

Proceedings

APPPC REGIONAL WORKSHOP

ON

Empowering Farmers through IPM-FFS Training
in Support of Sustainable Intensification of Crop
Production

**Asia and Pacific Plant Protection Commission
2017**

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TABLE OF CONTENTS

	Page
Executive summary	iii
Group photo	iv
1 INTRODUCTION	1
1.1 Background and purpose	1
1.2 Opening session	2
2 COUNTRY REPORTS	3
2.1 Bangladesh	3
2.2 Cambodia	8
2.3 China P.R.	11
2.4 Lao PDR	14
2.5 Malaysia	17
2.6 Myanmar	20
2.7 Nepal	24
2.8 Pakistan	32
2.9 Philippines	34
2.10 Sri Lanka	38
2.11 Thailand	44
2.12 Vietnam	45
2.13 Summary, discussions and conclusion	48
3 SUSTAINABLE INTENSIFICATION OF CROP PRODUCTION	50
3.1 Long-term impact assessment <i>by Gerd Walter-Echols</i>	50
3.2 FFS Guidance Document <i>by Alma Linda AbuBakar</i>	55
3.3 Institutionalization workshop <i>by Alma Linda AbuBakar</i>	59
3.4 Climate change adaptation in agriculture through FFS in Nepal <i>by Madhusudan Paudel</i>	61
3.5 Innovations in IPM-FFS and adaptation to climate change <i>by Cahyana Widyastama</i>	66
3.6 IPM developments in support of Save and Grow in Thailand <i>by Paveena Konyong</i>	72
3.7 Linking plant clinics with FFS <i>by Vonod Pandit</i>	77
3.8 Rapid bioassay pesticide residue analysis in Nepal <i>by Man Bhandaur Thapa</i>	80
3.9 Intensification and institutionalization of IPM-FFs in Nepal <i>by Binod Saha</i>	85
3.10 FFS – an approach to address food and nutrition security <i>by Ratna Kumar Jha</i>	89
3.11 Dissemination of Cost-effective organic farming technology <i>by Khadga Bhankta Paudel</i>	94
3.12 Developing IPM packages for vegetable crops <i>by Lalit Prasah Sah</i>	105
3.13 Summary, discussions and conclusion	107
4 FIELD TRIP	112
4.1 Rapid bioassay pesticide residue laboratory	112
4.2 Sayapatri IPM Resouce Centre in Kushadevi, Kavre	112
4.3 IPM-FFS	113
4.4 Conclusion	114

	Page
5	DISCUSSIONS AND FOLLOW-UP 115
5.1	SWOT analysis of IPM-FFS 115
5.2	Follow-up strategy of SICP 118
5.3	Development and use of possible alternatives to chemical pesticides 119
5.4	New pests 120
5.5	Climate change challenges 120
6	CLOSING SESSION 121
	 ANNEXES 122
	ANNEX 1: Workshop programme 123
	ANNEX 2: List of participants and addresses 125

EXECUTIVE SUMMARY

The workshop took place in Kathmandu, Nepal from 27 February to 2 March 2017 and was attended by 30 participants (including 7 women) from 13 Asian countries. It was organized by the Standing Committee on IPM of the Asia and Pacific Plant Protection Commission (APPPC) and FAO of the United Nations in cooperation with the Plant Protection Directorate in Kathmandu.

Delegates from participating countries reviewed up-to-date developments of farmer empowerment approaches with Farmer Field Schools (FFS) in the region. Participants shared experiences and lessons-learned from various country practices of FFS. It was noted that FFS has become the mainstream approach for developing capacities of farmers and communities in discovery-based learning and has been included in various programmes such as food and nutrition security, health (plant, soil, human or environment) management, livestock, water management, climate adaptation, etc. Notable progress of institutionalization and networking of FFS has been made in Bangladesh, Cambodia, China, Indonesia, Nepal, Philippines, Thailand and Vietnam. More and more local communities, CSOs and GOs are closely collaborating in the promotion of ecological approaches through empowerment of farmers by using the participatory approach of FFS, which contributes to the implementation of the *Save and Grow* strategy.

Participants were briefed on the FAO FFS Guidance Document which provides a framework of FFS and operational guidelines to FFS facilitators, trainers, supporters, policy makers and various stakeholders for promoting quality FFS. The workshop also included a field visit to successful IPM-FFS groups in Kavre District of Nepal. During the field visit participants observed a number of farmer-led experimental trials on soil and plant health associated with using composts, botanical pesticides, entomophthogenic nematodes, balanced fertilization, various cultivations, etc. FFS facilitators played a key role at community level in implementing field research under the supervision of agriculture and plant protection officers.

Finally, the workshop finished with plenary discussions on key issues such as how to define follow-up strategies to continue IPM-FFS development and innovation in support of *Save and Grow* for sustainable intensification of crop production.

Group photo



**APPPC Regional Workshop on
Empowering Farmers through IPM-FFS Training in Support of
Sustainable Intensification of Crop Production
27 February – 2 March 2017, Kathmandu, Nepal**

1. INTRODUCTION

1.1 Background and purpose

The purpose of this workshop was to strengthen IPM-FFS management capacities and to assist countries to achieve sustainable intensification of crop production.

More specifically, the objectives of the workshop were to...

- (1) ... share experiences and lessons learned on the empowerment of farmers through IPM-FFS training;
- (2) ...share experiences on IPM-FFS programme implementation in terms of innovation, sustainability, institutionalization, local relevance, effectiveness and ownership;
- (3) ...identify follow-up strategies to support IPM continuation for SICP under the *Save and Grow* policy; and to...
- (4) ...document successful cases of IPM for SICP under the FAO's *Save and Grow* policy for the technology extension.

These workshop objectives were in line with FAO's Strategic Objective 2 insofar they support pesticide reduction, sustainable intensification and the implementation of international guidelines. The workshop built capacity to implement these objectives.

The outputs of the workshop were

- (1) Country reports on the updated status of IPM for SICP under *Save and Grow* in the APPPC member countries. (Country reports were asked to cover the modality of FFS, coverage of IPM in area and crop-wise, marketing system of IPM products, success stories, development and use of biological control methods, follow-up programmes, institutionalization and ownership of the IPM programme, and future strategy);
- (2) Strategies for follow-up: how to continue support for IPM development and application for SICP under the *Save and Grow* policy in APPPC member countries;
- (3) Documentation of successful cases of empowerment through IPM-FFS training for SICP under the FAO's *Save and Grow* policy.

1.2 Opening session

The opening session was chaired by Dr. Suroj Pokharel, Secretary, Ministry of Agricultural Development.

The workshop was formally inaugurated by the State Minister of Agricultural Development, Ms. Radhika Tamang, by lighting the ceremonial lamp.

A welcome address to the delegates and guests was delivered by the Director of the Plant Protection Directorate (PPD), Dr. Dilli Ram Sharma who recognized the expertise and experience of participants. He hoped that the workshop would raise awareness about IPM, FFS and *Save and Grow* in face of the challenges brought about climate change. The programme would provide opportunities for sharing experiences and panel discussions, as well as observing some of the achievements of the Nepal National IPM Programme.

After the individual self-introduction of all participants and country delegates, the Secretary of the Asia-Pacific Plant Protection Commission (APPPC) and Senior FAO Plant Protection Officer, Dr. Piao Yongfan, introduced the workshop and reminded the participants that after more than 20 years of Farmer Field Schools in IPM, many of the first-generation officers are about to retire while new challenges have to be tackled. The task will be to empower farmers to sustainably engage in managing a number of newly emerging issues in collaboration with various stakeholders at community and national levels. FFS capacities are available throughout the region to address upcoming complicated issues such as sustainable intensification of crop production and climate change adaptation and move forward by using FFS and discovery-based learning to come up with innovative solutions. The countries of the region can learn from each other and APPPC can serve as a platform for such exchanges.

Following this introduction, the FAO Country Representative, Dr. Somsak Pipoppinyo, stressed the relevance of the workshop for Nepal where FFS has been institutionalized by the Government and is now being used to address agricultural, health and environmental issues. Year-long FFS and follow-up activities have been instrumental in empowering farmers to undertake community action and reach thousands of farmers. The impact of IPM has shown that FFS farmers use less pesticides, gave more income and make better management decisions. Concepts and procedures of FFS are widely accepted in Nepal and implemented by different programmes, including food and nutrition security.

The Director General of the Department of Agriculture, Dr. Yuwak Dhowaj, then emphasized the high importance of agriculture for the economic and social development of Nepal, and the role of integrated pest and pesticide management for achieving sustainable food and nutrition security without harming the environment and compromising people's health. However, there are still problems affecting health and the environment. The Government's strategic plan for agricultural development therefore includes risk analysis of pest and disease outbreaks as a result of climate change and upgrading plant protection laboratories.

The keynote speech was delivered by the Chief Guest, the State Minister for Agricultural Development, Ms. Radhika Tamang. In her speech, she reminded the participants that the massive use of pesticides has caused adverse effects on human health and environmental pollution. To mitigate this threat to national agricultural development, IPM has been a significant contributor to improving people's health and the conduct of FFS has created awareness of biological strategies in rural communities. Government policies, strategies and priorities clearly reflect the IPM-FFS strategy for enhancing crop productivity. Manpower development, curricula for different crops, institutionalization, systematic monitoring, marketing of IPM products, and establishment of model IPM resource centres in communities have been the major achievements of the IPM programme in Nepal. In addition, Nepal is strongly committed to the implementation of the FAO Code of Conduct on the Distribution and Use of Pesticides, as well as the Rotterdam, Stockholm and Basel Conventions on pesticide management. She emphasized that biological control strategies are the cornerstone of bio-intensive pest management. Biological control is a sustainable, energy saving and non-polluting alternative to chemical pest management. In Nepal, this control approach is still in its infancy, however, it has a high potential. She thanked PPD and APPPC for organizing this workshop and she wished the participants beneficial discussions and a pleasant stay in Nepal.

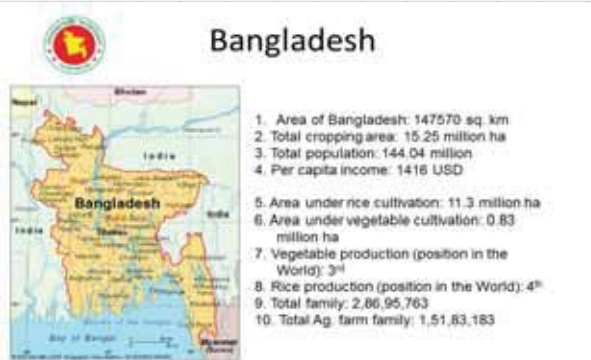
Finally, the session was closed by the chairperson, Dr. Suroj Pokharel, Secretary, Ministry of Agricultural Development, who summarized the achievements of IPM and FFS in Nepal and some of the future challenges. He thanked the organizers and participants and wished them fruitful deliberations.

In conclusion, a group photo with all delegates and guests was taken.

2. COUNTRY REPORTS

2.1 BANGLADESH

by Rezaul Islam



Journey with IPM FFS

Bangladesh has a long journey for implementing IPM

- 1st IPM FFS- FAO inter-country programme for IPM in rice ((Early 1990s) .
- UNDP, CARE-Bangladesh & DANIDA: scaling up IPM FFS (1997-2002)
- DANIDA-IPM FFS (2002-2006;SPPS-II) DT/FT
- GOB-IPM FFS (2006-2013) DT/FT
- DANIDA- ICM FFS (2006-2013) DT/FT
- GOB: SCP-IPM FFS (2013-2018) DT/FT
- DANIDA: IFM FFS (2013-2018) FF/FT
- Blue Gold: Transfer of technology FFS-FF/FT (2013-18)

FFS Accomplished up to 2013

- SPPS project Phase-1: 4,534 FFS
- SPPS Project Phase-II: 10,505 FFS
- AEC Project : 11,913 FFS
- IPM Phase-I : 4,621 FFS
- IPM Phase-II : 4,185 FFS
- DCRMA Project : 156 FFS
- Total : 35914 FFS

Ongoing FFS projects in Bangladesh

Name of project	FFS Target	Accomplished	Ongoing
Safe crop production through IPM project (2013-2018)	6700	3875	1525
Integrated Farm Management Component (2013-2018)	17100	9106	2150
Transfer of technology for agricultural production under Blue Gold Program (2013-2018)	1000	230	198
Agriculture and Food Security Project in the Chittagong Hill Tracts (2013-2018)	1800	1681	
Total	26600	14892	3873

FFS sessions



Practicing AESA



Sweeping as pest surveillance & pest control



Light trapping & perching as pest control



Bagging: Mango & Guava



Practicing IPM



Practicing pheromone trap



Organic pesticide used



Marketing vegetable & fruits



Practicing hand pollination & fruit fly trap



Hand pollination in bottle gourd

Fruit fly trap

Biopesticide



Bio pesticide based IPM technology getting enormous popularity

Registered Bio-pesticide

- Abamectin: Okra aphid
- Cuelure: Fruit Fly of bitter gourd, Fruit fly of mango & guava.
- Physcion: Powdery mildew of sweet gourd.
- Phomone lure (4[p-acetoxiphenyl]-2-butanone: BSFB, common cutworm of cabbage, fruit fly of bitter gourd
- Azadiractin: Aphid, Red spider mite
- Potassium salt of fatty acids: Aphid
- Attractant Lune-Butanone: fruit fly of bitter gourd
- 1,2-Dimethoxy-4-(2-propenyl)Benzene: Guava f. fly
- Lantadenes & Vasine: Red rust-tea
- Azadirectin A + B: Jute Hairy Catterpillar

Component Banner of IPM (Rice)



Component Banner of IPM (Veg)



Integrated Farm Management



Impact of IPM/ICM FFS

- Developed IPM policy (2002)
- GOB operating the IPM activities
- Some big project is following the FFS approach
- Use of bio-pesticide increased
- Demonstration: Impact of bio-pesticide
- Strengthening man power: Departmental Officer, Farmer Trainer
- Institutional Development: IPM/ICM Club

Sustainability efforts of IPM

- National IPM Policy-2002
- Established IPM Section in the PPW of DAE
- Encourage registration of bio-pesticide
- Promote IPM/ICM/IFMC club (22,798)
- Market linkage to Farmer Organization
- Farmer Trainer/FF
- Promoting IPM practice by GO & NGO
- Extension-IPM operator linkage

Climate change mitigation and adaptation in IPM FFS

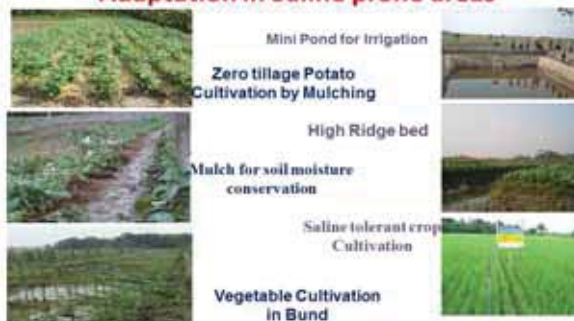
Safe Crop Production Through IPM Approach Project (GOB)	-Introduction of tolerant varieties, adjustment of sowing time, seedling management, - Water management in relation to crop production & pest management
Integrated Farm Management Component (DANIDA)	- Effect of climate change & adaptation technique (Role play & discussion).
Climate Field School (CFS)	- Climate Forecast applications at local level, - CC-Adaptation options for Agril. Sector,
Transfer of technology for agricultural production under Blue Gold Program (DAE Component)	-Crop intensification in polder areas, - CC-Adaptation options for Agril. Sector- introduction of new crop & technology, value chain market, input supply etc.
Floating vegetable & spices production technology	-Floating cultivation in flood prone areas. - CC-Adaptation options for Agril. Sector

Climate Change Mitigation: Floating agriculture



- Usually used in areas where agricultural land is submerged for long periods.
- Vegetables are the main crops of this farming system.
- The bed is built up of layers of aquatic weeds, mainly water hyacinth (*Eichhornia crassipes*).

Adaptation in Saline prone areas



Adaptation Options in Saline prone areas



Adaptation Options in Flood prone and Flash Flood prone areas



Suitable adaptation technology for flood /flash flood prone areas



Adaptation technology for drought prone areas



Lessons Learned

- Weak climate based surveillance and forecasting system creating challenge for crop production.
- IPM alternatives of chemical pesticides reduce pest infestation, but alternatives are not sufficient & available.
- Adaptation to climate change is very location specific.
- Farmers need more time to adapt with CCA and DRR technologies and learning how to adapt (better).
- Scope of capacity building (short term/long term) for farmers as well as DAE and project staffs is insufficient.
- Awareness building programme for institutions relevant to the agriculture sector and also farmers (vulnerable people) is insufficient.

Lessons Learned

- Poor marketing facilities for ensuring farmers income from their produced.
- Climate change concepts are integrated in the learning activities of Integrated Pest Management (IPM) schools and Integrated Crop Management (ICM) clubs.
- Bagging against fruit fly in all crops instead of insecticide show good performance.
- Sex pheromone, perching, light trapping are now popular practice for insect pest control.

Initiatives Needed

- Crop zoning
- Crop selection in flood, draught, saline & cold prone areas.
- Floating cultivation of vegetable & spices.
- Addressing pest problems in relation to climate change.
- Collaboration with national & international research organization.
- Exchange of extension messages among IPM operator
- Strengthening research activities on IPM
- Strengthening quarantine services

Recommendations:

- Climate change issues in relation to pest infestation and management should be addressed in IPM FFS.
- Enhance capacity of farmers and officers of line department regarding climate change, disaster risk reduction and adaptation knowledge
- All IPM operators should have a strong linkage to share IPM experiences.
- Promotion of solar energy operating irrigation system & Integrated on-farm water management





Recommendations:

- Provide quality seeds to the farmers & rapid expansion of Tolerant varieties
- Enhance early warning facilities in crop production, salinity intrusion, increase, tidal up surge etc.
- Introduce different agricultural equipment for farm mechanization
- Need to enhance location specific options/ interventions
- Need to expansion of the use of biological pesticide through more IPM FFS.
- Need to continue Climate Field School (CFS)



2.2 CAMBODIA

by Chou Cheythyrih

 <p>Workshop on Empowering Farmers through IPM FFS Training</p> <p>27 February - 2 March, 2017</p> <p>THE NATIONAL IPM PROGRAMME</p> <p>Mr. Chou Cheythyrih, IPM Coordinator, the National IPM Programme</p>	<p>Outline</p> <ol style="list-style-type: none"> I. The National IPM Programme (NIPMP), II. Farmer Field School Implementation III. Impact of IPM
 <p>Chapter I</p> <p>The National IPM Programme</p>	<p>Background of the National IPM Programme</p> <ul style="list-style-type: none"> – IPM Program was initiated in 1993 by MAFF after a National Workshop on "Environment and IPM" – The overall goal of the National IPM Programme (NIPMP) is to improve food security and safety through the promotion of Integrated Pest and Crop Management skills at the farm level
<p>Objectives of the National IPM Programme</p> <p>The National IPM Programme has been implemented by GDA in collaboration with concerned stakeholders with aims to:</p> <ul style="list-style-type: none"> ▪ Reduce the dependence of farmers on agricultural chemicals, especially pesticides in agriculture, ▪ Build up the capacity of agricultural trainers and extension workers in conducting training and experiments and providing appropriate services, ▪ Educate farmers on agricultural technologies by enhancing their knowledge on field ecology and by developing skills in managing crops effectively. 	<p>Approach and Principles</p> <ul style="list-style-type: none"> – Employing participatory, discovery-based and experiential education approach "learner learning rather than teacher teaching", – Key principles are: <ol style="list-style-type: none"> 1. grow a healthy crop by taking into account all prod aspects, 2. conserve natural enemies by rationalizing the use of chemical pesticides, 3. observe fields regularly to identify problems and take action based on ecologically friendly approach, and 4. farmers become experts in their own fields and beyond. 
<p>Main Activities of the NPIPMP</p> <ul style="list-style-type: none"> ▪ The National IPM Programme has adapted the strategy of "learning by doing" using the Farmer Field School (FFS) model and the training methods are based on the principles of non-formal adult education with emphasis on a discovery learning approach. This approach allows farmers to participate in a season long training covering one full crop cycle with intensive field practice. 	

Part II

Farmer Field School Implementation in Cambodia



The Implementation Process (Cont.)

3. Farmer Field School

FFS is a "school without walls", is usually made up of 25-30 farmers (women and men) who meet half a day each week to learn, starting at the time of planting and continuing until harvest. The FFS enable farmers:

- Improve their technical skill
- Observation skill
- Analytical skill
- Decision making skill



The Implementation Process

1. Training of Trainer

- Full time season long training while field trials set up and practice carry out FFS
- Learn many technical topics and facilitating skills
- 956 district and provincial officers (37% women) trained on rice, vegetable, watermelon, mungbean and cassava

2. Farmer Trainer Orientation Course

- 2 weeks training for pioneer IPM-FFS graduated farmers
- Training focuses on facilitating skill, FFS preparation and some technical topics
- 3126 farmers (36% women) trained on rice and vegetable.
- They play role as local agricultural extension facilitator

The Implementation Process (Cont.)

- FFS on Rice, Vegetable, Mung bean, Water melon, Corn, Cassava, Life School, Organic Chili, and Integrated farming system: Totally about 10,146 FFS

4. Post-FFS/IPM-FFS Alumni

- Self-help group
- Exchange views and experiences
- Participatory action research for finding out further alternative methods and practices to chemical

Achievement of NIPMP up to Dec. 2016

No.	Description	IPM Trainers		Farmer Trainers		Farmers	
		Total	Women	Total	Women	Total	Women
1	Rice Crop	723	275 (38%)	3,002	1,078 (35.90%)	228,866	114,256 (49.93%)
2	Vegetable Crop	86	37 (43.14%)	124	37 (29.83%)	17,915	8,765 (48.92%)
3	Watermelon Crop	41	17 (41.46%)	0	0	3,097	1,238 (39.97%)
4	Mungbean Crop	25	7 (28%)	0	0	651	299 (45.92%)
5	Organic Chili Crop	0	0	0	0	69	36 (52%)
6	Fruit Flax	13	4 (30.76%)	0	0	165	101 (61%)
7	Cassava	50	11 (22%)	0	0	2,900	1,308 (45%)
	Total	956	351 (36.71%)	3126	1118 (35.66%)	253,663	126,993 (49.71%)

Number of Farmers were trainer in IPM-FFS

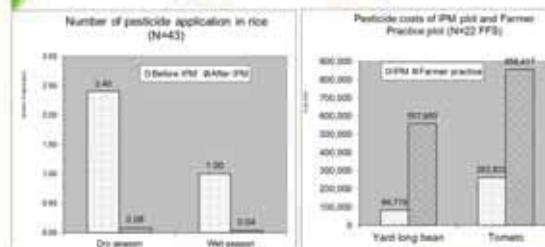
NUMBER OF FARMERS WERE TRAINED IN FFS



Chapter III

Impact of the National IPM Programme

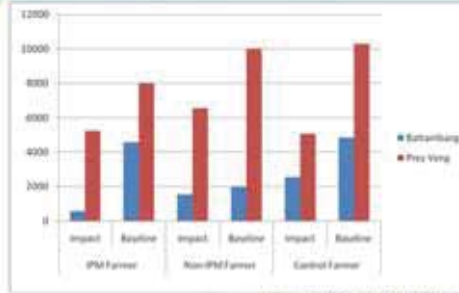
Pesticide Application



(Source: Phal, 1997)

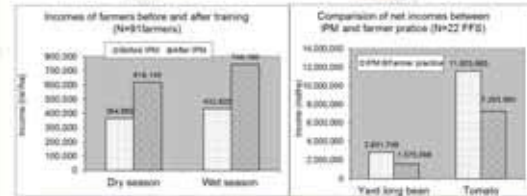
(Source: FAO Vegetable IPM Project, 2003)

Amount of pesticide uses in all classes (ml/hh)



(Source: FAO Vegetable IPM Project, 2011)

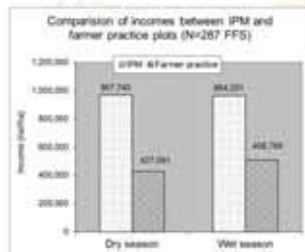
Economic comparison



(Source: Phil, 1997)

(Source: FAO Vegetable IPM Project, 2003)

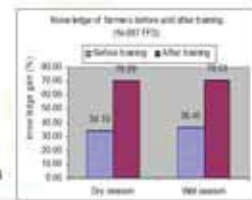
Economic comparison



(Source: Phil, 1997)

Social and Knowledge

- The result from 144 FFS on rice conducted in the provinces of Takeo, Kampot, Kampong Speu, Kandal, Pursat, Kampong Cham and Siem Reap indicated that the farmers' knowledge has been a sharp rise from 38 % to 78 % in the wet season and from 36 % to 75 % in the dry season (APPIP/ IPM 2002).



(Source: Danida IPM Project, 2004)

Social and Knowledge

- Increased relationships b/w farmers and technicians
- Farmers are more capable and confident in solving problems
- Improved position or had the opportunity to obtain a better job
- Improved decision making skill
- Empowered farmers into a more powerful position vis-a vis technical, political, market and social forces
- Increased technical knowledge, observation skills and set-up field studies

Farmer Field School make farmers smile and smile forever with better Crops, Environment and Net-Income, and then its contributes to better life.

Thank You Very Much!!!



<http://www.vegetableipmasia.org/>

2.3. CHINA P.R. by Zhu XiaoMing

<div data-bbox="248 285 781 464"> <h1>IPM-FFS in CHINA</h1> </div> <div data-bbox="451 499 581 600"> <p>NATESC ZHU XIAOMING Feb. 2017 Kathmandu</p> </div>	<div data-bbox="873 291 971 317"> <h2>Outline</h2> </div> <div data-bbox="889 331 1317 583"> <ol style="list-style-type: none"> 1. Brief history 2. Success Factors 3. Ongoing FFS projects 4. Results of evaluation and assessment 5. Policies for adapting climate change and upscaling FFS 6. Discussion </div>
<div data-bbox="248 680 781 1062"> <h2>Overview of brief history</h2> <ul style="list-style-type: none"> 1988 • China joined FAO Inter-Country IPM Programme for Rice in 1988 and began to explore a new, innovative IPM farmer training approach—Farmer Field School (FFS). 2000 • China was involved in the EUPAD regional cotton IPM programme (2000-2004) supporting FFS training in 5 major cotton growing provinces. 2003 • The FAO-supported vegetable IPM-FFS programme (2003-2008) was launched in Yunnan province. 2007 • The FAO/China Pesticide Risk Reduction (PRR) Program (Phase I 2007-2013) was launched in Yunnan and Guangxi Province. 2014 • The FAO/China PRR Program (Phase II 2013-2018) was launched in Hainan Province. 2015 • Development and extension program of safe and high-yielding technologies for winter season vegetables production in Hainan Province (TCF 2015-2016). </div>	<p>In general, the FAO/China IPM Programs have introduced and helped sustain participatory, farmer-led IPM in rice, cotton, vegetables and fruit crops in many provinces throughout the nation. In total, about 180,000 smallholder farmers have benefited from participation in season-long IPM-FFS training conducted during the period 1988 to 2016.</p>
<div data-bbox="248 1100 781 1482"> <h2>Success Factors</h2> <p>➤ Main stream support structure</p>  </div>	<p>➤ Special fund to support FFS</p> <p>Agriculture extension system reform program (2008-2013). Each county allocated 200,000 yuan to support demonstration FFS annually in national wide.</p> <p>From 2013-2016, the NATESC support 300,000 yuan to Yunnan and Guangxi PRR program. In Guangxi and Yunnan, local government support 100,000 yuan to hold FFS per year.</p> <p>➤ Technical support</p> <p>MOA set up professional team from different institutions to support IPM-FFS implementation, such as organized TOT, develop manual and guidelines, establish demonstration FFS, work out indicators for FFS M&E. Collaborates with NGOs in TOT trainings/FFS/Model IPM community.</p>
<div data-bbox="248 1520 781 1887"> <h2>Ongoing FFS Projects</h2> <p>➤ The FAO/China Pesticide Risk Reduction Programme (GCP/RAS/229/SWE) (2007-2018)</p> <p>The FAO-supported IPM-FFS/PRR Programme was launched in Yunnan Province (2003), Guangxi Province (2007) and Hainan Province (2014).</p>  <p>Yunnan Guangxi Hainan</p> </div>	<p>➤ In Yunnan, the programme concentrated its efforts initially on capacity building for IPM FFS training on 3 types of vegetable crops (tomato, Chinese cabbage and sugar pea) in 8 major vegetable growing counties.</p> <p>➤ Subsequently, FFS training was implemented in 80 counties in 16 cities covering 13 types of vegetable crops.</p> <p>➤ From 2007-2015, some 384 IPM FFS were implemented in 80 counties in 16 cities, training 10,030 (49% female) farmers.</p>



- In **Guangxi**, the IPM-FFS/PRR programme was initiated in Nov, 2007.
- 32 seed facilitators from Guangxi and 6 from other province were trained in Apr.-Aug. 2008, the season-long training of trainers. The target crops were rice, tomato, mango.
- From 2008 - 2015, some 316 IPM FFS were implemented in 55 counties in 13 cities, training 9970 (34.7%female)farmers.



- In **Hainan**, the first TOT was held in Qionghai City, during the period Dec.9-18,2014. 18 seed facilitators were trained for initiating and scale up IPM and PRR.



- During July-August, 2015, the facilitators hold 20 3-day farmer training courses in 19 Counties in Hainan Province. Let the participants practice the capacity in FFS training activities in rural education.



- During Nov,2-9,2015, a Refresher Training of Trainers Course on Pesticide Risk Reduction was implemented in Sanya.



- During Nov, 2016-Jan, 2017, 14 IPM/PRR FFSs targeting on vegetables and fruits were implemented in 6 counties in Hainan. This training program combines with the anti-poverty work in middle counties of Hainan Province. Nearly 470 farmers were trained. We plan to construct Model PRR community, develop training manual and hold RTOT in next 2 years.



- **Hainan winter-vegetable safety and high-yield technical development and extension programme (TCP/CPR/3503) (2015-2016)**

The Department of Agriculture of Hainan province and Tropical crops research institute of Hainan province are mainly responsible for the program. This FAO-supported program is aimed to establish technical standard based on introduction of advanced and proven technology in combination with the local technical foundations and develop a set of cultivation practices that suit the actual field conditions in Hainan. Establish a number of technology demonstration sites that provide opportunities to local farmers for learning farming skills. From April, 2015 to Dec, 2016, there were 15 FFSs hold and 450 farmers trained.



Results of evaluation and assessment

In general, the FFS programme has successfully been implemented in China. After years of pilot IPM FFS programmes implemented by NATESC/PPS stations and FAO, the FFS impact have been seen by the stakeholders, more and more attentions are paid on FFS by wider stakeholders. **At central level**, FFS has been adopted by MOA as an important approach for agricultural technology extension system reform at the grass root levels of the national agricultural extension system. **At local levels**, several municipalities like Chongqing and Beijing expanded FFS rapidly. It is believed and verified that this agricultural extension approach could contribute greatly to go across "the last one kilometer", which is the gap between the agricultural technologies and farmers. FFS have become more of a government-led activity instead of a project-led activity.

> Season-long participatory training is the most effective model in extending IPM

It is hard for farmers with relatively low educational level to receive IPM because farmers tend to attribute poor control effect to the technologies or products itself instead of the unscientific or unstandardized practices. Through season-long participatory training, the farmers can learn better about the IPM concept, principles and good practices, they appreciate that pesticides are not the only pests control measures.

> It is important to identify and cultivate leading farmers

In many successful FFSs' cases, we can find that the farmer leaders played important role. We need to choose the one who likes to receive new ideas and practice experiments, so that he can sharing his experiences with other participants and influence others. Someone even guided the participants to set up cooperative and build mass rearing plant, becoming a well-known technology leader.

> Combination of professional technologies and participatory training tools is a powerful technologies extension method

FFS is an educational method with farmers as the center, field as the classroom and practice as a method. It applies participatory, interactive and heuristic training methods. The primary goal of FFS is to improve farmers' technologies adoption rate through training activities, cultivate farmers' scientific conscious and research capacity so that farmers could better understand and master related technologies and apply to agriculture production through observation and participation in activities like group dynamics and experiments etc.



> Sustainability

Some FFS projects are sustainable while others are not. In the first case, when FFS projects end, FFS are taken up by other donors and projects, which continue and further develop FFS. Farmer trainers may also continue FFS. There are cases where other donors and projects use FFS management infrastructure, they normally provide enough overhead for projects management and operations. There are also government-led FFS Programmes where IPM facilitators become master trainers in expanding local facilitators' networks and conduct demonstrative FFS. Those projects provide financial resources for expansion of the FFS numbers and graphical coverage or adding new topics to FFS.

> Methods for Establishing self-financed FFS

- ✓ Assisting farmers to set up cooperatives in the course of or at the end of FFS.
- ✓ Obtaining multi-channel support from multi-departments to carry out various programmes and to improve farmer facilitators' abilities. FFS participants improved their communication skills, organizational management skills through implementing different projects. At the same time, self-confidence was built and improved in the process.
- ✓ Encouraging farmers to set up and carry out FFS.

> The self-financing FFS – A Case from Rongnan County, Guangxi

After the FAO-funded FFS, farmer facilitators of the Kumquat Cooperatives continued FFS by themselves, using FFS as an important method to train cooperative members and performing cooperatives functions. Through FFS, cooperative members reduced pesticide risks and improved yield and quality of the products. Their efforts taken were rewarding, the kumquat products were certified and a famous local brand was developed, broadening the marketing channels. Their kumquat are now sold to Shanghai, Zhejiang Province and exported to Southeast Asian countries.



Policies for adapting climate change and upscaling FFS

> The No.1 Central Document 2016 mentioned to protect resources and ecosystem, promote green agricultural development. China's "National Sustainable Agricultural Development Plan (2015-2030)" was officially released, one of the policy goals is, by 2020, coordinated and integrated pest management will be applied in 40% of farmlands, and pesticides use will no longer increase by 2020. Low-toxic pesticides are encouraged. Under all these China agriculture Modernization Policy Framework, required us pay more attentions to the ecosystem and the effects of climate change. The NATESC of MOA combines the IPM-FFS with the "National Crops diseases and pests green control demonstration project", especially in Guangxi and Yunnan Province.



> The Department of Science, Technology and Education (DSTE) of MOA recognized the strengths of the FAO-supported FFS and launched a new initiative aimed at promotion of the FFS model at policy level for institutionalization and upscaling of the FFS-based extension and farmer-education project from 2013.

> On 29th December 2015, Central Agricultural Radio and Television School of MOA, released the "Opinions for accelerating the construction of farmer field school" ([2015]109). Plan to build over ten thousand farmer field schools all the country during the 13th five-year (2016-2020). Aimed to Research and summarize the construction and operation mechanism about farmer field school. Promote to realize the full coverage of leading agricultural industries, support the farmer education and training.

Discussion

- In China, the farmland is rotated and more concentrated to big holders like big growers, large family farm, leading agriculture enterprises, farmers' cooperatives etc. How to develop IPM-FFS modality based on the changing situation needs to be considered. How to train new professional farmers is an emerging task for agriculture modernization in China.
- The fast growing demand for FFS programmes may cause "fast-food TOTs and FFS".
- In China's context, in the long run, the role of FAO IPM-FFS Programme in China could be: proving FFS implementation guidelines to help the countries to assure FFS quality; providing a platform for inter-country experiences sharing; facilitating Exchange visits among countries.
- IPM-FFS has become one of the powerful tool to empower farmers to become leading farmers and expert farmers, the programme impact in China is far more a beyond IPM FFS, driving rural social change to sustain agriculture and rural development.

Thank you for your attention

2.4 LAO PDR

by Phoukawthong Sykaisone

 <p>APPPC Workshop on Empowering Farmers Through FFS IPM Training , Kathmandu, Nepal, 27 February – 2 March 2017</p> <p>Presentation from Save and Grow – SIRP Results, Lessons Learned and Recommendations</p> 	<h3>Background</h3> <ul style="list-style-type: none"> • Objectives/Targets of Save and Grow-SIRP: <ul style="list-style-type: none"> - Enhancing productivity and profitability; - Increased resource use efficiency; - Ecological sustainability; - Climate-smart and enhancing resilience. • Intervention: Capacity building through 31 Farmers Field Schools in 4 Lao rice producing provinces implemented during 2015 -2016. • Implementation partners: Plant Protection Center/Department of Agriculture (FFS interventions) & technical support by DLF (rice-fish) and NAFRI (TOF). • Results assessment: National University of Laos • Funding: FAO-RR1 and TCP/LAO/3601/C1
<h3>Project Interventions in 2015-2016</h3> <ul style="list-style-type: none"> - Baseline Surveys in 11 districts, 4 provinces (February 2015 & May 2016) - Implementation of 31 FFSs (total 883 farmers including 310 women) in 4 provinces: Sayaboury (8), Xiengkhuang (8), Savannakhet (7) and Champasak (8) (April-November 2015 & 2016) - FFS M&E & technical backstopping - Refresher training/Curriculum revision (TOF/Rice-Fish) workshop, Phaxay, Xiengkhuang 16-18 July 2016 - FFS Evaluation, Results Assessment and Refresher Workshop (Savannakhet, 8-12 Dec 2015 & PPC, Vientiane Capital, 23-25 Jan 2017) 	<h3>Project Interventions in 2017</h3> <ul style="list-style-type: none"> - Implementation of 3 FFSs in 2 provinces: Sayaboury (1), and Champasak (2) (January - April 2017) 
<h3>Baseline Results and Rational for FFS Intervention</h3> <p>Summary of Baseline Data of 4 Lao provinces (February 2015 & 2016 prior to FFS implementation):</p> <ul style="list-style-type: none"> • Land productivity low: Rice yields=> 2-3.5 T/ha (2015) & 2.5 – 3.85 T/ha (2016) • Economic benefits low, resulting from poor management and inefficient use of production inputs: <ul style="list-style-type: none"> • Low quality seeds and low use of improved varieties; • Higher seed rates used (narrow spacing & more seedlings/hill); • Use of old seedlings making inefficient use of agronomic potential; • Chemical pesticides not yet used frequently but on the rise, particularly for weed management in direct seeded crops; • Soil, fertilizer and water management are often not appropriate and inefficient; • Utilization of production land for additional/other income is limited to none. 	<h3>Curriculum Development</h3> <ul style="list-style-type: none"> • 17 week FFS curriculum developed to address production problems and inefficiencies of production input use based on location and situation specific baseline data • FFS Curriculum revision including rice-fish and TOF 

Field Experiment Design

- At least 1,000 meter square field experiment plots, replicated across 31 FFS sites, in which Save and Grow-SIRP good practices are compared with conventional practices
- Crop compensation study with replication
- Yield estimates (ton/ha) at harvest time (through crop cuts and yield parameter assessments)
- Economic benefits assessments (revenue, total production costs, gross margins (LAK/ha))



Save and Grow-SIRP improved management practices promoted in Farmers Field Schools

- Use of certified seeds and improved high-yielding varieties, reduced seed inputs;
- Single, younger seedlings & wider plant spacing;
- Using natural biological control and natural pesticides, if needed;
- Balanced chemical fertilizer applications, including replacement with bio-fertilizers;
- Reduced labor through direct-seeded method.

Farmer Field School: Curriculum Overview: A typical weekly FFS session

- Regular field visit and crop monitoring
- Agro-ecosystem and Economical Analysis
- Icebreaker/Group dynamics
- Special Topics: Depending on location and situation specific learning priorities



Examples of Special Topics:

- Crop Growth Stages and management needs;
- Fertilizer management;
- Compost and Soil Ecology;
- Pests and diseases identification & management;
- Preparation and use of Botanical pesticides;
- Yield and economic benefit assessments



Targets to be achieved

- Different provinces have different conditions: Save and Grow applied based on location and situation specific productivity improvement targets set

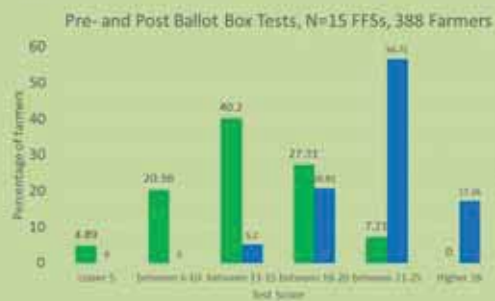
Province	Yield	Labor, seeds & water	Organic fertilizer	Chemical fertilizer	Pesticides
Savannakhet	increase	Reduce	increase	Better Balanced based on crop needs	Not to be used
Champasack	increase	Reduce	increase	Better Balanced/ increase	Not to be used
Xiangkhouang	increase	Reduce	increase	Better Balanced	Not to be used
Xaiboury	Equal/ increase	Reduce	increase	Better Balanced	Reduced use

Indicators for Results Assessment

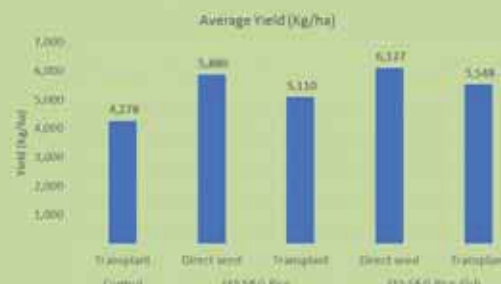
Measurements of:

- Changes in farmers knowledge and skills by means of a pre and post FFS Ballot Box Test;
- Changes in yield (kg/ha), cost reduction (LAK/ha), revenue (LAK/ha) and gross margins (LAK/ha) by means of comparison of Save and Grow and conventional practices and their impact on yields and economic benefits obtained in FFS experiment plots.

Changes in farmers knowledge and skills

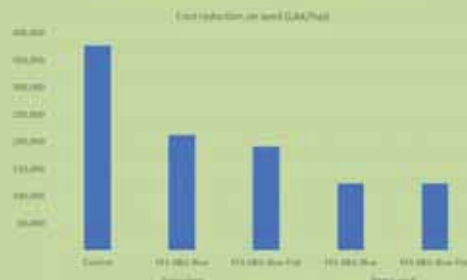


Results: Average yield for each cultivation method

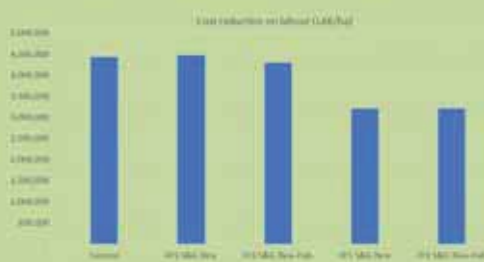


Results: Changes in Total Production Costs, Revenues and Gross Margins

Cost reduction on seeds



Cost reduction on labour



Cost, revenue and gross margin for Save and Grow(LAK/ha)



Conclusions:

- Farmers acquired new knowledge and skills in the FFSs and appreciated the training interventions;
- Field results clearly showed the potential for more efficient use of production inputs (saving on labor and seeds), leading to higher rice yields and profits for farmers;
- Direct-seeded crops attained higher yields and profits;
- More efficient use of production inputs and reduced use of chemical pesticides allows farmers to engage in rice-fish production, which increases land productivity and results into substantially higher gross margins;
- Elimination of pesticide use in rice production supports conservation of aquatic biodiversity important for local food and nutrition security;
- Government officials at provincial and district level were highly supportive of the FFS interventions and the results obtained.

Lesson Learned and Recommendations:

- Further curriculum adaptation needed to address location and situation specific issues/production challenges;
- Integrated rice and duck raising should be included in curriculum;
- Development FFS guide for S&G-SIRP as to provide better guidance for field trainers/lead farmers;
- 17 week FFS curriculum revision with special topics on TOF & rice fish with focus on soil health aspect was confirmed doable;



2.5 MALAYSIA

by Arizal Bin Arshad


MALAYSIA

APPPC/FAO WORKSHOP ON EMPOWERING FARMERS THROUGH FFS – IPM IN SUPPORT OF SUSTAINABLE CROP PRODUCTION INTENSIFICATION (SCPI) WITHIN CONTEXT OF CLIMATE CHANGE

Kathmandu, Nepal
27th February – 2nd March 2017

Presentation Outline:


1. Agriculture is important to Malaysia;
2. Development of FFS-IPM in Malaysia;
3. The usage of IPM Tools;
4. Development of FFS in Malaysia;
5. Involvement of NGO in FFS-IPM;
6. Climate change in Malaysia;
7. How climate change affects agriculture;
8. Climate change mitigation and adaptation;
9. Recommendations.



Map of Malaysia

Agriculture is important to Malaysia

Agriculture sector continued to expand in 2015 with a contribution of **8.9 per cent** to the **Gross Domestic Product (GDP)**




PERCENTAGE SHARE TO GDP BY KIND OF ECONOMIC ACTIVITY, 2015 (CURRENT US\$ PRICE)

Kind of Economic Activity	Percentage Share to GDP
Manufacturing and construction	24.1%
Services	59.7%
Agriculture, forestry and fishing	8.9%

Agriculture is important to Malaysia

Number of employed persons in the agriculture sector was 1.75 million people, increased by 3.5 per cent

EMPLOYMENT IN THE AGRICULTURE SECTOR



Employment in the agriculture sector dominated by male (more than 70%)

In 2015, number of non-seasonal employed persons in the agriculture sector was 645.4 thousand persons, increased 15.7 per cent compared to 2014


Agriculture is important to Malaysia

Production and export

Wheat (hard wheat), Fresh fruit (citrus fruit) and rubber (rubber) showed an increase in production by 4.5 thousand tonnes (52.8%), 2,271.3 thousand tonnes (2.4%) and 83.5 thousand tonnes (5.2%) respectively in 2015.

Production of country's staple food (wheat) has increased by 473.5 thousand tonnes (18.8%) in 2015 compared to the previous year.

Planted area of paddy was 733.9 thousand hectares, increased 7.0 per cent compared to 679.2 thousand hectares recorded in the previous year.




EXPORT COMMODITIES TO NEARLY 100 COUNTRIES, 2014-2015, US\$ million

EXPORT COMMODITIES TO NEARLY 100 COUNTRIES, 2014-2015, US\$ million

Agriculture is important to Malaysia

8 of the 13 selected **fruits** recorded Self-Sufficiency Ratio (SSR) more than 100 per cent.

6 selected **vegetables** recorded SSR more than 100 per cent



SELF-SUFFICIENCY RATIO (SSR)

100 per cent or above indicates self-sufficiency in the production of the commodity

1. Fruit (selected 13 items)

2. Vegetable (selected 6 items)

3. Cereals (selected 1 item)

4. Aquatic (selected 1 item)

5. Livestock (selected 1 item)

Agriculture is important to Malaysia

The development of agriculture sector in Malaysia is guided by the **National Agro-Food policy (2011-2020)** and the **National Commodity Policy (2011-2020)**, which aim to increase food production and exports of industrial commodities.

The objectives of the **National Agro-Food Policy** are to:

- (i) Ensure food supply and food safety;
- (ii) Develop the agro-food industry into a competitive and sustainable industry;
- (iii) Increase the income level of agricultural entrepreneurs.

Development of FFS - IPM in Malaysia

- Private research and development network belonging to major plantation agencies are usually involved with IPM of major pests of plantation crops.
- Development and production of IPM texts mostly with governmental agencies like DOA, MAF and NARD, especially for rice.
- IPM has rooted deeply among rice farming community and all participate in the decisions making based on economic threshold level of pests and thus pesticides are applied only as and when required.
- DOA Malaysia is the agency responsible for extension services. Extension agents in the frontline in implementing IPM at district level. The agents are trained by experts from the Plant Biosecurity Division, DOA.

Development of FFS - IPM in Malaysia

- Malaysia took part in the FAO's Intercountry Programme (ICP) for the Development and Application of Integrated Pest Control in Rice in South and South-East Asia which started in 1985.
- The implementation of IPM field school in Malaysia was slow since the ICP programme.

The Usage of IPM Tools

CROP	PEST	IPM TOOLS	LESSONS LEARNED
RICE	Rats (<i>Rattus argentiventer</i>)	Using barn owl (<i>Nyctalus abdi</i>)	Prior to the barn owl program, farmers had to rely heavily on baiting with rodenticides. Only after a year of its implementation, the quantity of baits distributed to farmers by DOA had decreased by nearly 40%.
	Weedy rice and weeds	Using ducks to scoop up seeds of weeds	Farmers also gain extra income from the selling of duck eggs. Income generated can be around RM 70 to RM 150 per day.
	Golden Apple Snail (<i>Pomacea</i> spp.)	Using ducks and fish that feed on the eggs and adult of GAS. 100 ducks can control GAS in 5 – 6 ha of paddy areas.	

The Usage of IPM Tools

CROP	PEST	IPM TOOLS	LESSONS LEARNED
OIL PALM	Bagworms of oil palm (<i>Morisa plana</i> , <i>Pteroma pendula</i> , <i>Mahaseta corbetti</i>)	Usage of: (i) Aerial spraying of <i>Bacillus thuringiensis</i> as biopesticide. (ii) Beneficial plants such as <i>Cassia copanensis</i> , <i>Tournefortia</i> and <i>Antigonon leptopus</i>	In 2013 and 2014, approximately 8,000 hectares of oil palm plantation areas were infested with bagworms and could have caused damages up to 40% within 2 years of infestation. IPM was used to mitigate the pest infestation by means of aerial spraying of <i>Bacillus thuringiensis</i> as biopesticide, which also contributes to the increase of bagworm parasitoid. The use of beneficial plants had also contributed to the increase of the population of bagworm predator and parasitoid. Thus, successfully suppressed the damage caused by the bagworm to less than 10%.

The Usage of IPM Tools

CROP	PEST	IPM TOOLS	LESSONS LEARNED
VEGETABLES	Diamondback Moth (DBM) (<i>Plutella rhyssalis</i>) in cabbage	Using <i>Diadegma</i> (<i>Diadegma areolaris</i>) a parasitoid wasp	a) lower population of DBM despite less usage of insecticides; b) <i>Diadegma</i> became the dominant parasitoid; c) farmers realized that they need not be dependent on insecticides.
	Leafminer (<i>Liriomyza</i> spp.)	Using Tiger fly (<i>Coenosis exigua</i>)	DOA has introduced the use of bio-control Tiger fly (<i>Coenosis exigua</i>) in vegetables farms under rain shelters to control leafminer. Initial results of the program which started in 2015-2016 has also support the organic productions of several vegetables such as spinach, tomatoes, Kai lan, Poh Choy and broccoli without the use of any insecticides to control leafminer.

Development of FFS in Malaysia

- FFS on rice management is conducted in Malaysia by DOA Malaysia with support from the Integrated Agriculture Development Area (IADA) and National Agriculture Training Center (NATC).
- 3 FFS projects has been conducted in 2016 and 4 other projects to be conducted in 2017.
- In 2016 a total of 92 farmers and extension agents were successfully trained, while another 118 trainees will be trained 2017.
- The trainees are trained at 4 FFS locations in the states of Pulau Pinang, Selangor, Perak and Kelantan. All projects are co-managed by IADA.

Development of FFS in Malaysia

- The curriculum for FFS in rice management is in line with the widely-used RiceCheck System - a holistic crop management system and farmer participatory extension approach.
- 16 modules are developed and delivered to the participants through class lectures, field visits and hands-on training.
- The modules are:

No.	Topics	No.	Topics
1.	Best practices in rice management	9.	Disease management
2.	Soil preparation	10.	Fertilizer application
3.	Paddy field infrastructure	11.	Pesticide application
4.	Water management	12.	Technical visits
5.	Seed management	13.	Rice Quality Check
6.	Pesticide management	14.	Post Harvest management
7.	Weed management	15.	Waste management
8.	Pest management	16.	Agro-tourism

Modules of FFS in Malaysia

Modules of FFS in Malaysia

Involvement of NGO in the Development of FFS - IPM

- An IPM Farmers Field School on vegetable management was conducted by (Pesticide Action Network) PAN Asia Pacific an NGO in Blue Valley, Cameron Highlands in 2015.
- Aims to develop the capacity of farmers in making informed decisions based on their experience of observing, conducting experiments and monitoring of their farms.
- It also involves the participation of scientists, extension officers and experts in the field of agriculture to provide input and work with the farmers for viable solutions to the problems they face on the farm.
- The focus of this particular FFS in Blue Valley was to incorporate biological control instead of harmful pesticides to deal with the infestation of the Diamondback Moth among cabbages.

Climate Change in Malaysia

- Mean surface temperature increasing 0.18°C per decade for over 40 years since 1951 (MOSTE, 2000)
- There is a significant reduction of annual precipitation; meanwhile, there is an increase of one hour rainfall intensity by 17% by comparing 2006-2007 value to the 1970s value (NAHRIM, 2010) causing **increase frequencies of drought and flooding**.
 - This can be seen with 2007 floods in Johor the southern state of Peninsular Malaysia and prolonged water rationing due to water shortage of 1998 and 2014 in Klang Valley at central Selangor comprising Kuala Lumpur and its surroundings cities.
- Rising of sea level 4.6 cm to 11.9 cm, satellite altimetry data of 1993 to 2010 (NAHRIM, 2010).

How Climate Change Affects Agriculture

- Water scarcity:**

Crops like oil palm could flourish with hot rubber plantations could suffer due to loss of tapping days and crop workload. 275,000 ha of land or 18% of current rubber land could be affected.
- Decreases in rainfall:**

Water shortages could delay and disrupt paddy planting season. 222,000 hectares of irrigated paddy fields and another 278,000 hectares of rainfed paddy fields. Prolonged droughts make it impossible to sustain the flooded agro-ecosystem.
- Increase in temperature:**

Rice grain yields will reducing as much as 13% with a temperature rise of 2°C. Increase in temperature and changes in rainfall pattern could affect crop yields directly, or by the spread of fungus and diseases indirectly.

the yields of important crops such as rice, vegetables, cocon, oil palm and rubber are **susceptible to extreme weather patterns** during their varying stages of growth.

The multiple impacts of climate change could **significantly reduce the effectiveness of current integrated pest management (IPM) strategies** leading to higher crop losses.

Climate change effects may jeopardize the country's quest to **achieve its food imports and enhance food security**.

Climate Change Mitigation and Adaptation

Paddy Production

- Established rice varieties such as MR219 and MR332, which were developed to be cultivated under existing weather conditions may no longer be viable in the near future.
- R&D rice varieties which are **tolerant to floods, drought, shorter maturity time** (e.g. MR 211) and extreme temperatures has been initiated.

Paddy resistant to water stress with the following traits:

Tolerant Against	Resistant against
Heat	Stem borer
Drought	Sheath blight
	Tungro virus
	Plant hopper

- Water-saving aerobic rice variety** (e.g. MRSA 1) has been developed for rice to be grown in well-drained soil condition and with minimum use of water.
- Simulation studies on **shifting planting dates** are on going.

Climate Change Mitigation and Adaptation

Oil Palm, Rubber and Cocoa Plantations

- Breeding programmes for heat- and water-efficient varieties of oil palm and cocoa are being conducted.
- The use of the **Low Intensity Tapping System** and of **rain gutters** in rubber plantations has been also introduced but deployment of these techniques would require substantial efforts to impart the skills to the workforce in this labour-intensive industry.
- Increase oil yield in production of palm oil instead of opening more arable land to increase plantation hectareage. The average oil yield is targeted at 6 ton/ha/year and fresh fruit bunch (FFB) yields to increase from the current 21 ton/ha in 2009 to 26 ton/ha by 2020.
- Environmental performance regulations and sustainability criteria for palm oil production are complied with through the **Roundtable Sustainable Palm Oil (RSPO)** and **Malaysian Sustainable Palm Oil (MSPO)** which will become mandatory to oil planters in 2019.

Climate Change Mitigation and Adaptation

Greenhouse Gases Emission (GHG)

- In 2011, agriculture accounts for 9% of GHG emission in Malaysia
- Emission are primarily from agriculture and and efforts are being made to optimized agriculture fertilizer application.
- Efforts currently implemented to reduce GHG:
 - Implementation of Malaysian Good Agricultural Practices (M-GAP)**
 - emphasize on environmental, economic and social aspect to ensure safe and good quality products. It also aim to reduce environment pollution and assist in developing an environmental-friendly and sustainable national agricultural industry. Currently, 1,523 farms are certified under this scheme.
 - Implementation of Organic Scheme (MyOrganic)**
 - to recognize organically cultivated farms which do not use chemical pesticides and synthetic herbicides. It was launched in 2007 and aims to set the requirements for the production, labelling and claims for organically produced products. The requirements cover all stages of production, including farm operations, preparation, storage, transport and labelling. Currently, 151 farms occupying 7,848 ha of land are certified with MyOrganic.
 - Zero burning policy during reforestation of rubber estates**

Climate Change Mitigation and Adaptation

Other Measures

- Preservation of forest reserves and water catchment areas** to ensure adequate water supply for agriculture;
- Optimization of water management through efficient irrigation management and techniques** is one of the priorities given in adaptation measures taken;
- Department of Agriculture (DOA) provides important up-to-date information such as **Agriculture Rainfall Index (ARI) Map, Agro-Climatic Map, and Soil-Crop Suitability Classification Map for Peninsular Malaysia** to help major players of the agriculture industry, small holders and researchers plan their agriculture activities.

Source: Department of Agriculture Malaysia, 2013


Recommendations

- Enhancing crop modelling activities** in order to predict the impact of climate change on crop yields and farmers' income;
- Intensification of **research into pest and diseases** in anticipation of changing patterns of such incidences due to climate change;
- Strengthening the resilience of the agriculture sector through implementation of good agricultural practices as well as intensifying research and development, especially in **agriculture climate modelling and expansion of good agricultural practices**;
- Strengthening of institutional support and extension services**, including training extension officers in managing anticipated climate change impacts, would also be important.
- At the national level, Malaysia has formed a **National Steering Committee on Climate Change (NSCCC)** (the roles: policies on energy usage, public awareness on climate change, food supply and effective land and coastal management)

Thank you

2.6 MYANMAR

by Aye Aye Htayam

<p>APPPC Workshop on Empowering Farmers through FFS IPM Training 27 February – 2 March 2017 Kathmandu, Nepal</p> <p>Mrs. Aye Aye Htay Staff Officer Plant Protection Division Department of Agriculture Myanmar.</p>	<p>General Information</p> <ul style="list-style-type: none"> Area : 676,578 sq km Total Sown area : 23.62 Million Ha Population : 54 Million (2016) Population density : 83 per square kilometer Pest incidence : 1-3% (Insect, Disease, Weed and Rodent). 																
<p>Borders of Myanmar</p>  <table border="1"> <tbody> <tr> <td>China</td> <td>- 2192 km</td> </tr> <tr> <td>Laos</td> <td>- 224 km</td> </tr> <tr> <td>Thailand</td> <td>- 2096 km</td> </tr> <tr> <td>Bangladesh</td> <td>- 256 km</td> </tr> <tr> <td>India</td> <td>- 1331 km</td> </tr> <tr> <td>Coastline</td> <td>- 2276 km</td> </tr> <tr> <td>Land</td> <td>- 6099 km</td> </tr> <tr> <td>Sea</td> <td>- 2276 km</td> </tr> </tbody> </table>	China	- 2192 km	Laos	- 224 km	Thailand	- 2096 km	Bangladesh	- 256 km	India	- 1331 km	Coastline	- 2276 km	Land	- 6099 km	Sea	- 2276 km	<p>Cont'd</p> <ul style="list-style-type: none"> The total area of Myanmar is 676,577 sq km (261,228 sq mi). From north to south, Myanmar stretches about 2,085 km (about 1,295 mi); from east to west, the distance is about 930 km (about 575 mi). The country has about 12,800 km (about 8,000 mi) of navigable rivers and canals.
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Land	- 6099 km																
Sea	- 2276 km																
<p>The main agricultural crops</p> <ul style="list-style-type: none"> Rice Pulses Oil seed crops (ground nut, sesame and sunflower) Industrial crops (jute, cotton, rubber, sugar cane) Horticultural crops (fruits and vegetables) 	<p>Responsibilities of Plant Protection Division in Myanmar</p> <ul style="list-style-type: none"> Pesticide management and control Sanitary and Phytosanitary issues (Sanitary, in the area of residue control and mycotoxin analysis) Integrated Pest Management activities Training and education (Government staff, private entrepreneur and farmer in the area of IPM technology transfer through Farmer Field school, safe and efficient use of pesticides and field problem identification and control measure Field services for pest control , treatments prior to export, assisting farmer in their problem 																
<p>National Plant Protection Organization (NPPO) in Myanmar</p> <ul style="list-style-type: none"> Plant Protection Division Major task- <ul style="list-style-type: none"> to undertake plant pest control measure to manage pesticides at state and regional level, district and township levels, to issue phytosanitary certificates 	<p>Name of National Plant Protection Organization (NPPO)</p> <ul style="list-style-type: none"> Contact Person : Director Office Address : Plant Protection Division Department of Agriculture Ministry of Agriculture ,Livestock & Irrigation Bayintnaung Road, West Gyogone, Insein P.O 11011, Yangon, Myanmar Phone : 95-1-644213, 95-1-644214 Fax: : 95-1-644019 E-mail : pmmas.moal@mptmail.net.mm 																

Integrated Pest Management Implementation in Myanmar

- In Myanmar, Plant Protection Division under Department Of Agriculture is working underway of Integrated Pest Management based concepts to suppress pests and diseases with crop by crop package.
- Plant Protection Division strongly emphasizes on IPM with the view of five main tasks,
 - use of varietal resistant
 - use of cultural practices
 - conservation of natural enemies
 - sound and efficient use of pesticides application
 - encourage to initiate the application of bio-pesticides and bio agent to farmers

9

Farmer Field School Activities in Myanmar

- Farmer Field School Activities are established with the objectives of –
 - sharing the apply integrated pest management knowledge to farmers and solving field problems based on proper IPM packages
- Farmer Field School Activities were started since 2000
- Total numbers of trained farmers are 7991 persons
- Target crops-
 - Rice, pulses, cereals, vegetables, oil seed crops and fruits

10

Farmer's field school Activities In Myanmar (Cont'd)



11

Farmer's field school Activities In Myanmar (Cont'd)



12

Farmer's field school Activities In Myanmar (Cont'd)



13

Climate change mitigation and adaptation aspects of IPM-FFS in Myanmar

- There are not special management for adaptation in Myanmar for climate change
- Department of Agriculture have been conducted for maintain to reduce climate change impact on agricultural crop such as replace the bio-pesticide instead of chemical pesticides by making trainings to farmers and also making practice to use natural pesticides such as tobacco, garlic, pepper and lemon grass

14

Plant Protection Division Myanmar Website

www.ppdmyanmar.org

15

Conclusion

The importance of Plant Protection has been recognized and Myanmar will make every possible efforts for better co-operation and coordination among APPPC member countries and as well as with other nations.

16

Supplement

Sr	Year	Division	Name of Crops	Farmers
1	2000-2001	3	Rice	212
2	2001-2002	3	Rice	90
3	2002-2003	2	Rice	64
4	2003-2004	4	Rice, Pulses	113
5	2004-2005	4	Rice, Pulses, Autumn crops	194
6	2005-2006	3	Rice, Pulses, Oil Seed Crops	135
7	2006-2007	7	Rice, Pulses, Oil Seed Crops, Vegetables	298
8	2007-2008	7	Rice, Pulses, Oil Seed Crops, Vegetables, Horticulture Crops	183
9	2008-2009	11	Rice, Pulses, Vegetables, Horticulture Crops	400
10	2009-2010	16	Rice, Pulses, Vegetables, Horticulture Crops	803
11	2010-2011	17	Rice, Pulses, Vegetables, Horticulture Crops	948
12	2011-2012	28	Rice	882
13	2012-2013	18	Rice, Pulses, Monsoon Sesame	862
14	2013-2014	13	Monsoon Rice, Summer Rice	469
15	2014-2015	24	Monsoon Rice, Summer Rice, Pulses, Vegetables, Monsoon Sesame	818
16	2015-2016	6	Monsoon Rice	271

No.	Pests & diseases	Biocontrol Agent (a.i)	Importer
1.	Lepidopterous pests, mites & sucking pests	Neem Azadirachtin; 45-60 cc/gal	
2.	Lepidopterous pests, sucking pests	Rotenone 0.175%; 15-40 cc/gal	
3.	Lepidopterous pests, sucking pests	Map super 6% SC Orange oil 6% + Boric acid 0.99%; 400-800 ml/100 L	Diamond Star
4.	Lepidopterous pests, sucking pests Red spider mites	Map LG super 8% SL Orange oil 3% + Lemongrass 5% SL; 400-600 cc/ac	Diamond Star
5.	Attractants	Methyl eugenol trap; 3-5/ac	

No.	Pests & diseases	Biocontrol Agent (a.i)	Importer
6.	Lepidopterous pests, sucking pests Red spider mites	Abamectin 1.8% EC; 90-450 cc/ac	Myanma Awba, Map Pacific, Diamond Star, JDS, Golden Lion, Forward International, JDS Co., Ltd. Golden Key
7.	Lepidopterous pests	Bacillus thuringiensis var kurstaki; 50-100 g/20 L	
8.	Lepidopterous pests	Map vincal 0.32% SL (Methyl 2-methyl butyrate 0.32% SL); 480-720 cc/ac	
9.	Lepidopterous pests	Mega 0.5% SL (Matrine 0.5% SL); 125-250 cc/ac	Golden Lion

No.	Pests & diseases	Biocontrol Agent (a.i)	Importer
10.	Lepidopterous pests	Map jade 0.2% SL (Nicotine 0.2% SL); 500-600 cc/ac	
11.	Lepidopterous pests	Mega 0.5% AS (Matrine/Aqueous solution); 125-250 cc/ac	
12.	Powdery mildew, Downy mildew, Wilt Anthracnose	Map LG super orange oil 3% + Lemongrass 5%; 250-400 cc/ 100 L	

No.	Pests & diseases	Biocontrol Agent (a.i)	Importer
13.	Powdery mildew, downy mildew, blight	Map super orange oil 6% + Boric acid 0.99% (don't use with S and Cu); 400 g/100 L	Diamond Star
14.	Root rot, collar rot (to prevent soil-borne) Phytophthora, Rhizotonia, Sclerotia, Fusarium Late blight, early blight, fruit rot, Anthracnose, scab, downy mildew, purple blotch, bacterial leaf spot, black rot, black leaf spot, Bacterial soft rot	Trisan Trichoderma; 50-200 gm/plt (under canopy) 50g/20 L (don't mix with alkaline) 400-600 g/ac	

Import of Bio-Agents

Pests & diseases against which BCA have been registered in Myanmar

N o.	Pests & diseases	Biocontrol Agent (a.i.)	Importer
15	Halo blight, leaf spot bacterial spot, Black leaf spot, Cercospora leaf spot, Early blight, Late blight	Copper hydroxide 85% WP (Don't use on brassicae such as mustard, cauliflower etc., 300g/100 L	

List of Banned Pesticide in MyanmarUpdate List approved by notification number 1/2013 of Pesticide Registration Board,17th June,2013.

NO	Active Ingredient	Reason
1	Aldicarb	PIC List
2	Alachlor	PIC List
3	Alpha Hexachlorocyclohexane	POP List
4	Arsenic Compound	Carcinogenicity
5	Binapacryl	PIC List
6	Chlordecone	POP List
7	Chlorobenzilate	PIC List
8	DNOC	PIC List
9	Ethylene Dichloride	PIC List
10	Endosulfan	POP List

List of Banned Pesticide in MyanmarUpdate List approved by notification number 1/2013 of Pesticide Registration Board,17th June,2013.

NO	Active Ingredient	Reason
21	Phosphamidon	PIC List
22	Tributyltin Compound	PIC List
23	Aldrin	PIC List
24	Beta-Hexachlorocyclohexane (BHC)	PIC List
25	Captafol	PIC List
26	Chlordimeform	PIC List
27	Chlordane	PIC List
28	Cyhexatine	PIC List
29	Dieldrin	PIC List
30	Dinoseb	PIC List

List of restricted pesticides in Myanmar

No.	Pesticide	Remarks
1	Methyl Bomide	Fumigant to be handled only by CPA holders.
2	Phosphine	Fumigant to be handled only by CPA holders
3	Bromadiolone	Highly toxic to be handled only by certified applicator
4	Zinc Phosphide	Intensely poisonous to mammals to be handled only by CPA
5	Brodifacoum	Fumigant to be handled only by certified applicator
6	Fenthion	Restricted to vector control
7	DDT	Restricted to vector control for malaria.

List of Banned Pesticide in MyanmarUpdate List approved by notification number 1/2013 of Pesticide Registration Board,17th June,2013.

NO	Active Ingredient	Reason
11	Ethylene Oxide	PIC List
12	Fluoroacetamide	PIC List
13	Heptachlor	POP List
14	Lindane(Gama Hexachlorocyclohexane)	POP List
15	Methomyl	Cholinesterase inhibitor,Acute Toxicity in Human
16	Methamidophos	PIC List
17	Methyl Parathion	PIC List
18	Monocrotophos	PIC List
19	Mirex	POP List
20	Pentachlorophenol (PCP)	PIC List

NO	Active Ingredient	Reason
31	Ethylene Dibromide(EDB)	PIC List
32	Endrin	Oncogenisity
33	EPN	Neurotoxicity
34	Inorganic Mercury Compounds	PIC List
35	Organic Mercury Compounds	PIC List
36	Parathion Ethyl	PIC List
37	Strobane	Oncogenecity
38	2,4,5 - T and 2,4,5-TP	PIC List
39	Toxaphene	Oncogenecity

2.7 NEPAL

by Rajiv Das Rajbhandari

Country report on Status of IPM with Emphasize on Empowering Farmers through IPM FFS

Presented at
WORKSHOP ON
"APPC/FAO Workshop on Empowering Farmers FFS IPM"
Kathmandu, Nepal
Feb. 27- March 2, 2017

Presented by
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PLANT PROTECTION DIRECTORATE
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MINISTRY OF AGRICULTURE AND DEVELOPMENT

JOINTLY ORGANIZED BY
PLANT PROTECTION DIRECTORATE
&
Asia and Pacific Plant Protection Commission (APPPC)

Country profile

- Rich in biodiversity and water resources.
- Land area of 147,181 Km.
- Located between
 - North latitude: 26 degree 22 ' to 30 degree 27 '
 - East longitude: 80 degree 4' to 88 degree 12'
- Population : 26.5 million; Population growth rate: 1.35%
- 80 percent of economically active labor force
- 65.6 percent of the total population depends on agriculture
- The contribution of agriculture to GDP is about 32.6 percent.

The country profile

- Land locked country
- Birth place of Lord Buddha
- Bordering countries:
 - China (Tibet): North
 - India: East, south and west
- Altitude ranges from few meters to 8,848m
- (Mt Everest; the highest peak of the world)



Geographical and Political division of Nepal

Geographical division: 3 Eco-zones

Mountain (16 districts)

- 35% of total area (4800 mt and above)
- Yak/Nak, sheep, alpine goats (Chyangri) and mule rearing forms the way of life of people in this region.

Hills (39 districts)

- Covers about 42% area (300 to 4800 mt.)
- Agro-based livestock industries and horticultural production in the region are the main source of income of the people.

Terai (20 districts)

- Covers about 23% of the total area (<300 mt.)
- This region serves as a main source of food supply to other region of the country.

Administrative division

- 5 Development regions
- 75 Districts
- 3995 Village Development Committees



Map of Nepal



Land use pattern of Nepal

Type	Land in Ha. ('000)	Percentage
Agriculture land cultivated	3091	21
Agriculture land uncultivated	1030	6.99
Forest (Including shrub)	5828	39.59
Grass land and pasture	1766	11.99
Others	3003	20.4

Agricultural situation in Nepal

Agriculture in Nepal is unique in many ways. The uniqueness of physiographic and climatic diversity favors to grow almost all plant and animal species of economic importance.

Physical region	Area in sq.Km		% of cultivated area of Nepal	% of cultivated area of the region
	Total	Cultivated		
Himalayan	51313	1436	4.0	3.0
Hills	61816	9337	25.50	15.0
Terai	33851	25138	70.5	74.26
Total	147181	35912	100.0	24.40

Major crops of Nepal with area and production

S.N	Crops	Area (ha.)	Production (mt.)	Yield (mt/ha)
1.	Paddy	1420570	4504503	3.171
2.	Maize	849635	1999010	2.353
3.	Wheat	754243	1727346	2.290
4.	Millet	274350	305588	1.114
5.	Barley	29598	33782	1.141
6.	Buckwheat	10681	10056	0.941



Major crops of Nepal with area and production...

1	Oil seeds	215600	179000	0.830
2	Potato	197234	2690421	13.641
3	Tobacco	1800	2430	1.350
4	Sugarcane	64483	2930000	45.438
5	Jute	11300	15500	1.371
6	Pulses (all)	333436	356743	1.070
7	Vegetables (all)	266392	3301684	13.400
8	Fruits (all)	101480	938731	9.250
9	Cardamom		5753	
10	Tea		20588	
11	Coffee		366	
12	Ginger		235033	
13	Turmeric		35725	

National consumption of pesticide

396 g a.i./ha

Registered Pesticides in Nepal-2017

S.N.	Pesticides	Trade name	Common name
1	Insecticide	1326	51
2	Acaricide	23	6
3	Fungicide	576	38
4	Bactericide	13	1
5	Herbicide	293	21
6	Rodenticide	29	2
7	Molluscicide	2	1
8	Biopesticide	79	9
	Total	2344	132



LIST OF BANNED PESTICIDES IN NEPAL

S.N.	Name of pesticides	Year	S.N.	Name of pesticides	Year
1	Chlordane	2001	9	Heptachlor	2001
2	Dieldrin	2001	10	BHC	2001
3	Aldrin	2001	11	Organo mercury	2001
4	Mirex	2001		Fungicides	
5	Lindane	2001	12	Toxaphene	2001
6	Phosphamidon	2001	13	Monochrotophos	2006
7	DDT	2001	14	Methyle parathion	2006
8	Endrin	2001	15	Endosulfan	2012
			16	Phorate	2015

Source: PPD, 2015

Pesticide Consumption by Crop

Crops	Quantity (a.i.kg/ha)
Cereals	0.046125
Vegetables	1.604693
Cash Crops	0.186542
Pulses	0.05075
Fruits	0.029187

Organizational structure



Pesticide consumption 2014-15

S.No.	Pesticides	Total Quantity (mt)	Total a.i. (mt)	Total Amount NRs. (million)
1	Insecticide	1064.070	156.0	330.059
2	Fungicide	362.5	250.808	177.638
3	Bactericide	0.259	0.0259	0.290
4	Herbicide	285.112	133.857	124.862
5	Rodenticide	19.105	9.180	10.196
6	Bio pesticide	7.288	0.052	3.142
	Grand Total	1738.37	549.965	646.187

1 US \$ = NRs. 107.23

IPM IN NEPALESE CONTEXT

- main constraints to increase agricultural production and value addition in the farm produce is the pest attack.
- Loss from crop pests is estimated to be around 35% annually.
- Pesticide use in Agriculture in 1960s in Nepal
- To reduce this loss farmers use synthetic pesticides, which are expensive, cause negative environmental consequences and are health hazardous to the growers and consumers.
- BPH outbreaks in Chitwan in 1996:
 - More than 1000 ha.
 - Loss of NRs. 23.13 million
 - then IPM was sought
- Technical Cooperation Project in rice within framework of FAO Global IPM Facility in 1997
 - Based on ecological principle

Basis of training methods and approaches

Four principles of IPM

1. Grow a healthy crop
2. Regular monitoring of field
3. Conserve natural enemies
4. Farmer become expert



Major points of Training module of Farmer Field School (FFS)

- Seed to harvest (Season long)
- Three preparatory meetings
 - GAM, CC, Social inclusion etc
- Field Experiments
 - IPM vs FP
 - Supportive studies
 - Problematic studies
- Insect zoo & cup studies

- Around 25 farmers
- Weekly session
- Each FFS session around 5 hours
- AESA
- Special topics
- Ballot box test
- Group dynamics
- Farmer Field day



Major Follow up activities after FFS

1. Farmer & Science
2. Post harvest FFS
3. IPM field studies/ action research
4. Participatory planning
5. IPM model village
6. