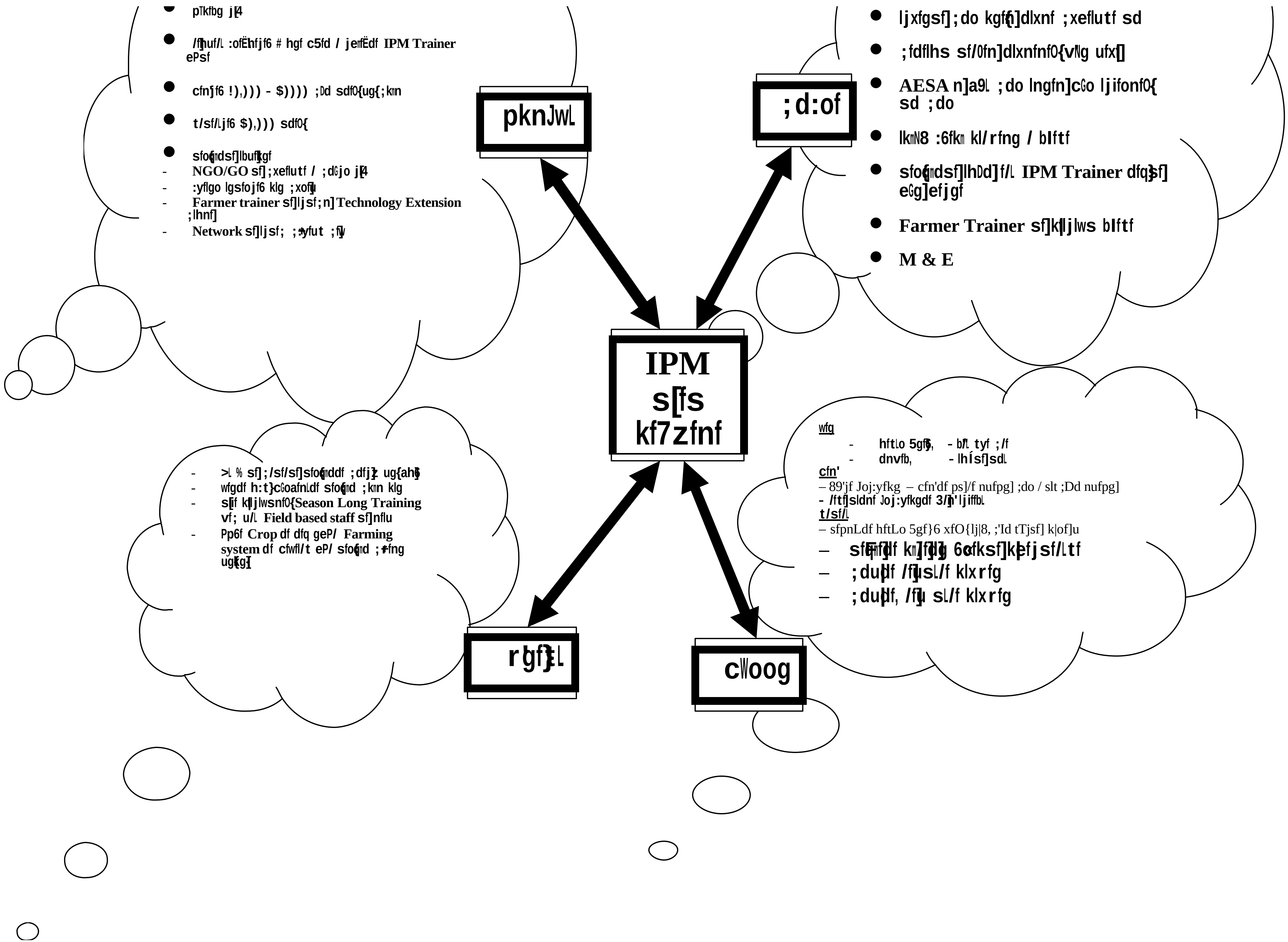
15. RECOMMENDATIONS

- Pragmatic field trial design should be included as sub topic of farmer and science
- IPM Performance report presentation to be mad on group basis.
- While conducting refresher training and other similar typed of training of the duration should be more than one week excluding holidays.
- Provision of field exercises (sitting together with FFS farmer) on participatory planning and farmers and science is suggested.
- Facilitation skill training to be organized for the facilitator.
- The group suggested increasing the number of experiments. More emphasis need to be given in pest and their management aspects.
- The PM&E indicator to be pre tested in Jhapa, kailali and chitwan, prior recommending it.
- Post harvest activities can be a activity as a follow up program for FFS
- The age group of the participants should be considered while analyzing gender role and participants pre and post test results.
- Technical norms in addition to the financial norms should to be developed and strictly followed.
- High priorities to be given on woman participation in the FFS. This can be done through conducting GRAM in the FFS to find their roles in agriculture.
- Gender role analysis matrix should be used in other agricultural activities, planning training visits and other similar activities.
- Caste, cultural /family relation, religion and social status are the social problems can be lowered through increasing group dynamic activities in IPM programs.
- FFS in other crops such as sugarcane, citrus, banana tea, coffee should be conducted.
- Specific topics conducted in every FFS day must be done on following order:

List the demand of farmer in a priority ranking basis :

- cropping calendar
- field problem
- Ad hoc basis - at epidemic
- AeSA
- 10 % of the time should be allotted for solving other crop problems of farmer

- Revision on the norms were suggested as



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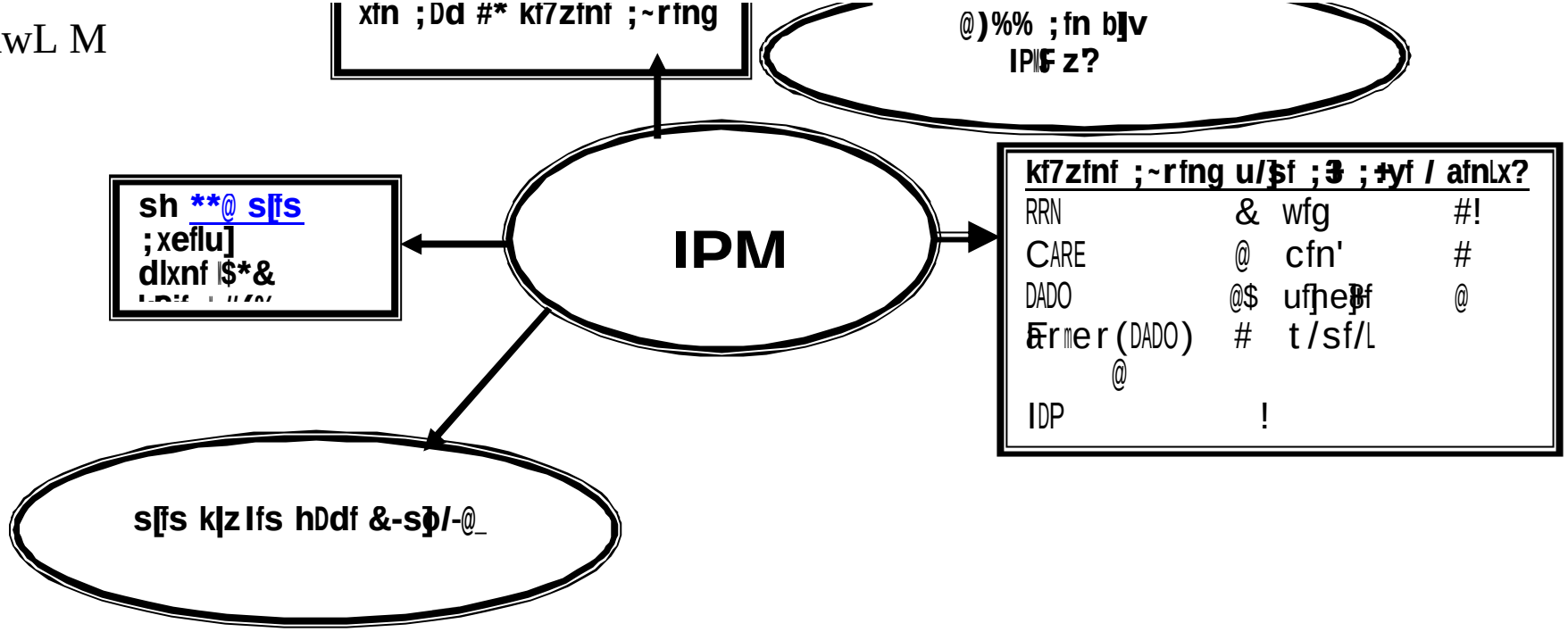
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Appendix : 3 IPM activities of Kathmandu District

SNAPSHOT

Facilitator : L. Bohara/Y. Shrestha/ R. K.C.

School Location	Mulpani	Gokarna	Taudaha
No. of Participants	43 (39F)	25 (20F)	25 (24F)
Conducted Season	Summer	Winter	Summer
Crop	Tomato	Cauli	Tomato
Variety	CL - 1131	K. Local	Manisha (NS 815)
Problem Started	B.W.	L. Verity	Early Blight

Outcome of Mulpani

- CL - 1131 was Found prone to BW and L. Blight
- Use of Agrilime and Urea 15 days before transplanting in soil @ 3000 kg/ha and 500kg/ha respectively showed better result among other treatment.
- Hybrid line of HRDN from NARC was Found tolerant to BW. (HRDN - 1,3,5 (6) 781

Outcome of Gokarna

- Main filed crop was severely affected by wire stem.
- Only IPM FFS process was delivered.

Outcome of Taudaha

- Plastic Cover, Better management, proper spacing and staking are key factors for successful growing of rainy season crop
- Chitwan local and Lapsigede showed better in open condition.

Important Points observed :

- Phase of IPM FFS
    - Pre school - Area/location, participants, crop, problem
    - During - AESA, Special Topics, Experiments, Practical
    - Post - Suggestion, Result, Recom.

Lesson learnt -

- Pre school starting Activities Analysis
- Openness, Coordination and creditability of Facilitator
- Resource utilizing capability

Major Achievement

- Attraction for other sector
- Better Extension and Farmer relation
- Presentation ability change
- Information update and increase
- Option of multiple choice
- IPM FFS process expansion

How it will become Sustainable

- Farmer Expert ⟶ Various Demand ⟶ Keeps Extension and Research busy

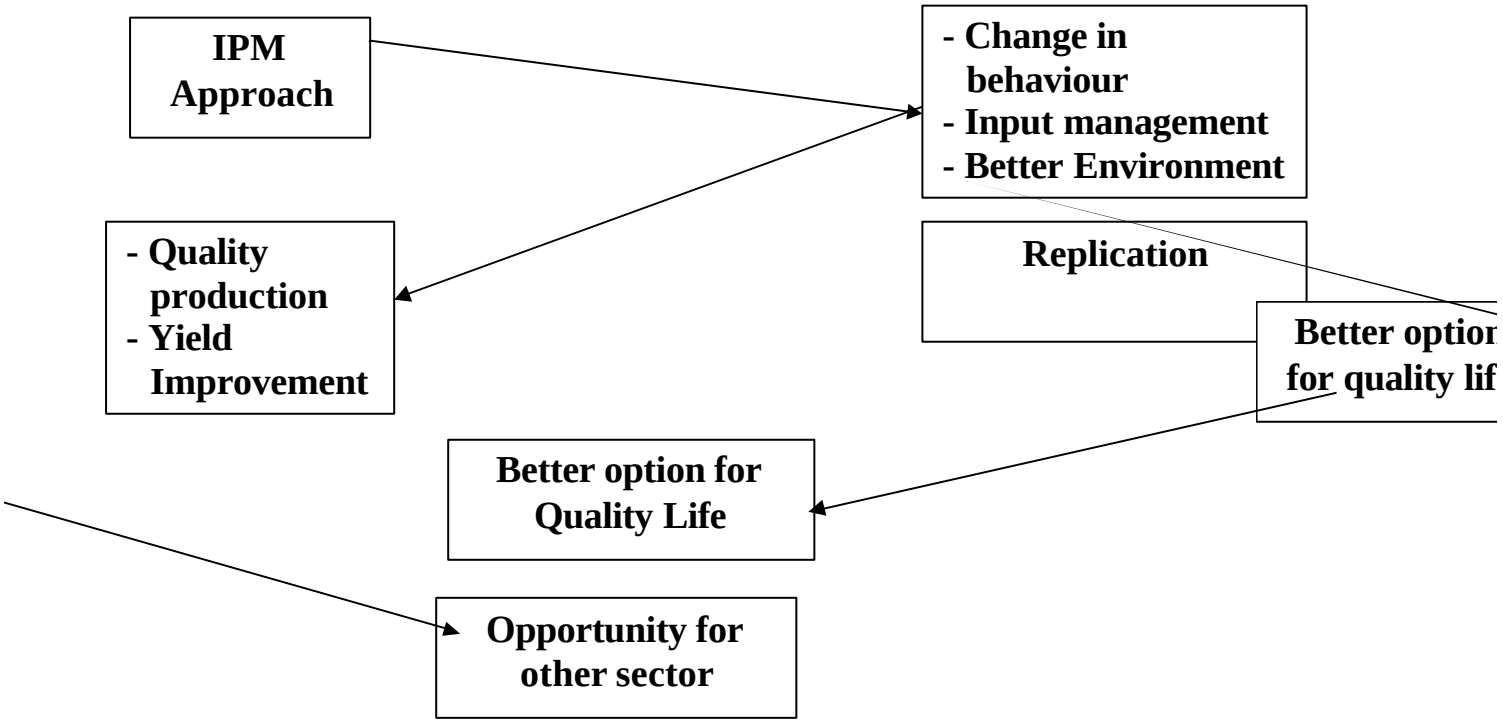
Poverty Allivation

- Local resource mobilization
- Input management
- Farmer trainer
- Quality product and yield increment

Women empowerment

- Overwhelming participation of women
- Exposure/Decision making/Leadership opportunity for women

IPM National Prospect



May Contribute to Multiplier Effect

Appendix 4 : IPM Activities of Sarlahi District

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- Bio-logical control measure x?sf] pknJwtfdf sdL . kd{fl0ft e}; s]sf Technology x?sf] s[fs:t/df k]efjsf/L k|;f/0fsf nlu cfjZos Inputs sf] pknJwtf sdLn] lj:tf/ ug{df k|ljlws s7LgfO{.
- Follow-up Programme sf] sdL / FFS ;+fng e}; s]sf :yfgx?sf hftsf] nflu Further activities sf] cefjn] Follow -up sfo{qmddf Go'gtf .
- Agro-vet x?jf6 s[fsx?df k|;f/0f ul/g] k|ljlwx?df u0f:tl/o cefj / s[if k|ljlws 1fg s[fsx?df Direct Agro-vet x?jf6 a9L dfqfdf k|;f/0f xg] / IPM Concept sf] ;DaGwdf pgLx?df Knowledge sdLn] ubf{ cgfjZos kl/df0fdf Pesticide sf] ljt/0f k]s[fdf b?kof]u e}x]sf] cj:yfdf Agro-vet x?nfO{klg sg}IPM Tools sf] dfWodjf6 1fg / ;Lk lbP/ IPM k|ljlw Joj:yfkg klfdf ;d]6g'kg{].
- Monitoring / Evaluation df sdL . xfnsf] c;xh kl/l:yltLdf ;j} ;DalGwt lgsfox?jf6 IPM FFS sf] Monitoring / evaluation df sdL .

s[fsn] rfxgf u/]sf vf]hdls cWoog ljj/0f .

