

**Linking Farmers Field School (FFS) towards organic agriculture:
A Case Study of Tharu Ethnic community in Nawalparasi District, Nepal**

Yubak Dhoj G. C., PhD
Program Director and National IPM Coordinator

Background

In recent years, the plant protection scenario in most parts of the developed and developing countries have undergone dramatic changes. The emphasis of the production of most of the agricultural crops has shifted from the hitherto dominant chemical pesticides to less and less use of chemical pesticides and finally towards organic production by using natural resources and indigenous knowledge of the farming communities. There have been great philosophical jumps in this regard where the concept of pests triangle with environment, pathogens and host are shifted to seven different Ps. Within this concept, there should be understanding and coordination of Plant, Pest, Pathogens, Predators, Parasitoids, Pesticides and People. In recent years, the Ps mentioned in the last has becoming more vibrant as it has great relation with the increasing or decreasing pest status. The protection of crops by combating the negative effects of pests on crop production is of major importance for food security especially in a developing country like Nepal. In this scenario, the motto of Plant Protection could be "**loose less, feed more**" making crop production easy, economical and environmental friendly. This is particularly true in these days where increased productivity is needed in order to achieve adequate food supply while considering the better environment. In order to address food security issues, many approaches are practiced. Among them, Integrated Pest Management (IPM) is one of the farmers' centred approaches which ensure optimum production in an economic and sustainable means with the full consideration for healthy environment. This novel idea was initiated for the first time in the sixties in developed world and only about mid 90s in case of Nepal. Until now, it has gone several metamorphoses with greater emphasis of producing safe foods which in fact in the line of a entry points for organic agriculture.

In case of Nepal, the chemical pesticides form an important means to control pests since long time. Despite the widespread use of pesticides, pest damage causes significant yield loss in most agricultural systems and it is still evident in case of commercialised vegetable commodities produced in the areas where market facilities exist. The world-wide pre-harvest crop losses caused by pests are estimated by FAO to be the order of 30-35%, and this figure is nearly within the same ranges in case of Nepal and sometimes in epidemics it reaches higher than that. With the rapid growth of pesticide resistance in insects, pathogens and weeds, these losses are likely to increase. Non-target effects to the human beings through the means of pollution in air, water, contaminated foods etc are also been realised. In Nepal, it is still very alarming as most of the producers are illiterate and likely effects of the pesticides are very high. There are several records and instances that, mis-use, overuse and abuse of these chemical compounds are very common in Nepal which however, varies from community to community. To combat this trend it is essential to design programmes of pest management that depend on the intelligent integration of various control measures and not on chemical control alone. The increased awareness of the environment and the need to implement sustainable agriculture production methods, and the occurrence of accidents with pesticides support this strive against the injudicious use of pesticides.

In order to implement these new programmes in Nepal, there should be initiation taken by some organisations. At the same time, there should be conceptual clarity among the technicians, pesticide handlers and farmers because they have lot of hangover of the pesticide oriented pest control method. In developed economy, a range of techniques are promoted by the Government and non-governmental organisations, which has been used by the farmers with great faith. The techniques include the use of various cultural practices such as crop rotation, multiple cropping, timing of planting, further habitat management that enhances natural enemy populations, biological control agents, direct trapping of insects, and use of thresholds and finally the careful and timed use of pesticides. At the same time basket of ethno-science are common among the Nepalese farmers, which however, can not be seen as well fused with improved agricultural practices. There is still wider gap among the practitioners involved in this field. Many botanical plants are thought useful for pest management. Similarly, there are many ideas and traditional beliefs on insect and disease management. The whole concept, utilising all possible pest control measures in an ecologically sound and for the farmer economically viable programme, is in fact called an integrated pest management (IPM).

Integrated pest management (IPM)

IPM is an interdisciplinary approach to reduce crop losses through the use, by farmers, or optimum mixes of pest control techniques. It combines the aims of agricultural productivity, environmental sustainability and cost effectiveness. It has arisen out of the need to avoid the problems of pest resistance build-up (leading to pest resurgence), secondary pest outbreaks, human health problems, the high cost of pesticide control and environmental degradation caused by excessive and inappropriate chemical pesticide use. The approach has become dosely associated with enabling farmers to make crop protection decisions in full awareness of factors operating in their agro - ecosystems.

With its emphasis on making the best use of local and human resources, IPM encourages, wherever appropriate, the use of natural control mechanisms (for instance pest predators) and "traditional" pest management techniques used by farmers. However, the adoption of practical alternatives to chemical methods of control may be difficult to apply on farms than simple chemical control techniques. It is still difficult in case of Nepal as the country has no chemical pesticides manufacturing industries in one side and purchasing of such compounds from abroad needs lot of resources in another side. An understanding of not only the biology and ecology of the injury causing agents (pest insects, pathogens and vertebrate pests) is required, but also of all the possible effects of the various control measures on the particular farming system of the farmers' technical solutions, the lack of resources, or socio-economic and other factors should also be considered. IPM considers how a farmer would determine when to use each type of method. IPM is a pest control system that incorporates a variety of techniques to promote the best socioeconomic and environmental conditions. For the effective adoption of the IPM, clearly understanding of the concepts, approach, tools and practices on the technicians, pesticide handlers, farmers and various extension methodologies is mandatory. At the same time,

every components of IPM such as biological monitoring, environmental monitoring, action and economic thresholds, choice of control methods should equally be considered, which may lead organic production of the agricultural crops. Adoption of IPM tools and components while producing organic vegetable is largely critical in case of Nepal.

Present pest management differs from control orientation to management, which is the origin of IPM. In recent days it is viewed in relation to human behavior and actions rather than pest killing or eradication motives. It means IPM gives more emphasis to the holistic approach of pest management based on certain principles of pest management whereas; traditional methods were basically oriented with the uses of chemical pesticides. Still there is lack of knowledge among the crop protection technicians involved in Governmental and non-governmental organizations about the recent approach of IPM practices, know how of the IPM tools, their application etc. Therefore, any initiatives through the modules of demonstration aim to anchor the knowledge gaps about the recent approach of IPM principles and practices with that of pesticide orientated pest control in Nepal. In order to raise the awareness on organic production among the producers and technicians it is important to initiate activities like **organic village**. It is largely envisaged these kinds of activities might be one of the cornerstones towards organic agriculture in Nepal.

Why organic villages for vegetables were attempted?

While talking organic agriculture, Nepal might be at embryonic stage however, looking into its geographical diversity and opportunity for niche products, its soil is highly fertile. In fact, it has not been using more amounts of active ingredients (a.i.) of the chemical pesticides per unit area in comparison to other neighboring countries. If we look back this figure which is still below than 163 g a.i on a hectare basis, while comparing more than 1200-1400 g a.i. per hectare of the countries like Korea, Japan. Moreover, it has not contaminated its soils and agricultural products as more as exaggerated by some of the organizations and in Nepal. However, it is true that, unnecessary and injudicious use of chemical pesticides is high in some crops and locations, which can not be generalized in the national context. In general term, most of its agricultural product in remote areas is primarily of organic nature as there is low or no access of external inputs. In this aspect, it can expand its organic exports and substitute the imports. Being a member country of World Trade Organisation (WTO), it has both challenges and opportunities for taking more of the advantages. It has to fulfill many of the pre-requisites and satisfy commitments as expressed by the Government in different international conventions, treatise and in the long term plannings.

Without much effort, Nepal can take advantages by increasing exports of certain niche products such as tea, coffee, honey and many of the indigenous products. Location specific and crop specific programs may be initiated where IPM could be an entry point to organic agriculture in the long run. In fact, IPM and organic pest management (OPM) are guided with similar principles. In this context, IPM could be an entry point to OPM. Increasing emphasis has to lay on substitution of inorganic inputs through enhance uses of organic sources. Therefore, the organic village intends to broaden the growers view on plant protection and its role on organic production in their own work situation by enhancing and strengthening the knowledge and skills of the farmer. They will be enabling to grow vegetables basically off-season without using poisonous chemical pesticides in one hand and heavy dependence on routine control measures in another side. The efforts has to largely lay on the changes on the farmers believes, skills and rhetoric practices which were largely imposed by so called modern agriculture. In order to achieve these goals, the organic approach was initiated on a pilot basis in a small scale in traditional *Tharu ethnic community* in Nawalparasi District. The underlying causes of choosing this community in fact is the *Tharu* culture is very rich in traditional knowledge including healing of the agricultural pests and diseases. They are adopting such practices since time immemorial; however, these practices and beliefs are concentrated only in certain areas, where they are settled. Transfer of traditional knowledge to other area is also the objectives of this study along with the improvement of their existing knowledge. Therefore, this study was attempted to initiate to give the awareness at three different tiers, to the producers, technicians and the consumers.

Following were some of the specific objectives of these initiatives;

- Enable farming communities about husbandry practices of agriculture
- Create mass awareness about the hazards of chemical pesticides so as to arouse their interest towards organic production in the long run
- Enable farmers in OPM approach as an alternatives to the chemical pesticides
- Establish model farm by integrating all the components of organic vegetable production
- Organize OPM training suitable for different level of farmers with especial emphasis of women and socially deprived and marginalized ethnic community
- Enable farmers for using eco-friendly pest management practices and tools for organic production through IPM as entry point
- Establish OPM farm as resource centre for communicating and disseminating technologies appropriate for subsistence to semi commercial farmers of Nepal
- Up-scale the modality of organic farming into wider agro-ecological zones

What had been done?

The study was conducted in Pithauli Village Development Committee (VDC), Nawalparasi district, Nepal in 2009/2010. After taking base line information of the site, farmer group was formed. The major ethnic group of this site is socially, economically marginalized deprived *Tharu* ethnic people. Their source of livelihood is basically agriculture and these people are very laborious by their ethnic occupation. Geographically, the site is located into flat land area, having access of road and partial irrigation. At the same time, the selected area is located in the vicinity of tourist hotels and business area indicating the ample scope of trading their produce in future. Traditional system of growing agricultural crop is widespread in the site as the majorities of the growers are illiterate and have low exposure on the modern agricultural system. As a result, use of traditional varieties and cultivation practice were very common. In this site, indiscriminate use of chemical pesticide was also started after the influence of commercial agriculture in the vicinity. At the same time, likely effects of these compounds are realized in the human health and

which were alarmingly increasing over the period. Short term and long term hazards were reported occasionally and accidentally by different organizations, however, farmer had almost low or no perception about these effects. The major reasons are due to lack of knowledge about the associated hazards of chemical pesticides and their safe uses. There is greater misconception among the majority of the farmers as they think chemical pesticides are "medicine" not as a "poison". Because of this reason the likely misuses and abuse are very high. At the same time, the farmers are largely ignorant about proper choice and method of application of chemical pesticides. Looking into the progressiveness of the farmer, there were ample scope of enhancing their knowledge and making organic agriculture as profitable enterprises in the site. Looking into this prospect organic production was initiated to build a model farm in the district from the very grass roots level. Probably, this will be first initiative in the country with regard to ethnic base of the people having very strong affection in the agricultural occupation.

The site is not far from the road head passing from east west high way, which allowed them to sell their produce up to tourist hotels and restaurants. At present, the model organic farm coverage is nearly two hectare and first batch of organic production of some of the seasonal and off-season vegetables. In the first batch cucurbitaceous vegetables such as cucumber, sponge gourd, bottle gourd, bitter melon, snake melon, ladies finger etc were grown. These crops were found profitable for growing particularly in this season, where they could sell these produce. Beside these vegetables, other crops were also grown as minor vegetable crops. Other crops such as spring season maize, Dhaincha (*Crotalaria juncea*), etc were also grown. In the rainy season, they have planned for organic rice production.

Incidence of insect pests and disease was recorded to a considerable level; however, they were combated culturally and adopting with biorational approaches. In cultural practices, farmers follow *sod culture*, incorporation of weeds and organic amendments, crop rotation, mix cropping, trap cropping etc. Reduction of the problem was found to an appreciable level. The severity of fruit fly (*Bactrocera cucurbitae*) was reduced by male annihilation techniques attracting with Steiner trap. Instead of using cue lure, locally prepared papaya juice and pumpkin juice were used as attractant in the trap where, where the insect population was minimized to a satisfactory level. Beside, these lure and kill approach, the insect pests and disease were minimized by using botanical plant materials which are available in their locality. Insect pests were killed using local knowledge and technology.

More emphasis was laid on cultural and biorational approach by integrating the traditional knowledge and folk lore of the *Tharu* ethnic people. The plan for growing round year production and marketing of vegetables profusely with the, mixture of summer and winter crops was possible. After technological intervention target were concentrated for producing ranges of summer and Cole crops organically. The farmers were well acquainted through community level of training and support about the improved method of agriculture. The major emphasis of such training was to schooling them into improved organic production techniques, where the farmers bring their pertinent problem about production and protection of the crops. The farmer groups were guided by technicians who deliver the skill on production aspect to the ranges of plant protection aspects. Major emphasis was laid from identification of the insects, diseases and other biotic problems. At every farmers field school (FFS), the community people were asked for collection, involvement for identification and maintenance as insect and disease zoos. The major emphasis was laid on application of the principles of organic production method of agricultural crops so the use and misuse of chemical pesticides are expected to be reduced gradually. Similarly, enhancement of the existing knowledge of the farmers was other objectives, where they were taught about indigenous method of pest and disease management. The farmers were asked to collect all the information with regard to crop pests, their simple biology and control method. They collected information on plant materials which are useful for pest management. After having data base of such materials, they were enabling to prepare "local pesticide" using local techniques. The material they named as "*Jhol Mal*". Along with this, use of cattle urine, wood ash mixing with kerosene, coal tar, animal milk etc were practiced in pest and disease management.

Achievement so far

Considering the time span of the study, it was too early to mention the outputs in tangible term as the intervention was short i. e. just for one year. However, there had been greater enthusiasm of the farmers about the efforts and initiation. In general, the study had been able to dug out the core problems of agricultural production, plant protection, and full exploitation of indigenous knowledge and techniques by changing the knowlege, attitude and practices. The farmers are able to know the suitable crop varieties into their locality along with their cultivation practices. The concept of using better seeds was greatly enhanced. At the same time, they knew the improved method of cultivation and suitable time by which they could produce and sale those as off-season produce. Their knowledge and decision on the appropriate choice of the biorational approach for managing insect pests and disease had been increased. In their view, the chemical pesticides are major culprits for problems of human health, environment and soil. The acquisition of knowledge was possible through meeting, visits, field observation and participating them in the farmers' field school. At the same time, the farmers were able to prepare botanical pesticide as "*Liquid pesticide*" using the plant materials which are available in their farm land. This along with other materials such as wood ash, kerosene, local plant materials etc had been found very encouraging in reducing the status of various insect pest and diseases. The farmers are found to be keen for continuation of such activities in the future too.

The major outputs can be seen in the improvement in the knowledge, skills and practices of the farmers. In fact it was the perfect venue for linking of the principles into practices all the way through Farmers Field School (FFS) to organic agriculture. If these enthusiasms will be continued through the coordinated approach of the Government and non-governmental organizations, the hope for producing, trading and naming this community as organic village seems possible in real sense. Taking this as a good example, future programs may be focused in other communities and locations. At the same time it could be a suitable examples to the individual and organisation involved in this area and up-scaed and outscaled to other crops and wider area. In future more focused program needs to be conducted which should have well link in the value chain and possibility of making agriculture as income generation enterprises. The important pre-requisite for organic agriculture in fact is the availability of alternatives products

to chemical pesticides. At the same time, growers and consumer awareness are other crucial issues. This has to be well supported by policies. Towards this direction, Government of Nepal and private organizations has to work hand in hand by involving all the counterparts working in research, teaching and extension.

Lessons learned

FFS has becoming one of the important means of community learning centre, which has to upscale to a wider area, however, most of the organizations has confined it very narrowly. In fact, this should not be only a platform of teaching with a fixed curriculum, but this should be utilised as a important places for changing farmers knowledge, attitude and practices. The environment for this should be informal and has well agro-ecocystem. In case of Nepal, couple of organizations has succeeded in changing the knowledge with very rhetorically blaming to the chemical pesticides, however, they have achieved almost nil towards alternative means. Because of this situation, such schools are less and less sustainable and practicing by almost negligible farm families. Simply such school may be just for keeping the job occupied for some group of people. In majority of the cases, farmers field schools are disappearing soon after the closer of the programs, that is why they have to be linked to the profit, where the organic approach could be one of them.

Another very important thing is that, FFS may be utilized as a best platform of validating hypothesis and beliefs with that of improved technology, which offers better opportunity for practicing them, seeing them and analysis them whether it is profitable or not. This infact will help in changing the attitudes of the farmers. The so called sophisticated research and their associated costs may be reduced significantly. At the same time, blanket recommendation IPM technology may be narrowed down, which has taken as a better outcome of the study. There is wider opportunity of producing some of the selected agricultural commodities in some of the specific location by which the nation may take significant benefits, which however, has to adopt and uptake by the national programs who are primarily mandated for running such kind of activitiies. Considering these aspect, since this year, Plant Protection Directorate has been conducting some of the activities towards this direction.

Future outlook

As Plant Protction Directorate is primarily mandated for reducing crop loosess caused by various biotic and abiotic constraints, it has to be more proactive towards the changing context nationally and internationally. To this end, it has recently completed its review program to the country wide and has received its feed back. Looking into its past strategies, it has to utilise the achievements so far and focus its program on the area of safer food production on the selected commodity and stressed for saving more and more food production to feed its ever growing population while considering better environments. Considering these facts, it has been launching some of the campaign based plant protection through the implementation of plant clinic, pest data base on the district to region and at the national level. Monitoring of the available pesticides and their residues on the crop will discourage the continuous use of chemical pesticides than the desired level. Development of alternatives technologies and compounds such as biorational compounds (botanical and biopesticides) as a means to reduce the use of chemical pesticides. Continuous exploration and exploitation of the useful natural enemies against pest insects will not be limited in principle. Transfer of technology from the researchers' lab to the extension agents' lab will be first step through functional enhancement of the capacity of its regional lab. For this one central lab is going to be established and it will continuously fuel to the regional lab and they further will support to the district program. In this way, the heart of plant protection will be made stronger. In addition to these, regular services like emergency plant protection, capacity building of the farmers and technicians through Farmers Field School (FFS) and their link towards organic agriculture will be continued. In nutshell FFS is the entry point for organic agriculture and PPD intends to make it bold and loud and expands its hand for joining more hands.