- wfg, t/sf/L nufot cGo afnLx? h:t}pv'-ujf/f] /ftf] ;8g_ h:tf afnLx?df klg FFS sf]dfu a9L .
- 3/]h' >f]t / ;fwgsf] k]efjsfl/tf cWoog . afnL ;/+lf0fdf pkof]uL lgd, ;lt{sf] emmf]n, lttkftL cfbL h:tf 3/]h' >f]tsf] pkof]utfsf] cWoog cfkm\g}k]olf ;xelutfdf ug{?rL /fv]sf].
- hflto u0fsf] k]efjsfl/tf cWoog . ljleGg afnLsf] hflto u0fsf cfwf/sf hftsf] 5gf}6 ug{;lsg] k]sf/sf cWoog Kn6x?sf] cfjZostf dx;'; .
- Bio-logical control measures sf] performance study : ljleGg Control agents x?sf] Demo plot design u/L ltgLx?sf] Impact Study df ?rL .
- Major insects sf] Life Cycle study : Major crops (Rice vegetable, sugarcane) x?sf] Major Insects x?sf] Life Cycle Study ug{].
- Insect / Disease sf] Damage symptom sf] Study : sL/fx?sf] cgkl:ytdf nlf0fsf] cfwf/df /f]u / sL/fsf] klxrfg ug{;xof]u xg] nlox? cWoog ug{].
- Crop Compensations Trial
  - I) Defoliation
  - II) Detellering sL/fsf] gf\$;fgLjf6 jf]6 lj?jfn] lflt kl't{ug{;Sg] kl/lf0fsf] cWoogdf ?rL /fVg]
- Spacing Trial
- Organic Farming Impact Study
- Vermiculture

IPM FFS tkm{cfkmh] ljleGg lhNnfdf xfF;n u/]sf pknJwLx? . -;nfxL lhNnf_

- s[fssf] Jojxf/df ;sf/fTds kl/jt{g / 5nkmndf ;xeflutfdf j[4, ljleGg lgsfo -;/sf/L, u}x| ;/sf/L_ df ;DjGw /fVg]/ gofF1fg / ;Lksf] vf]hL ug{[sfo{df j[4 .
- s[fssf] wf/0ffdf j[4 / /f]usL/fn] cfqmd0f u/]I jf cfqmd0fn] gu/Lsg ljiffbLsf] k|of]u ug{[dgl:ytLdf kl/jt{g e} v]tj/Lsf]lgoldt lgl/If0f ug{[c?sf]gSsn gu/L dnvfb tyf ljiffbLsf] ;dlrt k|of]u ug{[sfo{df j[4 .
- sfo{bIftfdf j[4 .
- afnL ;+Ilf0fdf j}slNks >f]tsf] pkof]udf j[4 / v]tL k|jlwdf ;'wf/, lgd, ;'tL{sf] em'f]hsf] k|of]u tyf cWoogdf j[4 .
- ljiffbLsf] vkt kl/df0fdf sdL !) – !%%
- dlxnf ;xeflutfdf j[4 ;fdflhs dNo / dfGotfn] dlxnf ;xeflutf a9fpg cj/f]w ePsf] cj:yfdf, dlxnf ;dx u7g Leader dlxnfsf] 5gf}6, 5nkmn, uf]7Ldf ;xeflu u/fP/ ;xeflu ;Vofdf j[4 ePsf] 5 . pbfx/0f sf]}gf uf=lj= df ;+fng uf=lj=;= df dlxnf ;xeflutf $)% kU}sf] lyof] eg] ;f]xL sfo{qmd /fdjg uf=lj=;= ;+fng ubf{)% lyof].
- cf0f{lk=Pd\ s[fs kf7zfnfsf] cGo lf{qdf -uf=lj=;=_ klg cfjZostfsf] dfudf j[4 s[fs lbjz nufot cGo s[fs kf7zfnf ;+fng ;dodf ljleGg /fhg}ts JolQm, ;dfh;]L, s[fs ;dXn] ;+flnt s[fsnfksf] cjnf]sg, lgl/If0fdf ;xeflu s[fsx?n] JoQm u/]sf cflh{ 1fg / l;kjf6 k|efljt xg'jf6 g}o;sf] k|efj a9]sf]5 .
- IPM Trainer sf]sfo{s'zntfdf u0ffTds ;'wf/
- r}t] wfg afnLsf] @)) lj3f lf{q lj:tf/ I l;+f0{sf] ;ljwf eP/ klg wfg v]tL gul/g] k;f{ uf=lj=;= df cf=j=)%*.%(df s[fs e]hf, 5nkmnjf6 %) lj3fdf wfg v]tL ug{nufP/ s[fs kf7zfnf ;+fng ul/Psf] lyof]. ;f]xL k|efjjf6 cf=j=)%(.^) df lf{q lj:tf/ eP/ @)) lj3f kU}sf] lyof].
- lhNnf:tl/o cf0f{lk=Pd\ s[fs Pzf];P;g / lhNnf:tl/o cf0f{lk=Pd= cgUdg ;ldltsf] u7g k|s[of @ r/0fsf] 5nkmn kZrft I clGtd r/0fdf kU}sf].
- lhNnfdf IPM Trainer (APPO) = 1

  ;+fng ePsf FFS = 8

  ;xeflu ;Vof = 240 (40% Women Participants)

  FFS Farmer Trainer åf/f

  ;+fng ePsf = 15

  ;xeflu s[fs ;Vof = 375

IPM sfo{gmdn]bLuf]s[if ljsf;, ul/jL lgjf/0f, dlxnf zzlQms/0fdf vh]sf] el/dsf M

- u0f:t/l/o jLpsf]dfu / kbf]udf j[4
- ;Gtlnt dnvfbsf]kbf]udf j[4
- /f;fog ljiffbLsf];dlrt kbf]udf ;sf/fTds j[4
- 3/]h'>f]t / ;fwgsf]kbf]udf ;sf/fTds kµtL .
- cGo s[if sfo{df u0f:tl/o ;'wf/
- 1fg / ;Lkdf ;sf/fTds j[4
- sfo{lfdtfdf ;sf/fTds j[4
- tflnd, eb0f, uf]7L, 5nkmn h:tf sfo{gmddf ;xeflutfdf j[4
- s[if pkh pTkfbgdf j[4
- cfo >f]tdf j[4
- lhjg :t/df ;'wf/ .

s[if pTkfbg tyf cGo rf}kmL{ljsf;df IPM sfo{gmdsf]s:tf]el/dsf /x]sf]cgebj M

- k|jlw k|;f/0f ug{cToGt kbefjsf/L dfWod
- ;xefuLx?n];xh / ;/n tl/sfjf6 l;Sg]
- Jojxfl/s klfjf6 l;sfO{g]xbf ;xeflutfdf a9\bf]?rL÷OR5f
- cgebjx?sf];f6f;f6 / ;dxut 5nkmn, cjnf]sg lgl/lf0f ul/g]xbf ;xeflux? jLrdf ldqtf a9\bg].
- vf]hk0f{l;sfO{g]k4lt ePsf]h]l;s]sf 1fg / ;Lk bLuf]xbg].
- l;s]sf 1fg / ;LknfO{kbefjsf/L ?kdf Jojxf/df kbf]u ug{].
- bLuf]s[if ljsf; xbg] pTkfbg nfutdf sdL / pTkfbgdf j[4 xbg].
- /fli6«o cy{tGqdf 6]jf k"/bfO{g].

Appendix 5 : IPM Activities of Mangdi District

cf0= lk= Pd= s[fskf7zfnf

- lbks clwsf/L
;:jf:;=c; DofUbL

!= @)%$;fn b]lv xfn ;Dd ;=fng ePsf s[fskf7zfnfx?sf]sDkfsnfk\ –

l;= g+	cflys{ aif{	jfnL	;dxsf]gfd÷7]ugf	sfo{qmddf ;xefuL		hDdf	cflys{ >f]t	sk]kmot
				d=	k=			
!	)%^÷%&	kmnkm'n -;Gtnfhft_	afujfgL s[fs ;dx /fv', eujtL	!)	!&	@&	>L % sf] ;/sf/	
@	)%*÷%(	t/sf/L -ufpheDf_	sfnLu08sL t/sf/L jfnL IPM s[fskf7zfnf, l;d ;f/]df/] /Tg]rf/	&	!*	@%	Æ Æ	
#	)%*÷%(	t/sf/L -ufpheDf_	au/kmf6F t/sf/L jfnL IPM s[fskf7zfnf, au/kmf6F, Hofd?ssf6	@%	%	#)	kF0	
$	)%(÷^)	t/sf/L -cfn'_	sf6;fF dlxnf s[fs IPM s[fskf7zfnf, rbgL, cy{E]	#)	–	#)	>L % sf] ;/sf/	
%	)^)÷^!	Æ	nflnuF; t/sf/L jfnL IPM s[fskf7zfnf, vj/f Hofd?ssf6	!)	!%	@%	Æ Æ	rfn'

@= cf0k/]sf sl7gf0{\ –

- IPM cjwf/f0ff Aojxf/df nfu' ug{sl7g 5 . To;}n] sfo{qmddf ;=Ug k|=;=÷gf=k|=;= x?nf0{klg sfo{qmd jf/] /fd|]1fg ePsfn] sfo{qmd cem ;f]r]cg';f/ k|efjsf/L xg g;s]sf].
- >L % sf] ;/sf/sf] Norms df s]xL sdhf/L ePsfn] sfo{qmd ug{s]xL c;lhnf]ePsf]/ k|df0f–kq, j|p, dn, laiffbL cfbL h:tf clt cfjZos lrhx?sf]pNn]v gePsf].
- APP sf]cjwf/0ffdf kmnkm'nf0{lazf]f hf8 lbOPsf]5 . t/ o; sfo{qmddf kmnkm'nf0{hf8 glbPsfn]kmnkm'ndf FFS rnfpg c;lhnf]dx;'; ul/Psf].
- t/sf/L jfnLdf /f]usf]k|sf]kdf df}dsf]k]oIf elDdsf /xg]xbgfn]@÷$ lbgd}/f]u b]lvof kl/ jfnL gi6 xg]b]lvof].
- Pp6f 6f]ndf s[fsx?sf]z]Hfs:t/ ;dfg gxbgfn];xeflutfsf]:t/ gldNg]xbF ;xefuL ;Vof 36g'.
- ah]6 lgsf;f ;dodf gxbg'.
- s]x aif{la/fP/ slxn]sbg}slxn]sbg}nufpbF ds}jfnLdf km]hL ls/fsf]Aofks k|sf]k ePsf]n]IPM rnfPkl5 ds}df laiffbLsf]Aofks k|of]u ug{k/]sf].
- IPM k|alwsf sltko ;fdfu|L :yflgo ahf/df gkf0g];fy}dxuf]ePsf].

- IPM sf]kefjsfl/tf nfdf]cjlwsf]afnLdf 5f6f]cjlwdf dxz'z ug{g;lsg].
- clzlIft 7fpFdf sfo{qmd ubf{;do jl9 nfUg].
- jh{gsf];d:ofn];b/ d'sfd b]lv 6f9f sfo{qmd ;+rfng ug[;d:of k/]sf].
- O{wgsf]/sd ;f]kbf]hg gxg]7fpFdf cGo sfddf kbf]u ug{;d:of .

#= s[fsn]rfxgf u/]sf]vf]hdL's cWoog laj/0f

- cfn'sf]k'tnL lgoGq0f
- /ftf]sldnf lgoGq0f
- jLp pTkfbgsf]nfuL nufO{sf]t/sf/L jfnLdf ljiffbL kbf]u gu/L ls/f lgoGq0f
- jg:klt jf6 tof/ u/LPsf]ljiffbLsf]kbf]ujf6 ls/f lgoGq0f -s[fsn]kbf]u u/L;s]sf]

$= IPM FFS tkm{xfl;n u/]sf]pknlAwx? M

- ;dxdf j:g];d:ofdf kxlrfg u/L ;dx 5nkmn jf6 To;sf]lg/fs/0f ug{]jflg j;]sf].
- /f]h / ls/fsf]lgoldt cjf]hf]sg ug{]sfo{;?u/]sf].
- IPM ;DjGwL 1fg l;k / wf/0ffdf kl/jt{g e}Plsst /f]ls/f Joj:yfkgdf s[fs :jo+;lfd ePsf].
- kof{l/0f lx;fjn]lbuf]?kdf jfnL ;+lf0f ug{;?u/]sf].
- kbdv /f]u ls/f klxrfg ul/ ;q'lhj / ldq'lhj 5fGofpg ;Sg]ePsf].
- ljiffIwsf]kbf]u ubf{;fjwflg kbf{ ;'/lIft;fy kbf]u ug{]u/]sf].
- t/sf/L / kmnkmh v]tdf cfO{kg{];d:ofsf]lg/fs/0fsf]nflu IPM kljlw jf/]lg0f{ lng s[fs :jo+;lfd ePsf].
- ;dxsf];b:ox?df cfk;L ;dembf/L jl9 ;dx jlnof]ePsf].
- ;xefuL s[fsx?n]o; sfo{qmdsf];dfkg kl5 o:t}vfnsf]sfo{qmdsf]dfu u/]sf .
- sfo{qmd ;+rfng ePsf]s[fsx? ;+u kljlwsx? jl9 Familier ePsf].
- df}d jfnLdf Fruit Fly, uf]he8fdf kmnsf]nfe]sf];d:of e0{v]t ug{5f8]sf]7fpFdf IPM tflnd kl5 /f]u ls/f joj:yfkg eP kl5 s[fsx? o; kljlw tkm{cfslif{t ePsf .
- ljiflbsf]kbf]udf cfn'jflndf @) % uf]he8fdf #)% sfpnLdf !% % ;gtnfdf !% % sld cfPsf].
- s[fsx?n]/f]u ls/f ;fy}ldq'ls/f , zq'ls/f klxrfg ug{;Sg]ePsfn]hyfeflj ljiffIb kbf]u ug{5f8]sf .
- s[fsx?n]t/sfnL jfnLsf pGgt v]t kljlw ckgf0{pTkfbg j9]sf].
- s[fs lbj; sfo{qmd jf6 IPM kljlw jf/]cfd ;dbfon]hfgsf/L kfPsf].

%= IPM sfo{qmdn]bLuf]s[if lasf;, u/LaL lgjf/0f, dlxnf ;zlQms/0fdf v]h]sf]el'dsf

- IPM sfo{qmd s[fs kf7zfnf dWod af6 hfbf cjlw e/ ;+rfng xg]xbf s[fsnf0{IPM sf]l;4fGt af/]/fd[hfgsf/L xg];fy}pGgt s[if klalw af/]hfgsf/L xg]xbf' s[fs kf7zfnfsf]kefjsfl/tf a9L b]lvPsf]5 . o; lhNnfsf ;a}7fpsf s[fsx? Aoj;flos ?kn]tfhf t/sf/L / alp pTkfbg ul/ /x]sf 5g\ ;fy}cGo lf]qx?sf] lf]qkmn la:tf/ e0/x]sf];Gbe{df IPM sfo{qmd lbuf]?kdf hfg];Defjgf a9b}5 .
- o; lhNnfsf]d'Vo t/sf/L afnL uf]he8f tyf kmnkm'hdf df}d kb{5 / lolg afnLdf qmdzM kmnsf]nfe]/ kmn sxfpg]cf}+fsf]Aofks k|sf]kn]ls;fgx? afl6Gt nfe lng ;s]sf lyPgg\ / v]tL ug{5f8]g nfu]sf lyP o; kl/k]fdf IPM klalw ckgf0{ls/f Aoj:yfkg eP kl5 s[fsx? kgM pQm v]tL ug{yfn]sf 5g\. kmntM s[fsx?sf] cfo >f]t df a[4 e0{ul/aL lgjf/0fdf ;xof]u kU]sf]5 .

- IPM df :yflgo >f]t ;fwgsf] kl|bfg xg] / ljiffbLsf] k|bfg|df sdL cfpg] ePsf] xgfn] bLuf] ljsf; ul/jL lgjf/0fdf ;xofu kU5{sf].
- IPM sfo{qmd z? ug{eGbf klxnf ul/g] Gender Metrix Analysis af6 dlxnf ;xeflutf xg hf8 ldnfsf]5 . v]tL ubf{^% k|tzt ofu|bfg dlxnfsf] ePsf] af]v ePsf]5 ;fy}pgLx?df xfd|]ofu|bfg a9L /x]sf] yfxf kfPsf 5g\. AESA tof/L / Group Dynamics ubf{;fy};f]sf] k|zt'tLs/0f ug{]ubf{dlxnf df w]/}hgfsf] cufl8 k|tlt xg];fy}lg0f{o xg] lfdtfsf] lasf;df cf]d an / laZjf; a9]sf]5 .

^= cgej M –

- @)%^÷%& df ;Gtnf jfnLdf cf0f=kL=Pd= s[fs kf7zfnf ;+rfng ul/Psf] lyof] / ;f] sf] ;+rfngdf ;DjlGwt k|ljlwsf] IPM TOT glnPsf] cj:yfdf ;+rfng k|s[ofdf jhf jvt bljwf pTkGg xg hfg]/ ;dX kl/rfngdf k[olf sl7gf0{pTkGg xg]u/]sf] lyof] t/ IPM TOT xf]F;n u/]kl5 ;+rfng ul/Psf] t/sf/L jfnL IPM FFS df ;f];d:of g/xL ;+rfng ug{;xh xg uPsf]dx;'; ul/Psf]5 .
- t/sf/L jfnLdf wfg jfnLdf h:tf]&÷& lbgsf]km/sdf tflnd ug{]cjlw k|ljlws b[i6sf]0fn]l7s h:tf]nfu|g cfn' uf]he]8f jfnLdf dfxfdf/L ?kdf nfUg]89'jf / aGbfdf nfUg]k'tnLn]t #–$ lbgsf]km/sdfg}jfnL k0f{gi6 e};s]sf] xG5 . ;fy}kmnkmh jfnLdf &÷& lbgsf];6f !%÷!% lbgsf]km/sdf ug{kg{]cgej k|Kt eof].
- jfnL ;+/If0f ;DjlGw k|bz{gx? / cleofg sfo{qmd -d';f lgoGq0f cleofg, km'6 /6 lgoGq0f cleofg, k|m'6 KnfO{ lgoGq0f_ o;} sfo{qmdndf ;dfj]z u/]/ nluPsf] x'gfn] sfd ug{ ;lhnf] ePsf]
- df6f] kl/If0f sfo{qmd ;+rfng ubf{ a9L k|efjsf/L ePsf] .
- /f]u ls/f Aoj:yfkgdf ;dXsf];fdlxs k|bf;sf]dxTj s[fsn]dx;'; u/].
- dlxnf s[fsx?n]Ps cfk;df 3hldn eO{3/ l5d]sdf eO{cfpg]dg d6fjdf sdL ePsf]dx;'; u/].
- dlxnf s[fsx?sf];dXdf k|t't xg]lfdtfdf clej[Mb ePsf].
- s[fsx?n]/f]u ls/fsf]:ki6 klxrfg ug{;Sg]eP .
- s[fsx?n]k|dv ls/fsf]lhjgrqm / lfltsf]cj:yf tyf k|s[t 56\bfpg ;Sg]eP .
- s[fsx?n]zq'/ ldq'ls/f 56\bfpg ;Sg]eP .
- k|dV /f]ux?sf]nIf0fx?, /f]u nfUg]jftfj/0f jf/];H+fKt 1fg xfF;n u/].
- /f]u ls/f Aoj:yfkgsf]nflu lg0f{o lng ;Sg]eP .
- dVo dVo laiffbL lrGg ;Sg]eP .
- ljiffbLsf];'/lIft k|bf]u ug{;Sg]eP .
- t/sf/L nuf0g]lf{]kmn tyf pTkfbsTj a[4 ePsf].
- s[fs lbj; sfo{qmddf k|bz{g ul/Psf s|fsnfkjf6 cfd ;dbfon]klg o; sfo{qmd jf/]?rL b]vfPsf]kf0{f].
- DofUbL lhNnf t/sf/Lsf]ljp pTkfbgsf]/ ;Gtnfsf]ks5 lf{] ePsf]h]/ jLp jfnLdf j9L /f]u sL/fsf]k|sf]k j9L xg] ePsf]t/ kmh kmNbf ljiffbL k|bf]u ug{g;sLg]ePsf]h]pSt jfnLx?df IPM s[fs kf7zfnfsf]dfu cfPsf].
- Farmer and Science / Participatory Planning jf/]hfgsf/L eP sfo{qmd a9L k|efjsf/L xg].
- s[fs / kf=;=÷gf=kf=;= nf0{klg TOT sf]Joj:yf eP sfo{qmd a9L k|efjsf/L xg].

&= **IPM s[fskf7zfnfaf6 k/]sf]k|efj M –**

<u>k[olf</u> M–

! ;dxsf s[fsx?n];Gtnfhft jfnL ;fy}aif[t/sf/L jfnLdf nfUg]/fu ls/faf6 xg]lflt jf/]hfgsf/L kfO :jo+ cfkm}n]dVo /fu ls/fsf ;fy}ls/fsf]zqx?sf]klxrfg ug{;lfd ePsf].

@ dVo dVo ls/fsf]hLjgrqm, xflgsf/s cj:yf, lfltsf]kbsf/ jf/]hfgsf/L kfPsfn]lgoGq0f ug{plrt ;dosf] 1fg ePsf].

ls6gfzs laiffbLsf];'/lft kbfu ug{;lfd ePsf].

$;Gtnfhft kmnkm'nsf]cf}+f ls/f / km]p slxg]/fusf ;fy}ufnes}fdf nfUg]89'jf /fu kmnsf]ujf/f]ls/fsf] lgoGq0faf6 pTkfbgdf xg]lfltaf6 jfnL hfufpg s[fs ;lfd ePsf].

% :jf:yjfnL pTkfbg eO{pTkfbg a9]sf].

ck]olf – –

! FFS n]s[fsx?df IPM ;jHGw 1fg ;Lk / wf/0ffdf kl/jtg NofPsf]5 .

@ kmnkm'n / t/sf/Ldf dVo dVo /fu ls/fsf]lgoGq0f sfo{qmd kbfjsf/L eP kl5 jif{gL kmnkm'n nufpg] lfqjkmndf a[Wb xb}5g\.t/sf/Ldf klg lfqjkmndf a[Wb xg];efjgf j9]sf]5 .

s[fssf]cfTdjn j9g'sf];fy}s[fs :jomfO{lg0fo lng ;fxl;nf]/ :jjnDjL jgfPsf]5 .

$;dxdf cfjWb xbf plgx?sf];d:of klxNofO{;lx klxrfg ul/ sfof{jog ug{;lhnf]ePsf]/ gofFkljlw ckgfpg lxrlsrfj6 sd ePsf]5 .

% ;dxdf a;L 5nkmn ug{]/ s[fs ;dxdf gePsf]s[fsn];d]t kljlws hfgsf/L kfPsf 5g\. To;}n]cGo uf=lj=;=sf s[fsn];d]t rfv b]vfPsf 5g\.

^ laiffbLsf]kbfuaf6 ;j}lgoGq0f xG5 eGg]wf/0ffdf kl/jtg eO{IPM kljlwsf]dxTj a9]sf]5 .

& gkfnsf]h:tf]Farming system cg';f/ IPM n]kmnkm'n / t/sf/Lsf]v]tLdf pNn]vlgo ofubfg lbPsf]5 .

* pk/fdm lqmofsnfkaf6 jftfj/0fdf ;sf/fTds kbfj eO{sfo{qmd kbfjsf/L ePsf]cgel'tePsf].

(jftfj/0f ;Gthg /xg]/ sd vr{df zWb / :jf:ykb tfhf t/sf/L pTkfbg xg]h;sf]pkefun]dflg; :jf:y xg].

***= tflnd k|t wf/0ff ||–**

DofUbL lhNnf dWo kxf8L lhNnf xf]. oxfF]kdl\ cfodhs jfnL kmnkm'n / t/sf/L v]tL xf]. kmnkm'ndf dWo ;Gtnfhft kmnkm'n v]tL ul/G5 . eg] t/sf/L jfnLdf w]/}lsl;dsf v]tL ul/G5 . APP sf] cjwf/0ffn] klg pQm jfnLx?nf0{hf\$ lbPsf]5 tfklg kmnkm'n jfnLdf eGbf cGo jfnLdf /f]u ls/fsf]k\$fk al9 5 . w]/}s[fsx?df /f]u ls/fsf]klxrfg ug{1fgsf]cefj 5 eg] /f]u ls/f nfu]/ Iflt ePsf s[fsx?n] /f]u ls/f g56\bf0{\$g To;}laiffbL 5g{ rng 5 To;}n]ubf{pQm /f]u ls/f lgoGq0f ug{hyfefjL laiffbL kbf]u ubf{aftfj/0f blift xb] ;fy}cfly{\$ gf\$;fg xb]

;Defjgf xG5 , jfnLdf klg !%÷@% % pTkfbgdf Iflt 5 eg] ;f] ;d:ofaf6 56s/f kfpgsf]nflu s[fsx?nf0{;dX dfkm{ Plss[t jfnL ;+Iff0f k|jlw s[fssf]lar k¥ofpg Fn]7'hf]d2t k¥ofPsf]5 .

IPM s[fskf7zfnfsf]sfo{qmd /fd[]5 . s[fsx?nf0{hfgsf/L lbgsf]nflu o;sf]kefj /fd[]k/]sf] 5 . o:tf] sfo{qmd km]/L klg rNg'k¥of]eGg]s[fssf]k|tsbf 5 . o; sfo{qmdsf kefjsf/L laifox?df Ballot box, 200 and cub stady laiffbL ;+HGw Aojxfl/s ;Lk Group Dynamic cfbL kefjsf/L ePsf 5g\. s[fs lbj;n]w]/} s[fsx?nf0{o; sfo{qmd tkm{cfsif{f u/]sf]5 . o; sfo{qmddf uf0{g]lut / gf6ssf]dfWodaf6 cfd ;dbfon];lhn} ;u+ o; k|jlw jf/]hfgsf/L kfpg]/x]5g\. o; sf/0fn]ubf{s[fs lbjz sfo{qmd kl5 xfldklg tflnddf ;xefuL xb]kg{ /x]5 eGg]k|tsbf AofQm u/]sf 5g\.

o; sfo{qmdsf]kl/0ffd:j?k s[fsx?n]:jo+cfkm'n] /f]u ls/fsf]klxrfg ug{;Sg]/ ;lx ;dfwfg ug{\$f]nflu s[fs cfkm};lfd xb]b]vG5 . t/ pQm sfo{qmd ;+fng ug{kmnkm'ndf klg IPM model sf]lasf; xb cfjZos 5 . ;fy}k|=;=÷gf=k|=;= / s[fsx?nf0{Orientation tflnd lbg cfjZos 5 . Field level sf];d:of / af:tlastf It/ Tolt Wofg gkU]\$f]b]vPsf{h]cj Norms kl/dfhg ubf{/ lhNnfx?sf];'´fj / ;Nnfx lnP a9L kefjsf/L xb]lyof].

s[fskf7zfnf /Tg]rf]df s[fs lbj;sf]cj;/df ufPsf]uLt ||

!= p8Lhfg]dg]f r/L 9NsL lx8g]do/
IPM / pk:yLtnf0{:jfut xh/ .

@= k~rdfl;s tflnd IPM n]vhfof]
km;{bnf];donf0{/fd[]tNofof].

#= v]tL ls;fgL ul/vfg]xfdL ;j}s[fs
nf5L agL vfg]xf0{g u/f}lg:sif{.

\$= IPM sf];xof]un]ofxfF]d Nof0{bof]
s[fs xfdL ;jsf]nflu 0Zj/ e{bof}.

%= jfnL xfd[];vfj kfg{nfxLls/f / nfe]nf0{
IPM sf]larf/n]df/f}+jl/n}.

^= IPM n]ubf{xfdLnf0{hgr]tgf hufof]
km]fdg 6cfk ;d]t kbf]u ug{l;sfof].

&= bft[;+yf agL cfof]IPM g]kfndf
;/llft lsl;dn]laiffbLnf0{5g{l;Sof]xfd[]ufpB/df .

*= nfxL / eml;nls/fn]vf0{bg]t/sf/L
lt ls/fnf0{klg vf0lbg]/}5g\ls/f lzsf/L .

(= IPM n];xof]u u/L laiffbL eufof]
/f]u nfUg / ls/faf6 o;n]arfof].

Appendix 6 : IPM Activities of RPPL, Khairenitar

cfO=lk=Pd s[fs kf7zfnf cg'ej / pkAswL ..–

– dfg jxfb'/ Ifq
L

laut b'O{ jif{df tgx"F lhNnfdf If]=af=;+=k|of]uzfnfaf6 sfqmf] km;L{ hftdf / sfpnL hft t/sf/Ldf ! u/L hDdf b'O{ j6f cfO{=lk=Pd=s[ifs kf7zfnf ;+rfng ul/Psf] lyof] .

qm=;+	kf7zfnfsf] gfd	7]ufgf	cjlw	;xefuL ;+Vof	afnL
!=	eh]eh] jf/fxL I.PM. t/sf/L s[fs kf7zfnf	bhu'f8f–^,tgx'F	@)%* kf}if @) b]lv @)%* r}q #!	dlxnf !$ k?if !! hDdf .. @%	sfqmf] hlsgL
@=	sl/grf}/ IPM t/sf/L s[fs kf7zfnf	hfdb'g]–%,tgx'F	@)%(efb| !! b]lv @)%(kf}if @% ;Dd	dlxnf @! hgf	sfpnL,aGbf

pTkfbg

qm=;+	kf7zfnfsf] gfd	afnL	IP.. t/Lsf	s[fs t/Lsf	km/s
!=	eh]eh] jf/fxL	sfqmf]	* mt/ha	^=(& mt/ha	!=)# mt/ha
@=	sl/grf}/ IPM- FFS	sfpnL	!@ mt/ha	!!=@ mt/ha	)=* mt/ha

tTsflng jhf/ efp cg';f/ ..–

sfqmf]jf6 !),#)).– k|lt x]= jl9 cfDbfgL ePsf].

sfpnLjf6 &,#)).– k|lt x]= jl9 cfDbfgL ePsf].

s[fs kf7zfnf ;~rfngsf qmddf s[fsx?sf] rfxgf cg';f/ s}xL cWoogx? ;~rfng u/L p2]Zo cg'?ksf] pknJwLx? k|fKt ePsf]lyof]. hg lgDgfg';f/ 5g\.

1. Performance study of different micro-nutrient on squash.

Objective:-

To Identify the best source of fruiting hormone/micronutrients related to crop yield.

Technical details:-

☞	Variety	:-	Long grey
☞	Spacing	:-	1 x 1 m.
☞	Plant per treatment	:-	16
☞	Area per treatment	:-	96 sq. m.
☞	Fertilizer	:-	70:50:40 kg NPK/ha
☞	Seed sowing date	:-	4th Jan.2002
☞	Transplanting	:-	1st Feb.2002

Treatment Details :-

i) Miraculan – 2ml/ltrs. of water at 15 days interval.

ii) Compost tea – 1 ltr./8ltrs of water at 15 days interval.

iii) Atonoik – 1 ml/5ltrs of water at 15 days interval.

iv) Pensibao – 5 drops/litre of water at 15 days interval.

v) Vegimex – 1 ml./ 8 ltrs of water at 15 days interval.

vi) Control.

Date of nutrient application :-

Application #	Date
1st application	15th Feb. 2002
2nd application	1st March 2002
3rd application	16th March 2002
4th application	31st March 2002

Result:

Treatment wise fruit number and production kg.:-

S. N	Harvesting Date	15th March		17th March		19th March		21st March		24th March		26th March		31th March		4th April		Total	
	Treatment	Fruit No.	Wt. Kg.	Fruit No.	Wt. Kg.	Fruit No.	Wt. Kg.	Fruit No.	Wt. Kg.	Fruit No.	Wt. Kg.	Fruit No.	Wt. Kg.	Fruit No.	Wt. Kg.	Fruit No.	Wt. Kg.	Fruit No.	Wt. Kg.
1.	Miracular	13	9	12	9	7	3	9	7	10	10	19	14	20	16	13	12	103	80
2.	Compost Tea	11	8	12	11	10	7	7	6	11	8	14	8	17	13	14	10	96	71
3.	Atonik	9	6	9	6	10	8	5	4	14	13	9	5	18	14	13	12	87	68
4.	Pensibao	8	6	6	7	9	7	7	4	14	13	16	10	15	9	12	9	87	65
5.	Vegimex	12	8	12	8	11	10	6	5	10	9	10	8	22	18	9	7	92	73
6.	Control	7	5	7	5	6	9	4	3	15	10	10	8	15	12	10	7	74	59

Conclusion :-

Out of 6 treatment miraculan spray gave good result in both fruit number as well as production, i.e. 5 kg/plant followed by Vegimex, Compost tea, Atonik, Pensibao & Control.

2. simulation of defoliation on cabbage:-

Objective :- To know the effect of defoliator insects on cabbage yield at different stages of different severity.

Technical Details :

- ☞ Crop : Cabbage
- ☞ Variety : T-621
- ☞ Spacing: 60 x 50 cm.
- ☞ Plant/treatment : 6
- ☞ Area/treatment : 1.5sq.m.
- ☞ Total Area 12 x 1.5 = 18 sq.m.(i,e 4 x 4.5 m)
- ☞ Total No. of Plant : 12 x 6 = 72
- ☞ Fertilizer : 70:50:40 kg NPK/ha.
- ☞ Seeds sowing : 2059/05/22
- ☞ Transplanting : 2059/06/18
- ☞ Top dressing : 2059/07/15
- ☞ Date of leaf cutting :

  i) 2059/07/01 ii) 2059/07/15 iii) 2059/.07/29 DAT
- ☞ Date of harvesting : 2059/09/10

Treatment Details:

T_1 = 5% leaf cutting at 14,28 and 42 DAT.

T_2 = 10% leaf cutting at 14,28 and 42 DAT.

T_3 = 20% leaf cutting at 14,28 and 42 DAT.

T_4 = Control plot.

Result : (Production of cabbage in 1.5sq.m.plot)

Replication	Treatment			
	T_1 (5%)	T_2 (10%)	T_3 (20%)	T_4(Control)
14 DAT	2.5 kg.	2.25kg.	2.0 kg.	2.5 kg.
28 DAT	3.0kg.	2.5 kg.	2.0 kg.	3.0 kg.
42 DAT	2.5 kg.	2.25kg	0.25kg.	2.5 kg.

Conclusion :

i) In all 3 replication (i.e. 14,28 and 42 DAT) the production is slightly decreasing as the defoliation is increasing .

ii) Up to 20% leaf damage at 28 DAT is not very significant.

iii) Even at the age of 42 DAT the leaf damage up to 10% can be compensated by the crop itself.

iv) The result shows that 20% leaf damage at 42 DAT the crop can't compensate.

3. sfpnL jfnLdf ljleGg z1d tTj÷xdfGgsf]kpefjsfl/tf cWoog ||

p2]Zo ||

s_ thgfTds ?kdf jl9 pTkfbg lbg]z1d tTj xdfGgsf]klxrfg ug{.

v_ hyfeflj ?vdf xg]z1dtTjsf]kpfUdf sld Nofpg'.

cfjZos ;fdfu|

s_ P6f]gs v_ e]hd$; u_ k]; Ljfcf]

3_ dlN6Kn$; ª_ ol/of r_ sfpnL ljp÷j]bf{

5_ :kb/ h_ cfNdlgod 6bfu ´_ 6k,:sh cflb .

tl/sf

:gf]qmfpg xfO{j8 sfpnLsf]ljp ldlt @)%(÷)%÷@@ ut]hdfP/ cflZjg !& ut]/]lkPsf]lyof]. hUufnfO{$ x @=%dL= u/L hDdf !) ju{dL= sf]b/n]^ j6f Kn6 jgfO{^) x $% ;]dL=df lj?jf /f]lkPsf] lyof]. h; cg';f/ k]o]s Kn6df #% j6f lj?jf /x]sf lyP . dnvfb, uf8dh, l;+fO cflb ;dfg lyof].

pkrf/ lgDgfg';f/ ul/Psf]lyof]

pkrf/! P6f]gs ! ld=ln= k|t ln6/ kfgLdf !$ lbgsf]km/sdf 5g].

pkrf/@ e]hd$; ! ld=ln= k|t % ln6/ kfgLdf !$ lbgsf]km/sdf 5g].

pkrf/# k]; Ljfcf]! ld=ln= k|t ln6/ kfgLdf !$ lbgsf]km/sdf 5g].

pkrf/$ dlN6Kn$; # ld=ln= k|t ln6/ kfgLdf !$ lbgsf]km/sdf 5g].

pkrf/% ol/of @Ü -%uf=_ k|t ln6/ kfgLdf !$ lbgsf]km/sdf 5g].

pkrf/^ lgoGqLt -sg}klg z'1dtTj g5/]sf]

hDdf lf0fkm\n ^) j=dL=

;fgf]Kn6 !) j=dL=

k|t Kn6 lj?jf ;Vof #% j6f

hDdf lj?jf ;Vof #%x^=@!) j6f

dnvfb !@%%%*$ s]hL=gf=km=kf]÷x]

jfnL s6fgL @)%(÷)(÷!) ut]

glthf -pTkfbg_

q=;=	z'1d tTj 5/]sf] ldlt	pkrf/! pTkfbg	pkrf/@ pTkfbg	pkrf/# pTkfbg	pkrf/$ pTkfbg	pkrf/% pTkfbg	pkrf/^ pTkfbg
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@=	@)%(÷)&÷!%						
#=	@)%(÷)&÷@(						
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lg:sif{M

pTkfbg glthf x]bf{;j}eGbf jl9 pTkfbg @ k|tzt ol/of 5/]sf]df !^ s]lh=k|t !) ju{ld6/ eof]. To;k|5 qmdzM el]hd$; !$=@% s]hL, dlN6Kn$; !$ s]hL=,kl;Ljfcf]!!=% s]hL=,lgoGqLt !)=% s]hL= / P6f]gs * s]hL= dfq .

glthf cg';f/ ol/of, el]hd$; / dlN6Kn$;sf]k|efjsfl/tf sfpnLdf /fd|f]kfOof]eg]P6f]gs / kl;Ljfcf]TotL k|efjsf/L kfOPg .

s[fsn]rfxgf ug{]cMoog M–

hg :yfg ljz]ifdf hg ;d:ofx? jl9 x@5g\;fxL ;d:of ;dfwfg ug{]vfnsf k|jlwdf plgx?sf]rf;f]jl9 b]vf kb5{ .

IPM s[fs kf7zfnfsf]eldsf÷dxTj M

- ☞ tflnd kZrft s[fsx?df ljiffbLsf]gsf/fTds k|efjjf/]hfgsf/L xg]xbf To;sf]k|of]udf Jofks sld Nofpg].
- ☞ s[fsx?df jftfj/l0fo r]tgf clej[4 xg].
- ☞ of]Ps ;xeflutfTds,k|of]uTds / Jojxfl/s vfnsf]zMlfs k4tL ePsf]n]k|jlw x:tfGt/0fsf];;Qm dfModsf]?kdf b]vf k/]sf].
- ☞ of]Ps ;fdlxs sfo{/ 5nkmndf cfwfl/t k4tL ePsf]n]s[fx?sf]JolQmTj ljsf; nufot ;fdflhs ;DjGwdf k|of9tf j4L ug{].
- ☞ xfd|]b]z **WTO** df k|j]z u/]sf];Gbe{df ljiffbL /lxt / u0f:tl/o pTkfbgsf]nlo xfl;n ug{**IPM** s[fs kf7zfnf"d?b08sf]?kdf pleg ;S5 .
- ☞ xfd|f]b]zdf s[ifsf]clwsfz+ s[ofsnfkdf dlxnfx?sf];xeflutf jl9 b]vPsf]n]dlxnfx?nfO{cToflws ;xefuL u/fO{sfo{qmd ;~rfng u/]df jl9 k|efjsf/L xg]b]vG5

IPM s[fs kf7zfnfdf b]vf k/]sf ;d:of M–

- ☞ ;do Hofb}jl9 vlrg'kg{].
- ☞ k|zIfs eQmf Hofb}Gog .

Appendix 7 : IPM Activities of Tanahu District

cf0{k=Pd\ ultljlw

– wg jxfb'/ /fgf
lh=s[lj=sf=, tgxF

s[fs kf7zfnf ljj/0f M

- /fli6«o IPM/Regular sfo{qmd / kmf/Lsf] ;xof]jf6 @& kf7zfnf ;+fng -wfg, sfqmf] cfn', sfpnL ;dk afnL_
- % hgf dlxnf s[fs k|zIfs
- @ hgf kmf/Lsf] ;xof]sf]k|zIfs

s[fs kf7zfnf ;+fngdf b]lvPsf ;d:ofx? M

- ;'/Iffsf] ;d:of
- ;jf/L ;fwgsf] ;d:of
- kl/If0f Kn6sf] lfltkl't{df ;d:of
- ef}uf]lns ljs6tfn]kf/]sf] ;d:of
- AESA df a9L ;do nfUg]/ Special Topics 56\g]
- sIffsf]kfl/>lds Hofb}Gof]
- k|tj]bg k]sfzgdf ahl6sf]cefj

pknJwL÷cg'lj M

- n;'g + v';fgL whf]+ kfgL -^ s]hL= + ^ s]hL= + !)) ln=_ sf]eqmf]hn]wfgsf]kt/f]/f]syfd ug{ ;lsg].
- kf7zfnf ;+fngsf]s[ifsnfkdf k?if eGbf dlxnf a9L ;lqmo ePsf]b]lvof].

cf0{k=Pd\ sfo{qmdn]s[fsdf vh]sf]ef'dsf

- g]t[j ljsf;
- ljiffbL k|ofu]df r]tgf
- dlxnf ;xeflutfdf j[4
- /f]u, sL/f klxrfg 1fgsf]clej[4
- lhNnfdf IPM P;f];P;g :yfkgf

Appendix 8 : Summary of IPM Activities in different districts of Nepal (a review)

District	Crop	Key problems	Problem solving desires of farmers	Achievement
Ramechhap	Rice	* Stem borer * leaf folder * high dose of urea * No use of potash * Use DAP as top -dress		- Management of stem borer by continuous irrigation - Unfolding - baiting to manage mole cricket
	Citrus	* Dieback tip * Powdery mildew * Foot rot * scale insect	Citrus FFS demanded	-Pruning against stem borer -Machine oil use(1:80)
	Vegetable	* Use of high dose of urea		-Cow urine(1:4)
	Management	* Security * Mobility * Geographical obstacle * Allowance demanded * Absentees		
	Others			Involvement of Majhi in FFS, Demand of FFS in agro forestry, ginger
Kavre	Rice, vegetable, coffee	Untrained middle level technician in FFS, quality and standardization of FFS, Lack of incentives to farmer trainers , Unavailability of bio-agents/pheromones, delayed release of budget, Not coinciding the program and budget	Feeding capacity study, effectiveness of organic pesticides, life cycle study, damage study, fertilizer dose study , Adaptation and production capacity study	15% decrease in pesticide, 50% women participation, Use of locally available materials ,
Ilam	Tea, Vegetable, Spices crops	* Use of Ethion * How to conduct FFS in Cardamom, * Tea and Ginger	FFS also on different crops	IPM FFS incorporated in DDC master plan

Kapilvastu	Potato Vegetable	* Unavailability of appropriate tool to involve illiterate people, * Poor participation of women farmers in the morning time, * AESA is time consuming, * Sole responsibility is thought to be of APPO, * Low technical capability of FT,		*Area expansion, *Red ant management, *Variety selection (TPS), *Effectiveness of pheromone trap in cucumber, *Zinc management in rice
Jhapa	Tea	*Red spider mite, thrips, jassids *Ethion spray, *Untrained JT/JTAs, *Delayed budget release *Language problem with Rajbanshi, *Unsuitability of FFS site and venue *Coordination problem bet^{n} central and district.	*FFS of tea *Use of locally available plant materials, *Especially study of different botanicals (fermented juice),	*GO/NGO/CBOs involvement in FFS, *Environment Conservation Forum become interested in FFS conduction.
RPPL, Kailali		*Lack of supporting staff, *Problem with dealing in Rana community, *Untimely release of budget (after completion of FFS), *Demand of money for irrigation, *Banana - Fruit scaring beetle, red tinge between fruit bark and pulp, *Heliothis problem in mustard and gram, *Problem with stored grain pest, *Low supply of Celphos. *Red rot in sugarcane, *High drop out rate of male participants, *Unavailability of Bt. in local market,	Interest on efficacy of botanicals. Post harvest managent technique demanded, red rot management also demanded,	Performance of Bt found to be effective, Result of Beauveria was also effective, Good working coordination with Ecological Service Center (NGO)
Mahottari		*Insufficient support of CADO, *More illeterate farmers, *Refresher to IPM trainers, *Lack of follow up in IPM FFS,	*Damage level of different insects, *Use of local botanical in different insects, *Mixed and trap	*Skill increase in women farmers, *Environment and public health awareness among farmers,

		*Unavailability of related published materials, *Problem in mobilization of FT, *Problem with getting study plot and applying the management techniques, *Feeling of caste system, *Continuous full support to farmers with all expenditures,	crops for insect and disease management,	*Socialization of women farmers, *Effectiveness of pocket package program due to IPM FFS introduction. *Initiation of economic analysis, *Leadership development,

Date: March 3,2004

District	Crop/others	Key problems	Farmers desires	Achievement	Remarks
Chitwan	Rice	Yellowing may be due to BLB, mealy bug, white fly, iron toxicity, potassium deficiency	FFS in major crops demanded		Bio agent should be reared and distributed by RPPL
	others	DSA and fuel for monitoring F to F-FFS.			
	Vegetable	Indian vegetable growers are taking land in contract but are not included in IPM program.			Residue analysis of pesticides for mitigating WTO standard -Coordination with NARC
Panchthar	Tomato	Heliothis	Citrus, tea cardamom FFS Farmer TOT and refresher training demanded	support and coordination from DDC and VDCs, Formation of IPM pressure group, IPM trainer awarded by Environment Journalist Forum	District IPM field day celebrated on World Environment Day -IPM quiz contest -IPM Program should be l projected
Sarlahi	Rice, Cauliflower, Tomato	Weak coordination		Formation of District IPM Association is getting final stage.	Technical advisory provided by agro-vets is not qualitative.
	Sugarcane	Thimet as basal dose	FFS demanded		
		Weak monitoring			In all IPM programs

RPPL, Khairenitar	Cauliflower, Cabbage				*Micronutrient and hormone trial conducted. *Simulation of defoliation on cabbage.
Morang	Potato, Tomato, Cauliflower, Rice	*Lack of trained mid-level technician, *Delayed budget release, *Weak performance of FT on special topic, *Unavailability of reference material to FT, *Cocktail of up to 5 pesticides,	*FFS demanded, *Simple trial for varietal verification, *Use of indigenous botanicals, *Search for bio-agents, *Study especially on wilt and borers.	*Decrease of pesticide use, *Use of balanced fertilizer in commercial pockets, *Cooperation of GO/NGO/CBO on program implementation, *Feeling of ownership. *Cost analysis by farmers.	
Nuwakot	Rice	Blast, Rice bug, Borer, Imbalance in fertilizer application,	To be boost up FT, Follow up activities after FFS, Fertilizer trial, Effectiveness of alternative pesticides,		PPD should establish a unit for collecting and implementing local material based pest management activities.
Tanahun	Rice, Potato, Cucumber, Cauliflower	*AESA time consuming, *Weak coverage on special topics, *Low incentive as compared to work load, *Compensation to trial plot, *FFS concentrated only around center, * Budget allocation for report publication.		* Garlic+Chilli powder+water (6Kg+6Kg+100 liter) found to be effective for controlling stinkbug. * Female farmers are found more active than male farmers. * Formation of IPM District Association.	* IPM/FFS norms should match the norms of Irrigation Department,

Myagdi	Potato	* Lack of budget, * Weak participation in season long training, * Potato tuber moth and red ant.	* Management technique on potato tuber moth, Red ant.		Other plant protection activities such as rat-trap distribution, minikit distribution were conducted in the same FFS to make better participation till the end of training.

Appendix 9 : Procedures and format of participatory planning

Problem and Solve

PARTICIPATORY PLANNING

s]u/bf]eg]xfd[]ufpF/fd[]x¢5 -Ps ldg6 ;f]r] n]gxf]nf_

!= kDsL jf6f]
@= lzIffsf]clws ljsf;
#= k}f
$= vfg]kfgL ;ljwf
%= shf]
^= hgr]tgf
&= l;rf0{
*= ljhhL ;+f/
(= :yfgLo >f]tsf];xL pkof]u, n]Ëu ;dfgtf
!)=Market Driuves production based on sustainable use of available Natural resources.
!!. Equity
!@= lfdtf cg?ksf]cj;/
!#= /f]huf/L
!$=0df¢bfl/tf
!%= p¢gt ljp
!^= s[if pTkfbsTj j[4
!&= s[ifsf]ljsf;
!*= ljBt
!(= ;he zf}rfno
@)= 3/
@!= ;xsf/L 3/
@@= xl/of]jg
@#= l;+f0{shf]
@$= k§sf ln8/
@%= hgr]tgfdf clej[4
@^= IPM
@&= lfdtf cg?ksf]cj;/

lo ;j}s;n]ubf{5 t ?

!= ;/sf/
2. NGO
3. Self
$= ;dx
%= hg ;xeflutf
^= :yflgo ljsf;
7. CBOs

s[fs;F ;DalGwt lgsfox? sg sg xg ?

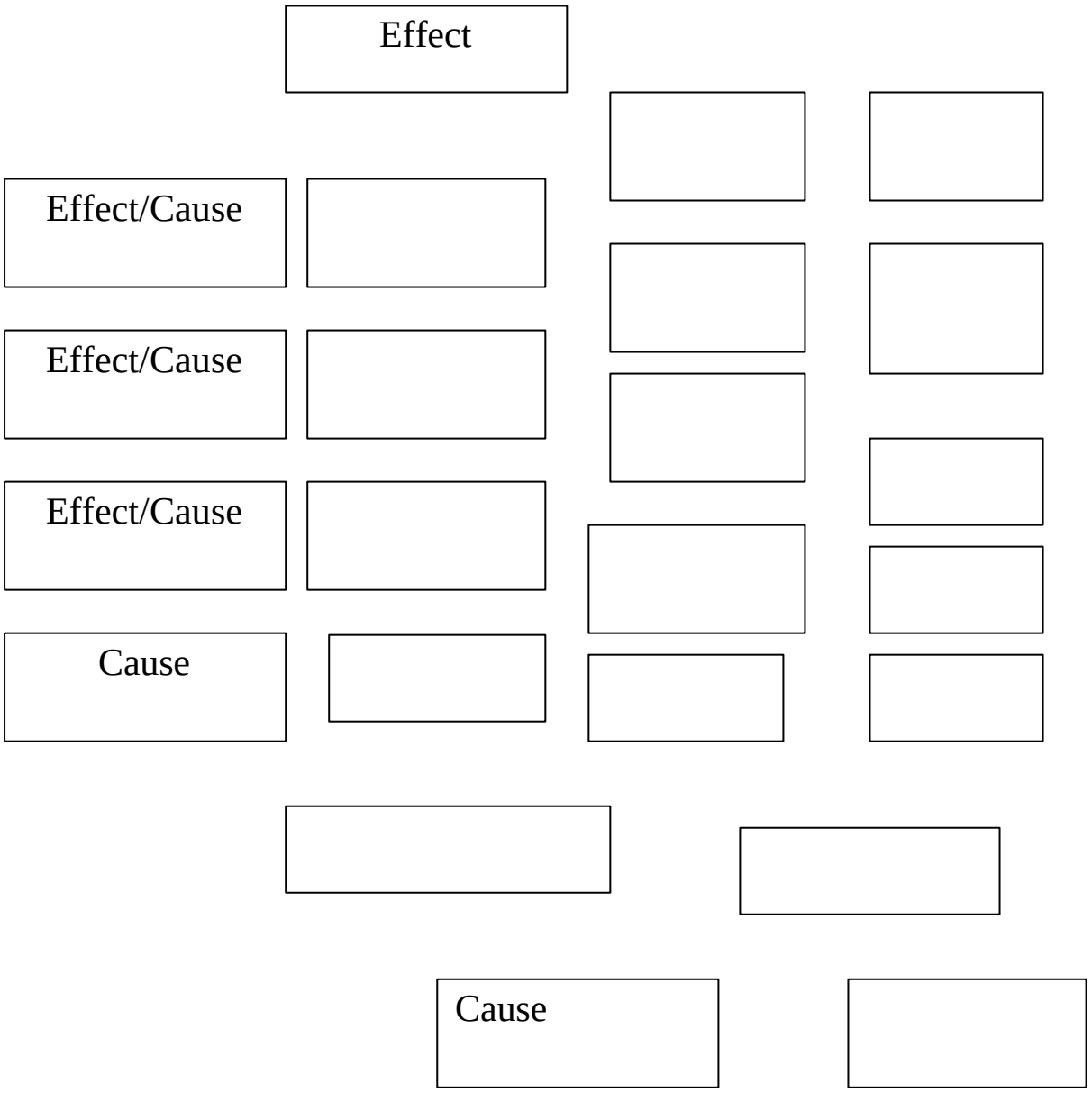
- kSsL jf6f];DalGwt ||;8s ljefu, lh=lj=;=, hg>dbfg
- lzIff sfof{no÷:sh
- k}f||a}s
- :jf:Yo rf}sL||
- s[if
- kz'sfof{no
- :jf:y,
- l;+ff0{
- lh=k|sf=
- uf=lj=;=
- ;xsf/L
- ljB't
- jg
- b/';+f/
- Pu[e6
- ahf/
- sf]8:6f]/
- :yflgo u}x|;/s/L ;+yf
- e";/Hf0f
- oftfoft ;ldlt
- xhfs

Relationship analysis

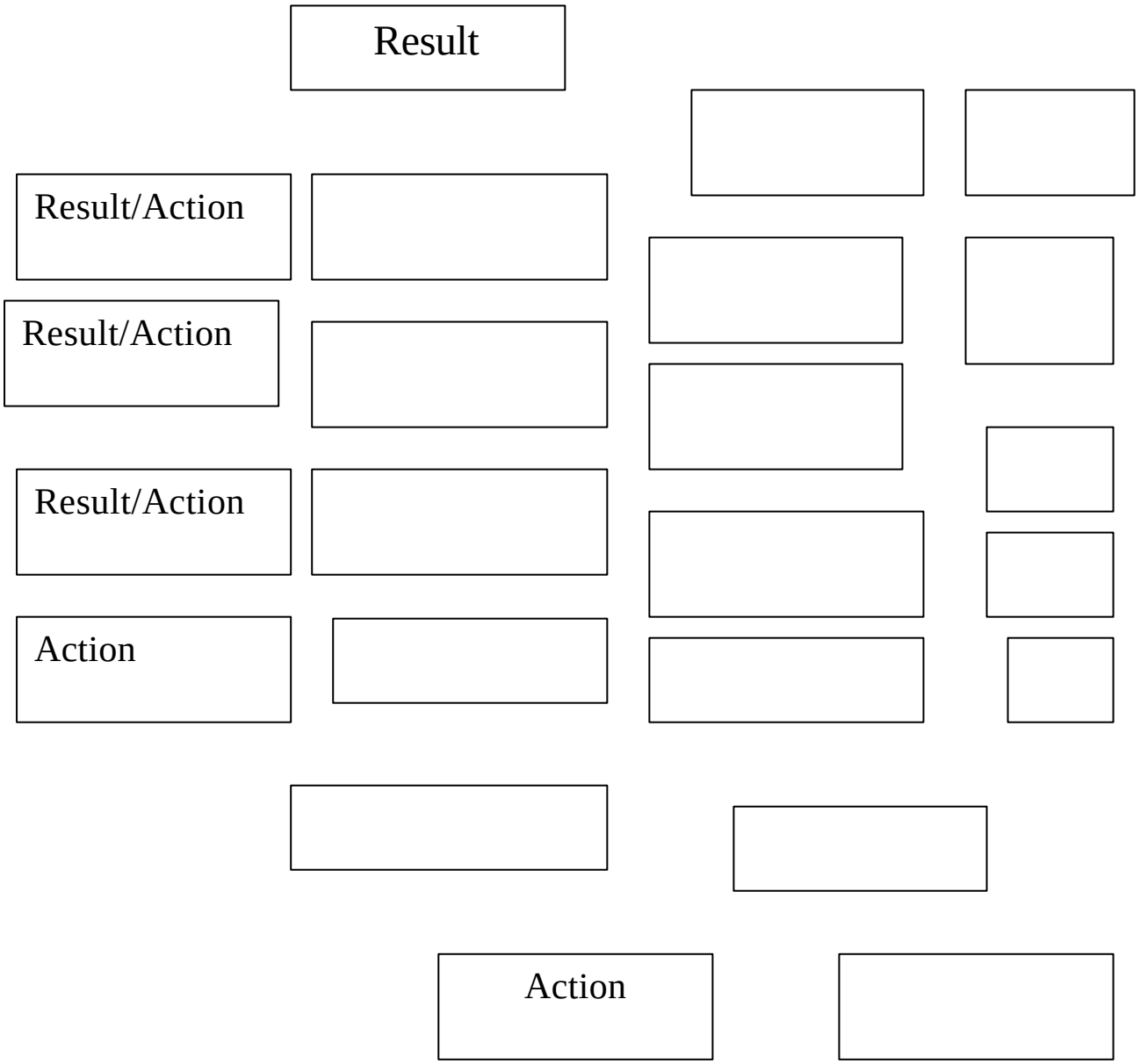
Who	What they provide	What they take	Benefit
Bank	Loan	Interest	Equal/both
Cooperative	Inputs/Loan	,,	
Asc/Aasc	Technical Support	Feed back	Farmers
Agrovets	Inputs/advice	Profit	Agrovets/both
Irrigation Office	Irrigation	Tax	Farmers
DDC/VDC	Development work		
NGO/INGOs	Technical/Inputs	Feedback	
Forest Office			
Soil conservation			
Veterinary Office			
Market			
Electricity			
Small Cottage Industry			
Seed Company			
Biogas			
Outreach			

Annex 10 : Problem Identification and Analysis

(Problem Tree)



Goal Analysis
(Goal Tree)



Role Analysis

Who/which organization	Potentiality/Capability (what do they have)	Expected contribution	Their expectation of the project	Constraints

Program matrix

Program strategy	Indicator of success	Tools of evidence	Important assumption
The goal			
The Purpose **1.** **2.** **3.** **4.**			
The result **1.** **2.** **3.** **4.**			
Activities **1.** **2.** **3** **4.**			

Activities: Example

Activities	When	Who is responsible	Cost

Priority ranking (in big group)

Activity	Criteria(1-5)					
	Capability	Weight of problems	Availability of local resources	More contribution of the final goal	Time duration	Total

Need Analysis

Activities	Needs	How to get it	How much money
Water mgt			
Farmer studies			
Rat control			

Fund resources investigation

Resources	Potentialities	How to get	Expectation
Farmer			
DADO			
DDC			
VDC			
NGO			
Cooperatives			

Program Organization

Jobs	Responsibility description	Who is he/she
Coordinator		
Secretary		
Treasurer		
Members		
1.		
2.		
3.		
4.		
5.		

Cross Expectation Matrix

Job	Will give/will take	Leader	Secretary	Treasurer	CO. Water mgt	CO. Farmer studies	CO. Rat control	Farmer
Leader								

Secretary								
Treasurer								
CO. Water mgt								
CO. Farmer studies								
CO. Rat control								
Farmer								

Time Frame

Activities	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Rat control a. b. c. d.												
Water management a. b. c. d.												
Farmers' study a. b. c. d.												

Annex 11 : Guidelines for quality AeSA

Quality Indicators

Indicators :

- As much as simple
- quantitative aspect
- Measurable if applicable
- Without compromising quality aspect.
- Attainable

Consensus
Guideline
Observation and drawing of AESA :

- Before activity participants are told
  - Goal of activity and
  - Participants all in the field
- Participants all in the field
- Process of observation includes the whole plant
- Observations written down
- Specimen's collected
- Drawings summarize observations

Presentation & Analysis :

- Presentations made by member of each small group
- Participants ask question of small group presenter
- Facilitator ask questions appropriate to analysis
- Group discuss, field conditions & agro-ecosystem relationship.
- "What if" scenarios discussed
- Previous weeks agroecosystem drawings wed for comparisons
- Field management decision critically examined by group
- Other factors in addition to economic thresholds are analysed (eg. Plant stage natural enemies)
- Facilitators are use leading questions to help participants analyze what learned during activity

Special Topics Indicators

- Before activity beings participates told goal and process of activity.
- All participants active and involved in the activity.
- No small group dominated by one person to the point that others are totally excluded.
- Participants present result of their work during the activity summarizing what has happened and why ?
- Leader asks leading questions to help participants examine stops in process of activity and apply learning to real life .

Activity :

1. Field Study

- Area 1000 Sq.mt.
- No based on problem
- Replication 3-4

2. AESA

- Area 1000 Sq.mt.
- Field observation/Processing/Present
- 10 sampling unit/plot.

3. Special topic

- 4-5 topic common to all based on IPM ? crop management
- Based on AESA result & problem
- What is that and what is this ?

- Phonology
- Crop physiology

4. Group dynamies

- Team building
- Group Game
- Role play

5. Field day

- To show participant activities to other farmer
- Number of IPM at least 50
- Still must.

AESA and Learning :

Top down
Bottom up

- go to the field
- observe
- Identify problem problem
- Ideas (from experience/information)
- What to find the cause/motivation
- analyse results
- conclusions

AESA :

- Insect pest - quantitative
- Plant height - quantitative
- Tillers - quantitative
- Water Level - quantitative
- Weather - quantitative
- Weed density - quantitative
- Type of weed - qualitative
- Diseases - qualitative/quantitative
- Behavior IP & NES - Qualitative

Tools are very Important for an AESA

- Direct observation - Dragonfly's behavior
- Cub studies :
- Cage studies :

Simple study

Eastern - Interaction - insect - plant

Central A - Interaction insect Natural enemy

central B - Behavior

Western - Development of disease

We should prefer - Direct observation and cupstudies in comparison to cage/300 studies - because it gives quick answers - like feeding beharior of spider - What feeds, how, how, how much ect. Role play direct observation and cage study -

Don't say immediately like a knowledgeable man rather let them find the farmer by bottom up approaches

Quality AESA :

What to do ?

How to do ?

Parasitization

Field work : Sample and observation

Group size 4-5

By whom - every body (also facilitator)

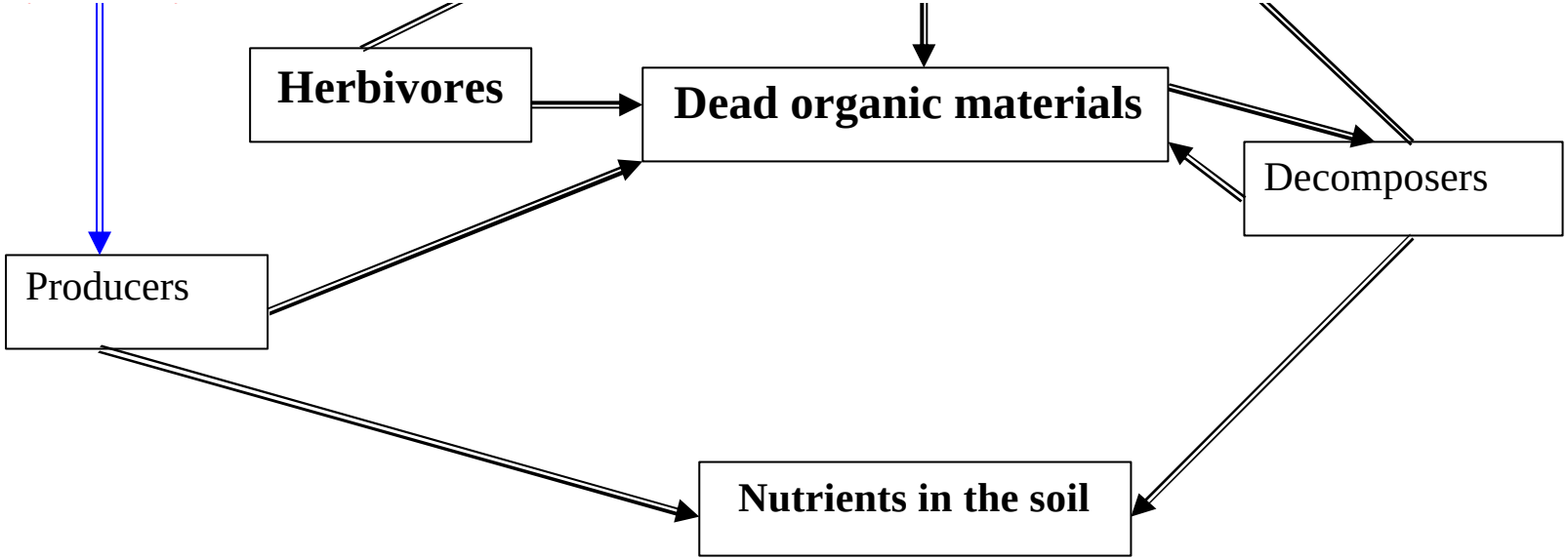
Sample size - 10 hills randomly.

Plot size - 500 squire metre (1 Ropani)

Each group should observe both FP & IPM simultaneously (2 & 3)

Observation should be taken -

- NE's IP's Unknown, Natural visitors.
- Water level, climatic data
- Plant condition (health, stage, damage, colour)
- Plant height & number of tillers
- Discuss, Weed density, type stage
- Time for observation - no limit
- Optimum time needed for observation
- It depends upon n. of observation


Herbivores
Dead organic materials
Decomposers
Producers
Nutrients in the soil

Appendix 12 : Study Area in Banana, Tomato, Citrus, Cauliflower and Rice

1. Banana:

Fruit scaring beetle management

Interculture trial

Post harvest trial

Banana beetle/weevil management

Fertilizer response (phosphorus) trial

2.Tomato:

Nematode management

Harvesting trial

Tomato wilt management

Micro nutrient management

3. Citrus:

Foot rot management

Root rot management

Scale insect management

Leaf minor management

4. Cauliflower:

Varieties management

Micronutrient management

Spacing management

Lime management

Manuring management

Fertilizer trial

Defoliation trail

Club root management

Weed management

5. Rice

- Khaira disease management
- Tiller number
- Irrigation management

Appendix 13 : Topic, Concept and Observation Matrix

Topics selection on M atrix cauliflower

S.N.	Problem/factors causing low yield	Current practice	potential to improve	constraints	selected topics
1	variety (early)	K.L. (Mid)	replace with early	-price -availability	
2	Micronutrients (efficacy)	-None -Deficiency Symptoms	-Application of Micronutrients	Recommendation -Dose -availability	
3	fertilizer (compost dose)	15 doko/R FYM	-dose increase -compost use	-availability - expensive	
4	defoliation (Insect)	Insecticide use	-Bio/Bot. Pesticide -Organic application	-availability -risk	
5	club root	fungicide	-liming -Resistant variety -crop rotation -trichoderma	-dose -waiting -availability - perfect solution.	1

Concept Matrix of Cauliflower

Concept (Possible effect of topic)	Source of each Concept	What do we think about each topic
Low pH is responsible for club root	DADO	not convinced need to be use
bio-agent are effective for fungus control	,,	,,
resistant varieties are available	Literature	,,
crop rotation reduces the intensity of disease	,,	,,
clay soil is more problematic	,,	,,

Observation matrix (Cauliflower) (use of Trichoderma for club roof management in cauliflowe r)

SN	What should be observed	How	When
1	Yield	7 m2 plot	At harvest
2	No of plants affected	Visual, counting	Weekly
3	Plant height	Measurement	,,
4	Number of IPS	Counting	,,

5	Number of NEs	Counting	,,
6	Secondary problem	Visual observation	,,
7	Weed infestation	,,	,,

Topics selection on Matrix Rice

S. N.	Problem/factors causing low yield	Current practice	potential to improve	constraints	selected topics
1	poor quality seed	Farmers' own seed	• Use of quality seed	• Not available	
2	Blast in nursery	Urea application	• Site selection • Use of burnt rice husk • seed treatment	• Experience • Not alternative crop • Costly	
3	Unbalanced fertilizer use	Use of urea only	Use of balanced dose of fertilizer	• Not availability • Increase in cost	
4	weed management	• No weeding • Improper timing • Use of herbicides	• Timely weeding may increase yield • Water management • Land preparation, hand weeding	• Unavailability of labour • Lack of leveling equipment	
5	Khaira disease	• Use of urea • Zinc as basal dose	• Use of zinc (folior) • PH improve	May .. in cost	Use of Zinc
6	Blast (Leaf/Nak)	Use of urea	• Use of burnt rice husk • Use of resistant tolerant variety	Not identified	

Concept Matrix

Concept (Possible effect of topic)	Source of each Concept	What do we think about each topic
Use of Zine increases yield	Extension	Need to be tested
Use of Zinc increases productive tiller number Participants	Radio	,,
Plant height	participants	,,
Influences uniform maturity	Radio	,,
Straw yield	Neighbour	,,
Basal application of Zn not effective in acidic soil	Literature	,, but how ?

Observation matrix (Rice)

SN	What should be observed	How	When
	Tiller number	10 sample plills/plot	weekly
	Plant height	do	do
	Maturity	Individual plot observation	before harvesting
	Khaira disease	Scoring	weekly
	Gain yield	Individual plot excluding border (5X5 m2)	At harvest
	Straw yield	do	do

Topics selection on Matrix Banana

S.N.	Problem/factors causing low yield	Current practice	potential to improve	constraints	selected topics
1	Fruit scaring	use of monocrotophos	use of repellant or botanical pesticide	Easily available	-
2	Weevil	use of furadane and thiodane	Chhoping trap use healthy sucker sanitation	Increase cost	weevil management by using trap healthy success sanitation
3	Hypothesis	sanitation, use of healthy sucker, use of chhoping trap management banana weevil			

Concept Matrix of Banana

Concept (Possible effect of topic)	Source of each Concept	What do we think about each topic
decrease the weevil infestation	literature	To be tested
Increase NEs	IPM FFS	To be observed
Decrease the weeds	Farmer experience	,,
increase plant growth	Extension worker	,,
Decrease the disease infestation	,,	,,
increase yield	Yield assessment	,,

Observation matrix of Banana

SN	What should be observed	How	When
1	Weevil infestation	Sample plant Scoring (2 plants)	15 days interval
2	Natural enemies	Count. (sample)	,,
3	weeds	4m2 canopy area of sample	,,

		plants	
4	plant growth height (cm) girth (cm)	Sample plant girth and height	,,
5	disease	Sample plant scoring	,,
6	Yield	From sample plant	At harvest
7	of leaves	Sample plant	15 days interval

Topic Selection matrix (Tomato)

SN	**Problems**	**Current practices**	**potential to improve**	**constraint**	**selected topics**
	Bacterial wilt	Uprooting and burning	use of bleaching powder	may be costly	Use of bleaching powder (ii)
	Nematodes	,,	use of chicken litter, saw dust	not in practice	use of chicken litter, saw dust (I)
	Fruit borer	Use of chemical pesticide	use of pheromon trap	not easily available	III
	Micro nutrient deficiency	Use of macronutrients	use of micro nutrients	not available in local market	IV

Concept Matrix of Tomato

Concept (Possible effect of topic)	Source of each Concept	What do we think about each topic
use of chicken litter and saw dust will manage the nematode problem	News paper & different literature	Not convinced tested locally
Plant height will increase by the use of litter and saw dust	One of the participant of FFS	Need to observed
NEs will be affected (increased)	Extension Officer	Yes, but now to observed
More labour will be required	Farmer calculation	Need to be tested

Observation matrix (Tomato)

SN	What should be observed	How	When
1	No of infected plants	Counting/up. rooting	Weekly
2	Plant height	Measuring the height of sample plant	,,
3	NEs population	Obs. and count the NEs in sample plants	,,

4	Labour required	Calculation	After harvest
5	Yield	Harvesting	After harvest

Topics selection on Matrix (Citrus)

S.N.	Agri operation	Current practice	potential to improve	constraints	selected topics
1	Intercrop	with maize millet, cucurbit	Dwarf legume		Intercrop with soybe an (2)
2	Planting	without pit	Pitting	Garden already established	
3	Scale insecticide	Rogar	Mineral oil	difficult to purchase	scale management (3)
4	Foot Rot		Bod. Paste, Nechuki		Footrot (1) management

Concept Matrix

Concept (Possible effect of topic)	Source of each Concept	What do we think about each topic
Bod. Paste, Nechuki expand Citrus life	Japanese expert	Not convinced needs to be tested locally
Wound healed	Ext. worker	,,
Increase Production	Innovative farmer	Need to be observe
Increase quality of fruit	News paper	,,

Observation matrix (Citrus)

SN	What should be observed	How	When
1	Wound healing	Measure by scale	30 days interval
2	Success of nechuki	Visual observation -hf]8Psf]/ ghf]8Psf]lj?jfsf]cj:yf_	Fortnights
3	Yield	Weighing	At the time of harvest
4	Quality of fruit	Size, Juice content, Texture of the skin and tightness	,,

Appendix 14 : Data Analysis Technique on pre-test and Post test result score

FFS participant's pre and post test score taken from ballot box test

Score obtained by farmers in Ballor box text BBT		
Participants No.	Score in pre-test	Score in post-test
1	7	14
2	11	14
3	10	17
4	13	18
5	14	16
6	13	19
7	8	12
8	10	14
9	13	14
10	13	15
11	11	17
12	12	16
13	15	19
14	7	14
15	7	12
16	13	16
17	10	15
18	12	13
19	14	16
20	15	16
21	10	16
22	8	15
23	15	20
24	10	19
25	13	20
26	15	20

Analysis of comparative studies (pair t-test)

By using computer **By using calculator**

	Score in pre-test	*Score in post-test*		Score in pre-test	Score in post-test	Difference
	7	*14*		7	14	7
	11	*14*		11	14	3
	10	*17*		10	17	7
	13	*18*		13	18	5
	14	*16*		14	16	2
	13	*19*		13	19	6
	8	*12*		8	12	4
	10	*14*		10	14	4
	13	*14*		13	14	1
	13	*15*		13	15	2
	11	*17*		11	17	6
	12	*16*		12	16	4
	15	*19*		15	19	4
	7	*14*		7	14	7
	7	*12*		7	12	5
	13	*16*		13	16	3
	10	*15*		10	15	5
	12	*13*		12	13	1
	14	*16*		14	16	2
	15	*16*		15	16	1
	10	*16*		10	16	6
	8	*15*		8	15	7
	15	*20*		15	20	5
	10	*19*		10	19	9
	13	*20*		13	20	7
	15	*20*		15	20	5
					Sum	118
t-Test: Paired Two Sample for Means					Mean	4.538
t Stat	***-10.54244***				s.d.	2.195
t Critical	*2.059537*			t-statistics = mean of diff./s.e.m. (s.e.m. = s.d. of difference/vn)		
						=10.54
				Tabulated t (25 df at .05 P) = 2.06		
Here, calculated t › tabulated t, so the difference is significant.						

Appendix 15 : Gender role analysis matrix (GRAM)

SN	*Activities*	*Weightage*	*Gender role*		*Weithted value*	
1	***Seed bed preparation***	*15*	*50*	*50*	*7.5*	*7.5*
	- Land preparation					

	- Sowing - Nursery management					
2	***Land Preparation (Main yield)*** - Land Preparation - Fertilization - Transplanting	*35*				
3	***Crop Management*** - weeding - Water management - Pesticide appn.	*20*				

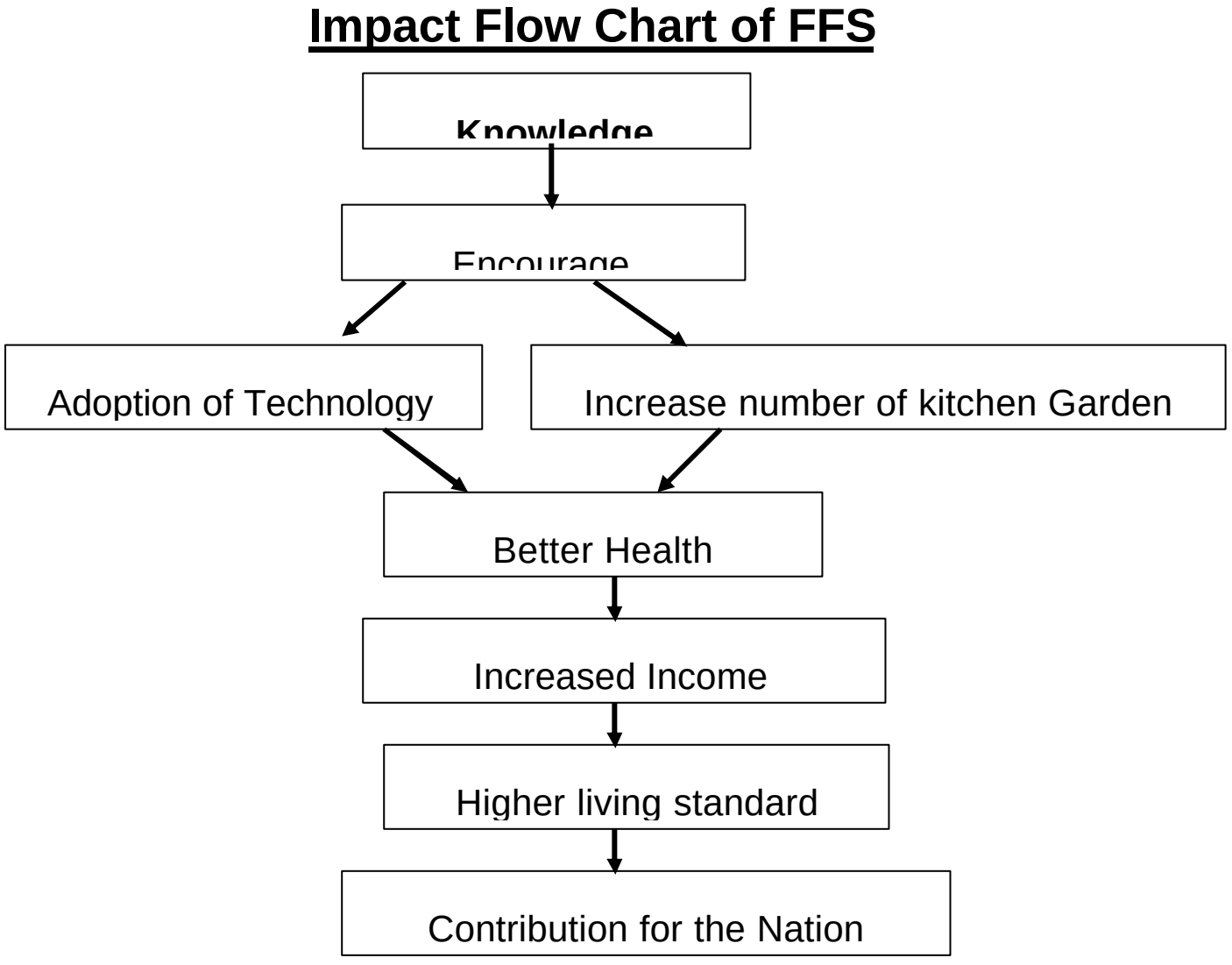
Bashu paper

Appendix 17 : Organic farming and Experience in Kathmandu District

- *L. Bohara/IPM Trainer*

Encouraging factor for organic farming :

1. Heavy use of Pesticide.
2. Veg. cleaning with contaminated water.
3. Un-availability of fresh vegetable.
4. Soil fertility degradation.
5. Financial problem.
6. Kitchen gardening - exercise.
7. Refreshment.
8. FFS.



Area of Organic farming :

- Adjoining VDC of Kathmandu municipality
- Small farmer
- Kausi vegetable
- Own purpose/Kitchen garden

Development Process for organic farming :

- Inorganic farming eg. commercial farming.
- Partial organic farming.
- Complete organic farming.

Step taken by DADO for organic farming :

- District level workshop - Net work formation
- Farmer + star hotel + club + technician Interaction workshop
- Observation tour
- IPNS/IPM FFS
- Vermiculture demostration
- Observation tour to DDC member

Input Management :

- **Compost** → **Ring Method**
  Brick Method
- Vermicomposting
- Poultry litter
- Farm yard manure
- Local varieties

Non-chemical Pesticide :

- Tobacco liquid
- Cow urine
- Kharani

Marketing Network :

- Star hotel
- Relatives
- Stall in Kalimati market (Proposed)

Challenges :

- Alternatives
- Reduction Yield at the beginning
- Research
- Expensive
- Commercialization

Appendix 18: Integrated Grain Storage Management -2059/060

Introduction

Post Harvest Loss Reduction division has felt the need to run Farmer Field School (FFS) for whole storage period in storage. It could empower the farmers in knowledge, skill, and decision making and finally in stored grain management thereby having a complete package of technology from pre to post harvest. Taking this in vision Post Harvest Loss Reduction Division started a study on "**Integrated Grain Storage Management** " activity since fiscal year 2059/060, based on the experiences of "Group monitoring" activity launched by the division in last years.

Objectives

- To increase knowledge and skill in integrated grain storage management by improving the local technologies and combining them with improved technologies to reduce loss.
- To find out problems (disease, insects, rodents and others) in storage, their causes and tactics to manage them.
- To aware about the cautions to be practiced before storage.
- To asses the loss from rodents and manage rodents to reduce the loss.

Details of FFS Activities

This programme was carried out in rice, as a follow up program of pre-harvest IPM FFS for an 8-month's storage period. The guidelines were same as in IPM FFS. After two successive preparatory meetings, the FFS was established in Gokarna VDC ward no. 9, Kathmandu, under the name of **Bhairav Anna Bhandaran Krishak Pathshala.**

The Farmer Field School was conducted for 12 times in a period of 2059/07/22 to 2060/01/12 and was closed by celebrating the "Farmer' Field Day" at the last. There were 25 participants (Appendix 1) from three VDCs; Gokarna, Nayapati and Kapan. Female participants were 21 and male were only 4. Stored grain was monitored and observed to record data (room temperature, humidity, and moisture percentage) in each FFS day, which was scheduled at an interval of 15days. The details of activities are as follows.

1. Preparatory meeting

Before establishment of FFS, two preparatory meetings were conducted. During these meetings a discussion was held with the farmers about the activity in details. In this course participant selection, establishment of FFS and naming of FFS were done. Besides, sub groups formation, rules and regulations were also formed.

2. Group formation in FFS

After establishment of FFS, an executive committee was formed to run the FFS smoothly. Members of the committee were as follows.

Chairman : Bimala Bista
Vice chairman: Dan Bahadur Lama
Treasure : Mana K. C.
Secretary : Krishana Devi Shrestha
Vice secretary : Ramhari Bhandari
Members : Rajendra Shrestha
: Gyatri Karki

3. Sub Groups

To provide equal opportunity for participation, farmers were divided into four sub-groups so that they could observe the stored grain, record the data and analyze the data finally to come to a conclusion for decision making. Each sub group constituted of 5-7 members was named as follows.

1) Butterfly (Putali)

2) Larva

3) Ghun(weevil)

4) Khapate

4. Setting of Studies

4.1 Main study: Farmer's practice Vs improved practice

Like in other FFS, FFS here was conducted based on IPM's four principles; grow healthy crop (here keep healthy grain for storage), regular monitoring, conservation of natural enemies and make farmer expert himself. AESA is heart of FFS. To do AESA a main study was carried out as follows.

Study on different types of storage container for comparative analysis

Four sets of storage studies with local practice Vs improved storage practice were designed for storage analysis. Each sub group was tasked one study each as follows.

1) Sub group; Putali: Metal bin Vs Plastic bora.
2) Sub group; Larva: Plastic drum Vs Plastic bora.
3) Sub group; Ghun: Earthen container ghyampo white enamel polished Vs non-polished.
4) Sub group; Khapate: Bamboo choyako bhakari with mud coating Vs bamboo choya bhakari plastic wrapping and providing a metal base and a lid.

In each set of study, storage structure used as well as the method were compared with farmer's storage structure and practice. The analysis was based on the parameters such as moisture percentage of grain, relative humidity of room, temperature of room, disease and insect presence and ultimate the loss percentage. In improved practice drying of grains up to required moisture 12 %, use of local plant materials and improved storage structure were emphasized.

Data for moisture percentage of grain, relative humidity, temperature, insect and disease presence were recorded on FFS day. Besides this, the farmers themselves also recorded other identified problems in each FFS day. Based on the recorded data and the identified problems, each sub group prepared AESA (AESA format as in appendix 2) presented for discussion in big group. After discussion they took decision.

4.2 Supporting studies

Main study is concentrated on comparative study of farmer's practice Vs improved practice only. To make a farmer expert, he/she should have an idea about how the grain in storage is affected by grain moisture, temperature, relative humidity and about the store room's and container's cleanliness. For which supporting studies were designed and carried out. These studies provide farmers learning by doing environment.

5. Special classes

Special classes on following topics were selected based on problem and interest of participants with participatory approach.

1) Types of storage loss and their causes.
2) Factors affecting quality of grain in storage
3) Types of storage structures and required physical facilities.
4) Methods of grain moisture percentage detection.
5) Methods of sampling
6) Relationship among grain moisture, relative humidity and temperature.
7) Causes of fungus development and its management.
8) Causes of insect incidence and its management.
9) Rodents and its management
10) Local methods of disease /insect management
11) Safe pesticide application procedure and precautions to be taken during pesticide use.

6. Daily activities

1. Registration
2. Recap
3. Climate setting
4. Storage Analysis study
   - Observation, facts recording of main studies.
   - Preparation of Agro-Ecosystem Analysis (AESA) of main studies based on recorded data and its presentation among big group by sub group member.
   - Group discussion, analysis and conclusion and decision taking.
5. Group dynamics
6. Special class
7. Observation and evaluation of supporting studies.
8. Evaluation of that day's activities.
9. Program planning for next day
10. Closing

Farmer Field School working hour: About 5 hours.

7. Farmer field day

Farmer field day was organized at the end of the storage activity on 060-01-12 following the norms of FFS. Certificates to graduated member participants were distributed at that time. Neighboring farmers, leader farmers, Village leaders and interested persons participated in the field day. Following activities were done in field day.

- Experience sharing by presentation
- cultural way of presenting the experience(songs, dance, poems and drama)
- Poster on different aspects of storage.
- Miniature demonstration
- Presentation of prepared AESA as poster.

8. Details of main study

Main study was designed and conducted for comparative analysis of farmer's practice and improved practice as well as storage containers. The comparative analysis was done by preparing AESA (conducting based on observation and data recorded at an interval of 15 days). The different groups were tasked different sets of study on 2060/08/16 where initial details is given in table 4 along with the final result, the loss %.

8.1 Metal bin Vs Plastic bora

This set of study was kept in well-ventilated and cemented room. The room was in first floor and was used for residence also. 50 gm of Black pepper powder in a muslin clothes was kept in middle of the metal bin at the beginning of the study set up. 90 gm of Bhojho cut into small pieces were also used at one month later when few moths flying were observed. In plastic bora 3 gm cake of Quickphos (Aluminium phosphide) was kept inside the grain in muslin cloth in the beginning of the study. The Mansuli paddy variety paddy was used. The study was set on 2060/08/16. The recorded data are as follows.

Table: 1 Data recorded in metal bin and plastic bora on different dates for grain analysis.

Observation date/Storage structure type		059/8/16 Initial	9/2	9/18	10/2	10/15	11/2	11/16	12/5
Metal bin	M	10.2	10.2	9.9	8.4	8.6	9.0	9.8	10.0
	RH	33	35	35	20	73	78	55	30
	T	22	20	20	18	13	13	20	19
Plastic bora	M	10.2	11.2	10.9	9.9	10.4	11.5	11.6	11.3
	RH	33	35	35	20	73	78	55	30
	T	22	20	20	18	13	13	20	19

T=Room temperature (^{0}c)

M=Grain moisture %

RH= Relative humidity %

8.2 Plastic drum Vs Plastic bora

This set of study was kept in mud brick made room. This room was also used for residence. This room was in second floor. In Plastic drum as mentioned before 50 gm of Black pepper powder in muslin cloth was kept in middle of the container at start of study set up. In plastic bora 3 gm cake of Quickphos was kept inside the grain in muslin cloth at start of study. The paddy used was Japanese munsuli. The study was set up on the same date that is 2060/08/16. The recorded data are as follows.

Table 2 Data recorded in plastic drum and plastic bora in different dates for grain analysis.

Observation date/Storage structure type		059/8/16	9/2	9/18	10/2	10/15	11/2	11/16	12/5
Plastic drum	M	10.2	10.2	9.6	8.7	8.2	10.0	10	9.6
	RH	44	40	35	30	70	75	76	75
	T	20	19	13	17	9	10	17	19
Plastic bora	M	10.2	9.8	9.3	9.3	9.4	10.2	12	11.8
	RH	44	40	35	30	67	75	76	75
	T	20	19	18	18	12	13	20	23

T=Room temperature (^{0}c)

M=Grain moisture %

RH= Relative humidity %

8.3 Earthen ghyampo enamel polished Vs non-polished

This set of study was kept in mud brick made room. This room was used as kitchen also. This room was in the uppermost floor, the third floor. In enamel polished ghyampo as mentioned before 50 gm of Black pepper powder at start of study set up was kept in middle of the container. In non-polished ghyampo 3 gm cake of Quickphos was kept inside the grain in muslin cloth at start of study. The variety of paddy used was Basmati.The study was set up on 2060/08/16. The recorded data are as follows.

Table 3 Recorded data of stored grain for analysis

Observation date/Storage structure type		059/8/16	9/2	9/18	10/2	10/15	11/2	11/16	12/5
Enamel polished ghyampo	M	10	9.3	9.7	9.6	10	9	8.5	
	RH	40	42	59	37			40	
	T	21	17	12	18			18	
Non polished ghyampo	M	9.6	9.9	10.2	10.3	8	10.8	11.5	
	RH	40	42	59	37			40	
	T	21	17	12	18			18	

T=Room temperature (^{0}c)

M=Grain moisture %

RH= Relative humidity %

8.4 Choyako bhakari Vs improved choyako bhakari

As above, Choyako bhakari used by farmers was compared with the improved choyako bhakari (giving plastic lining and providing metal lid and base). They were kept in same store. Treatments also were the same as done above in other studies. Grain in farmer type choyako bhakari was treated with Quickphos and in improved choyako bhakari was treated with black pepper powder. But here data could not be taken in details on corresponding dates. Hence loss % in case of choyako bhakari could be calculated only.

The recorded data were analyzed and discussed among the farmers participated. Possible reasons for the change of data were also discussed. At last on 2060/01/12 samples from each study were collected, brought to Post Harvest Loss Reduction Division and analyzed in laboratory. The loss % was calculated using the following formula of counting weight method. The result found is as table 4.

Counting weight method

$$\text{Loss \% of grain} = \frac{(\text{Und}) - (\text{Dnu})}{\text{U (Nd + Nu)}} * 100$$

U = Weight of Undamaged grain
D = Weight of Damaged grain
Nd = Number of Damaged grain
NU = Number of Undamaged grain

Table 4 Data recorded in different storage containers of comparative study

SN.	Storage type	Grain wt.	Moisture %	loss %	Pesticide used	Remarks
1.	Metal bin	90 kg	10.0	0.81	Black pepper and Bojho	A little number of moths appeared at first observation.
2.	Plastic bora	47 kg	10.0	0.82	Quickphos	No insects were seen.
3.	Plastic drum	33 kg	9.8	0.82	Black pepper	No insects were seen.
4.	Enamel coated ghyampo	22 kg	11.2	0.67	Black pepper	No insects were seen.
5.	Ghyampo non enameled	22 kg	11.4	0.87	Quickphos	No insects were seen.
6.	Choyako bhakari	120 kg	12.0	1.65	Quickphos	No insects were seen.

Result and discussion

Data in the all three studies shows that the temperature slowly decreasing upto Falgun then rising starts. Humidity is low till Magh to mid Magh and then slowly it rises till Chaitra first week. The temperature record in cemented house is slightly higher than in mud house made by brick where as relative humidity in brick mud house is relatively higher than in mud house where as relative huymidity in brick mud house is relatively higher than that of cemented. The moisture % was found to be different in different studies, if we observe the data of metal bin and plastic bora, the moisture % of the grain slowly decreased upto mid Magh and then started increasing in metal bin where as in plastic bora kept in the same situation (environment), the grain moisture % increased continuously. This proves that grain in plastic bora absorbs more moisture than metal bin. Grain was treated with Quickphos (aluminum phosphide) in case of bora as farmers in that area had a practice of doing that but grain in metal bin was treated with 50 gm of black pepper at first. It was followed by 90 gm of bhojo cut into pieces after few moths were observed on grain in metal bin.

In other set of treatment, plastic drum Vs plastic bora, the moisture % in drum decreased slowly upto Magh then started increasing where as in plastic bora the trend of moisture was similar but the increment of moisture in plastic bora is observed more than that of plastic drum kept in the same environment. Grain as before was treated with Marich in plastic drum and in plastic bora was treated with Quickphos. No insects were observed, hence the loss % was also very little (0.82%) in plastic drum. As regards the study in case of improved earthen container ghyampo(painted with white enamel) and farmers practice of using earthen container, the grain moisture was reduced upto mid Falgun in enamel coated ghyampo where as grain in not enameled ghyampo was found to have the moisture % slowly increased continuously in the same environment. The loss in improved ghyampo was 0.67% where as in non-enameled was 0.87%. The grain in improved ghyampo was treated with black pepper initially where as grain in non- enameled ghyampo was treated with Quickphos as farmers do. No insects were observed in both the cases.

Similarly in the fourth treatment improved choyako bhakari and non-improved choyako bhakari as treated above, the loss % in farmers practice of using choyako bhakari gave 1.65.

Data (tables 1, 2 and 3) show that the loss percentage is less in improved practice than in farmer practice such as bora, non enameled ghyampo and Choyako bhakari. Use of Black pepper and Bojho together with the improved containers was found effective compared to that of farmer's practice and using of aluminum phosphide to treat grain against the insect pests. Thus it can be said that farmers' practices used in this comparative study need to be improved for storage management.

9. Details of supporting studies

9.1 Demonstration on moisture flow in grain

A study was conducted with objective to demonstrate how grain absorbs moisture from air and moisture flow in between air and grain. The experiment was designed and conducted from 059/9/18 to 059/11/16. Treatments taken in the study were as follows.

1) 6 ml water in a measuring tube.
2) 8 ml water in a measuring tube.
3) 10 ml water in a measuring tube.

Procedure

This study was kept in well-ventilated and cemented room. For each treatment an air tight glass jar was taken with 200gm of rice grain having equal moisture percentage (9.8%). A measuring tube each with above-mentioned water level was kept inside the jar. The water level in measuring tube and grain moisture percentage were observed and recorded on each FFS day. The relative humidity of room was not recorded. The data recorded are as in table 5.

Table 5 Water level and moisture percentage at different days.

Date of Observation	Treatments								
	6 ml			8 ml			10 ml		
	Moisture %	Water Level	Water loss	Moisture %	Water Level	Water loss	Moisture %	Water Level	Water loss
059-10-2	9.3	5.75 ml	0.25 ml	10.0	7.5	0.50 ml	9.6	9.25	0.75 ml
059-10-15	10.0	5.5 ml	0.25	10.4	5.5	2.0	11.2	8.25	1.0
059-11-16	11.8	4.5	1.5	12.0	4.7	0.8	12.6	7.8	0.45

Source: Record book of FFS

Result and discussion

The table 5 shows that as the water level in measuring tube decrease then the moisture percentage in grain increases. It can be said that grain absorbed water through air as a result moisture percentage of grain is increased. This justifies to the fact that grains for storage needs airtight container to prevent from moisture absorption from outer environment. At the same time it also showed the relation of relative humidity and moisture content of grain. This experiment was very useful and practical to show farmers that how moisture content of the grain increase.

9.2 Use of different locally available plant materials for storage pest control

The study was designed to observe and show the participants about the incidence of the insect in the stored grain treated with different plant materials. Ten different plant materials locally available were taken for this study. Grain (without disinfecting with any fumigant) and plant materials in powder form (brought by farmers themselves) were kept in airtight glass jar whose details is given in table 6. Farmers' did the visual observation in each FFS day during the whole period (2059/11/2 to 2060/01/12), just to see the insect population and damage from outside the jar.

Table: 6 Local plants used in grain storage

SN.	Plants	Dose gm	Grain wt.	Initial grain Moisture %	Remarks
1.	Bojho	5	500 gm	12	No insects were found up to 2060-1-12
2.	Kapur leaf	5	500 gm	12	Storage moths were seen but number was not counted.
3.	Chiraito leaf	3	300 gm	12	Storage moths were seen but number was not counted.
4.	Basak leaf	5	500 gm	11.6	Storage moths were seen but number was not counted.
5.	Asuro leaf	3	300 gm	11.6	Storage moths were seen but number was not counted.
6.	Neem leaf	3	300 gm	11.6	No insects were found up to 2060-1-12
7.	Bakaino leaf	3	300 gm	11.6	Storage moths were seen but number was not counted.
8.	Simali leaf	4	400 gm	11.6	Storage moths were seen but number was not counted.
9.	Paiyu leaf	3	300 gm	11.6	Storage moths were seen but number was not counted.
10.	Pirre leaf	3	300 gm	11.6	Storage moths were seen but number was not counted.

Result and discussion

The table 6 shows that no insect was observed in case of Neem and Bojho treatments. But in plant materials like Kapur, Chiraito, Basak, Asuro, Bakaino, Simali, Paiyu and Pirre moths were observed. This shows that Neem and Bojho being effective aginst stored insects like moths (as moth was visiblein other treatments) can be used in grain storage management.

10. Conclusion

This study showed that such FFS in storage management is very much helpful for those farmers who have participated in IPM FFS. This helps them to acquire complete knowledge and skill in integrated pest management from seed to seed. It requires further study for better improvement in integrated storage management.

Name and address of participant farmers

S.N.	Name	Address	M/F	Remarks
1.	Chitradhoj Khadka	Kapan - 9	M	
2.	Bindu Sigdel	Gokarna - 9	F	
3.	Rati Basnet	Gokarna - 9	F	
4.	Devaka Mahat	Gokarna - 7	F	
5.	Ramhari Bhandari	Nayapati - 9	M	
6.	Subadra Bista	Nayapati - 9	F	
7.	Dan Bahadur Lama	Kapan - 8	M	
8.	Ganeshmaya Shrestha	Gokarna - 7	F	
9.	Krishna Devi Shsrestha	Gokarna - 9	F	
10.	Uma Sigdel	Gokarna - 9	F	
11.	Gayatal Karni	Gokarna - 9	F	
12.	Anju Thakuri	Gokarna - 7	F	
13.	Reeta Dhungana	Gokarna - 7	F	
14.	Meena K.C.	Gokarna - 7	F	
15.	Kanchana Bista	Nayapati - 9	F	
16.	Godawari Bista	Nayapati - 9	F	
17.	Bimala Bista	Nayapati -9	F	
18.	Mandira Karki	Kapan - 6	F	
19.	Rajendra Shrestha	Gokarna - 9	M	
20.	Usha Sigdel	Gokarna - 9	F	
21.	Bimala Bhandari	Nayapati - 9	F	
22.	Rama Adhikari	Nayapati - 9	F	
23.	Manju Nepal	Nayapati - 9	F	
24.	Rabina Adhikari	Neyapati - 9	F	
25.	Bindu Bhandari	Nayapati - 9	F	

AESA format

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Annex 19 : Schedule of Officer Level IPM Trainers' Training

Day	Particulars	Time	Facilitator/Resource person	Remarks
Day I				
	Registration	10:00		
	Welcome and highlight on the objective of the TRAINING	10:00-10:15	Nabin CTD Shrestha	
	Introduction	10:15-10:40	S.P.Rijal	
	Program directives	10:40-11:00	G.K. KC	
	IPM success stories presentation (district wise)	11:00-2:00	S.P.Rijal/M.S. Paudyal	
	Lunch time	2:00-2:30		
	IPM success stories presentation (district wise) Contd....	2:30-3:00	S.P.Rijal/M.S. Paudyal	
	Discussion and synthesis	3:00-4:00	S.P.Rijal/M.S. Paudyal	
Day II				
	Recap	10:00-10:15	S.P.Rijal	
	Moving from strength to strength	10:15-11:00	B.R.Palikhe	
	Expectation matching	11:00-12:00	S.P.Rijal/M.N.Timalsena	
	Farmers field school training curriculum	12:00-12:15	M.S.Paudyal/M. N.Timalsena	
	A. Agro-ecosystem analysis • Introduction • Components • Interaction/interrelationship • Quality matrix	12:15-2:00	M.S.Paudyal/M. N.Timalsena	
	Lunch time	2:00-2:30		
	B Special topics, selection and its deliberation Synthesis	2:30-4:00	M.N.Timalsena/ M.S.Paudyal	
Day III				
	Participation in pesticide Act and Regulation amendment National Workshop	10:00-1:00		Participation in pesticide Act and Regulation amendment National Workshop

	Lunch time			
	Designing pragmatic field trial • Problem • Lay out (Comparative, problematic and supportive) • Data collection – Procedure/technique • Field Monitoring technique	2:00-4:00	S.C.Parasar/S.P.Rijal	
Day IV				
	Recap	10:-10:15	M.N.Timalsena	
	Key features of IPM with different commodities • Cereals • Vegetables • Fruit crops • Plantation crops	10:15-12:00	D.Mishra /M.N.Timalsena/ S.C.Parasar	
	Participatory planning • Identify the agri related units • Analysis of participant's vision • Identify the problem and analysis	12:00-2:00	D.Mishra /M.N.Timalsena	
	Lunch time	2:00-2:30		
	Participatory planning Contd... • Analysis of target • Prioritization of problem	2:30-4:00	D.Mishra /M.N.Timalsena	
Day V				
	Recap	10:00-10:15	S.C.Parasar	
	Participatory planning Contd... • Prioritization of program	10:15-1:00		
	Synthesis	1:00-2:00	D.Mishra /M.N.Timalsena	
	Lunch time	2:00-2:30		
	Farmer group dynamics • Socialization • Group mobilization	2:30-4:00	M.S.Paudyal/S.C. Parasar	

Day VI				
	Recap	10:00-10:15	D.Mishra	
	Farmer and science • Why farmer and science • Question/problem identification and topic selection	10:15-12:45	S.C.Parasar/S.P.Rijal	
	Hypothesis (concept matrix) • Preparation • Presentation	12;45-2:00	S.C.Parasar/S.P.Rijal	
	Lunch time	2:00-2:30		
	Hypothesis contd..	2:30-4:00	S.C.Parasar/S.P.Rijal	
	Day VII			
	Recap	10:00-10:15	M.S.Paudyal	
	Design • Natural variation and bias • Treatment • Replication • Plot size • Lay out	10:15-1:00	D.Mishra/S.C.Parasar	
	Observation (observation matrix)	1:00-2:00	D.Mishra/S.C.Parasar	
	Lunch time	2:00-2:30		
	Observation matrix contd...	2:30-4:00	D.Mishra/S.C.Parasar	
Day VIII				
	Recap	10:00-10:15	S.P.Rijal	
	Analysis • Simple • Consistency	10:15-12:00	D.Mishra/S.C.Parasar	
	Evaluation matrix • Economic analysis (partial budgeting)	12:00-2:00	S.C.Parasar	
	Lunch time	2:00-2:30		
	Review of farmer and science	2:00-4:00	D.Mishra/S.C.Parasar	

Day IX				
	Recap	10:00-10:15	M.N.Timalsena	
	Living soil • Exercise	10:15-12:00	M.S.Paudyal	
	Introduction to plant nutrient management (PNM) • Tools used in PNM • Nutrient balance calculation	12:00-2:00	Resource person	
	Lunch time	2:00-2:30		
	PNM exercise	2:30-4:00	Resource person	
Day X				
	Recap	10:00-10:15	D. Mishra	
	Soil based exercise	10:15-1:00	M.S.Paudyal/ S.P.Rijal	
	Post harvest exercise	1:00-2:00	S.C.Parasar/Y.K.Shrestha	
	Lunch time	2:00-2:30		
	Post harvest exercise contd...	2:30-3:00	Y.K.Shrestha/ MS.Paudyal	
	Post harvest activities in follow up program	3:00-4:00	Y.K.Shrestha/ S.C.Parasar	
Day XI				
	Recap	10:00-10:15	S.C.Parasar	
	Organic farming • Concept • Review • Discussion	10:15-12:00	D.R.Bhatta/ M.S.Paudyal	
	Participatory Monitoring and Evaluation (PM&E) • Concept • Activities of FFS • Criteria of FFS	12:00-2:00	S.P.Rijal/m.N. Timalsena	
	Lunch time	2:00-2:30		
	Participatory Monitoring and Evaluation (PM&E) contd... • PM&E indicator • Level of monitoring and evaluation	2:30-4:00	S.P.Rijal/m.N. Timalsena	

Day XII				
	Recap	10:00-10:15		
	Planning and budgeting • Norms of FFS • Preparation of documents • Preparation of voucher • Reporting of final budget	10:15-12:00	D.Mishra/M.S.Paudyal	
	• Synchronization • Reports • Report writing	12:00-2:00	S.C.Parasar/M.N. Timalsena	
	Lunch time	2:00-2:30		
	Closing ceremony			

Appendix 20 : Monitoring sheet for facilitation

Group :
Score 1-5

S.N.	C1erion	Score				
		1	2	3	4	5
1	Motivation					
2	Presentation Skill					
3	Leading to Conclusion					
4	Time Management					

Appendix 21 : Suggested Pose Harvest Activities in Tomato, Rice, Cawliflower, Citrus and Banang

Question – Suggested Post Harvest Activities inTomato

What type of post harvest activities could be incorporated in FFS and What will be the design for the studies, experiments on those ctivities ?

Answer

1. **Follow up Activities**

2. **Studies**

   - Harvesting - Fruit color/maturity
     - size
   - **Packaging**
     - Plastic crate
     - Local Doko
     - Bamboo Basket
     - Carton (Paper)
   - **Storage**
     - Zero energy storage
     - Room temp. Storage.

3. **Other Basic Studies**

   - Suckering vs desuckering
   - Application of lime in desuckered sucker
   - Bunching vs debunching
   - Debunching
   - Intercultural vs role corpping
   - Seed sowing/planting
   - Scaring beetle management
   - Wrapping of bunch
   - Spraying of repellent/botanical pesticide
   - Weevil management
   - Choping trap
   - Sanitation
   - Use of Pesticide

Question – Post Harvest Activities suggested for rice

What type of post harvest activities could be incorporated in FFS and What will be the design for the studies, experiments on those activities ?

Answer

- Better to conduct post harvest activities as follow-up program of IPM FFS

Study

1. Location specific problems based on
   - Storage structure
   - Moisture
   - Temperature
2. Rat management

3. Use of indegeous materials/techniques
4. Pest biology study
5. Design : Compartive study

Question : (Post harvest activities suggested for Cauliflower)

What type of post harvest activities could be incorporated in FFS and What will be the design for the studies, experiments on those activities ?

Answer

- FFS Activities

- It depands on season
- It is better for follow up activities (4 weeks)

1. Size grading

- Relation with price/consumer attraction

- Upto 500 gm
- 500 - 1000 gm
- 1000 - 1500 gm
- >155 gm.

2. Quality Grading

- Color/variety
- No of remaining leaf
- Stalk length

3. Zero energy storage VS room to storage

- 3 days interval
- 4 weeks period
- Quality
- Change in weight

4. Transportation

- Sector crate
- Plastic crate — With open curd
- Jute bag — With closed curd.

5. Processing/value add

Question : (Post harvest activities suggested for Citrus)

Question :

What type of post harvest activities could be incorporated in FFS and What will be the design for the studies, experiments on those activities ?

Answer

- Waxing of fruits LR IS
- Wrapping of fruits by tissue net
- Use of cellar store
- Use of scissors for harvesting
- Use of cartoon for transportation (wood, paper, plastic etc)
- Cold store

- Zero energy storage
- Use of millet/rice husk (for 30 days)
- Use of exhaust fan in storage
- Sorting of fruits (Wounded)
- Periodical checks (every week)
- Dipping in benomy (….?)

Note : It is better to conduct a short time post harvest FFS after the completion of regular citrus FFS in the same group.

Question: **(Post harvest activities suggested for Banana)**

What type of post harvest activities could be incorporated in FFS and What will be the design for the studies, experiments on those activities ?

Answer

- cutting inflorescence (Bugo Katne)
- Wrapping fruit bunch with dry leaves
- Cutting bunch with sharp knife without making injury to the fruit.
- Cutting the bunch after physiological maturity
- Harvest the bunch after drying of dew/at the time of sunset.
- Grading the comb on the basis of size.

Transportation/Packaging:

- Collect on the doko/basket carton , wrapping with dry straw, newspaper, Foam cushions from orchard to collection center
- Transportation on vehicle with dry long sheath for support during distance market,

Ripening :

- Use Asuro, Siris, Bogate leaf jute bags, plastic wrapping, smoking for ripening
- Use kripon for ripening.

Study :

- Inflorescence cutting Vs non cutting
- Wrapping VS non wrapping
- Use different botanicals (local) materials for ripening
- *Cutting banana fruit at different date (observe ripening difference at room and standing plant.*

Appendix 22 : Others

Note : subdivision of the budget can be interchanged within the total allocated budget

Orange group materials

Training materials

- register x copy x pencil
- dotpen x ply wood
- Chart, brown paper
- marker pen
- Crawn x polythion bag
- netcloth, clay pot, photocopy
- masking tape, vial
- hand lens swiping net.
- scissor

- scale
- signboard
- ledder
- eugenal
- cuppor sulphate
- dropper
- petridishes

Observation Matrix

SN	What should be observed	How	When
1	Wound healing	Measure by Scale	30 days interval
2	Success of Nechuki	Visual observation (hf]l8Psf] / ghf]l8Psf], lj?jfsf] cj:yf_	Fortnightly
3	Yield	Weighing	At the time of harvest
4	Quality of fruit	Size, Juice content, Texture of the skin and tightness	,,

Checklist for

Citrus farmers Field School

- First Checklist - As such
- Comparative study of IPM Vs Farmers Practice - As such
- Socio economic data collection - As such
- Report on Preparatory meetings - As such
- GAM, Ballof box report - -pd]/ klg /fVg] , Age cg';f/ /fVg]_
- Central/Regional level monitoring of IPM activities - As such
- Studies and experiments

Basic studies

1. Foot rot study
   A. Application of Bordcux paste - Date :
   B. Nechuki done - Date
2. Inter cropping study
   A. Date conducted Crop : C
3. Planting of citrus plant study

Date conducted :

4. Scale insect infestation study

- date conducted :
- Name of the material used
- Dosage :
- Date of applications : 1st ……..
  2nd …….

Short Term Studies

- Insect 200/crup studies
- Effectiveness of pheromone trap

Norms

pk ;dx ‖ Participatory Planning/Farmer and Science

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Participatory Planing/ Farmer and science

- Refreshment 25/day/person
- DSA 500/day/official (person)
- Others as such

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Gender Analysis Matrix (GAM)

1. Sucker selection
2. Land preparation
   - Layout
   - Pitting
   - Comport application

Group Suggestions :

The PM & E indicators should be pre-tested in Jhapa, Morang and Chitwan.
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Tomato Group

1. Comparative study of IPM FP.
   - Cultural Practices differentiation
2. Simulation (insects damage)
   - defoliation
3. Yield and pest response in micronutrients
4. variety monitoring
5. Crop geometry (i.e. distance of Plantation)
6. Other if any :
   - Effectiveness of Bioagents

Review of Norms :

1. FFS by IPM Trainer (?= $$,&%)_
   - DSA ?= $)) xg'kg]-k\|t JolQm÷k\|t lbg_
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   - DSA ?= $)) xgkg].
   - Refreshment ?= @% k\|t JolQm÷k\|t lbg

2. FFS by Farmer
   - OK
   - Farmer Trainer Travel - ?= %) k\|t lbg k\|t JolQm

$= Farmer and Science
   - DSA ?= $)) xgkg].

- Refreshment ?= @% k|t JolQm k|t lbg .

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F2FFS Monitoring ug{5§}gd{ xgkg]{.

!= DSA .. Rs. 400 x 3 times x 2 person .. 2400
2. Fuel (Travel) ,, ,, ,, 1000
3. Stationary ,, ,, ,, 1000
4. Contingency ,, ,, ,, 600
5000

- of]gd{ k|t F2FFS sf nflu xgkg]{.

FFS Norms and Activities

1. **FFS by IPM Trainer**
   Field staff (27 x 300) = 8100
   Farmer (27 x 150) = 3175
   IPM trainer (27 X 500) = 13500
   Guest Trainer 5 x 500 = 2500
   Total = 27275
2. **Trainer materials**
   (Register, Copy ……. ladder etc.) = 8000
3. Refreshment (for 30 persons) 30 x 27 x 25 = 20250
4. Monitoring - 3 times, 9 person for 2 days
   3 x 9 x 2 x 200 = 10, 800
5. Fuel/transportation 27 x 200 = 5400
6. Field day (as such) + certificates = 8500
7. Report writing - 5000

Total = 58125

3. Participatory Planning
1. Allowance 1x5x500 = 2500
   1x5x300 = 1500
2. Training materials/ stationary = 3000
3. Refreshment 30 x 5x25 = 3750
4. Fuel/ transportation = 1000
5. Report writing = 5000
   Total = 16750

4. Farmers and Science

1. Allowance 1 x 9 x 500 = 4500
   1 x 9 x 300 = 2700
2. Stationary = 8000
3. Refreshment 30x5x25 = 3750
4. Fuel/transportation = 1800
5. Report Writing = 5000

Total = 25750

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Group Dynamic 3 : Making a knot Game

Procedure :

1. Each group having 4 person were provided 4 tremp size plastic role and told to keep criss cross.
2. Then they were told to make a small on smaller knot without changing or remoring the rope from hand and individual

3. Than, after completion they were again told to open the knot so that it can be put as provious position of separate rope.

Observation :

Whatever they did in making knot without thinking become diffcult or burdev/while unfolding the knot

Lession learnt :

- So, while doing any action we should think before what to be dove systematically.

Group Division of Participants

Tomato Group	**Cauliflower Group**
1. P. Dawadee	1. Rajesh K C
2. Thaman Karki	2. H.B. KC
3. Madan K. Shrestha	3. R. Kharel
4. Ramesh C. Subedi	4. Basu D.S. Pokhrel
5. Arun Ghimire	5. L. Bohara
6. S.K. Karna	6. S. K. Paudel
7. P.R. Adhikari	7. Jitendra Jha
Banana Group	**Citrus Group**
1. M.B. Chhetri	1. H.R.Bista
2. Narayan K. Shrestha	2. Bharat B. Acharya
3. G.B.Thapa	3. Achyut Adhikari
4. H.R. Pokhrel	4. Harihar Adhikari
5. S. D. Mainali	5. Y.P. Paudel
6. Dhan B. Rana	6. Dipak Adhikari
7. D.S. Sah	7. P.L. Hada

Rice Group

1. R.K. Malla
2. Kishor Bhattarai
3. Laxmi Kharel
4. Mahesh Acharya
5. Y. K. Shrestha
6. Govinda Barakoti

Review of Norms :

3. FFS by IPM Trainer (?= $$,&%)_
   - DSA ?= $)) xg'kg]-k|t JolQm÷k|t lbg_
   - k|tj]bg tof/L ?= !)))
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@= Participatory Planning
   - DSA ?= $)) xgkg].
   - Refreshment ?= @% k|t JolQm÷k|t lbg

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- ;a}Activities df s[fsx?sf clt l/Q] # hgfnf0{Refreshment vr{Joj:yf xgkg]{.

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!= DSA .. Rs. 400 x 3 times x 2 person .. 2400
2. Fuel (Travel) ,, ,, ,, 1000
3. Stationary ,, ,, ,, 1000
4. Contingency ,, ,, ,, 600
5000

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Special Topics (Group Tomato)

Activities	Conventional / Present way of Conduction	Suggestion / Improvement
1. Selection of Special Topics	✸ Farmers demand ✸ Field supervision ✸ Problem based ✸ According to cropping Calendar ✸ Epidemic ✸ AESA	✸ Time Management ✸ Teaching materials ✸ Demonstration ✸ Confidence to facilitator ✸ Presentation Skill
2. Methodology of Special Topics Session	✸ Participatory discussion ✸ Poster/pamphlet ✸ Speciemen	✸ Related field visit case study
3. Content and Relation with AESA	✸ Based on AESA	✸ Open question and Asnwer

Special Topics (Group Citrus)

Activities	Conventional / Present way of Conduction	Suggestion / Improvement
1. Selection of Special Topics	✸ Based on field problems ✸ Participatory rankings ✸ 10% time of special topics for the problems of other crops	✸ As it is.
2. Methodology of Special Topics Session	✸ Lecture and discussion ✸ Practical demonstration	✸ Brain storming ✸ Role play
3. Content and Relation with AESA	✸ Introduction & identification ✸ Importance ✸ Management	✸ Emphasis should be given on participants decisions

Special Topics (Group Cauliflower)

Activities	Conventional / Present way of Conduction	Suggestion / Improvement
1. Selection of Special Topics	✸ Problem this week ✸ Solution Next Week	✸ Sequential Topics ✸ Situation guided Topics ✸ Emergency/New
2. Methodology of Special Topics Session	✸ Lecture/P.D./Demo at Venue	✸ On farm Demo/Field
3. Content and Relation with AESA	✸ Discussion Indoor ✸ Generalized	✸ Should be outdoor ✸ Nice Pictorial representation

Special Topics (Group Banana)

Activities	Conventional / Present way of Conduction	Suggestion / Improvement
1. Selection of Special Topics	✸ Crop Stages ✸ Problems oriented ✸ Problems based on previous week	✸ Emphasis should be given on present situation/problems
2. Methodology of Special Topics Session	✸ Dominated by lecture method rather than participatory ✸ Teaching materials like pictures, Charts etc. are optional	✸ Must be more participatory ✸ It shoud be used compulsurly
3. Content and Relation with AESA	✸ Classes are conducted felt during AESA but relation to AESA is some what lacking	✸ Needs more efforts to relate closely to the AESA

Special Topics (Group Rice)

Activities	**Conventional / Present way of Conduction**	**Suggestion / Improvement**
1. Selection of Special Topics	✸ Crop calendar ✸ Problems on field ✸ Experiences of farmers ✸ Observed need	✸ Based on BBT ✸ To explore in preparatory meetings
2. Methodology of Special Topics Session	✸ Lecture type ✸ Participatory, Group discussion ✸ Role play ✸ Demonstration, Display, Visual aids	✸ Need to make more participatory , Based on situation
3. Content and Relation with AESA	✸ Seed ✸ Fertilizer, Composting ✸ Pesticide Monologue ✸ Use of Pesticides on IPs and NEs ✸ Root vessel test ✸ Rat population dynamics ✸ Cup studies ✸ Zoo Studies ✸ Dirty Trap ✸ Life cycle of Insects ✸ Diseases ✸ Weeds ✸ Food webs ✸ Economic analysis ✸ Life Cycle of Rice	✸ Need to make more participatory , Based on situation ✸ Content should be related with field situation.

Agro-Ecosystem analysis Quality Matrix

Steps	Quality Indicators
Field Observation	
Relevant Data Collection	
Data Processing and Analysis	
Presentation and Decision Making	

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Question :

What type of post harvest activities could be incorporated in FFS and What will be the design for the studies, experiments on those activities ?

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AGRO-ECOSYSTEM ANALYSIS

A. Observation

1. How to select sample plant?
2. How to make proper representation of field?
3. What may be the field area?
4. What are the important points/aspects that could make observation process more effective?

B. Data Collection

1. What are the most important data to be collected?
2. What are the problems of data collection for AESA and their possible solution?
3. Where to observe?
4. How to observe?
5. How to make monitoring more effective?

C. Processing and Analysis

1. How to record the data?
2. Where to put different information item on AESA report and how to organize them?
3. What may be the measurements of the collected information?
4. How to simplify the calculation?
5. What would be the appropriate tool to analyze the information?
6. What information and factors are essential to mention on AESA report for the reflection of real field situation?
7. How to relate environment (soil, temp., humidity, moisture level) disease, insect pest and NEs (predation, parasitization) with health of crop and crop growth stage?
8. How to mention the trend of crop development?
9. How AESA preparation time can be reduced and make it more effective?
10. How to make good participation of women and ultra-poor?

D. Presentation

1. How the ultimate role and contribution of agro-ecosystem and crop growth could be best related while making decisions?
2. How to make lively discussion?
3. How to draw group consensus for management strategy?
4. How to relate and review the previous decision and implementation?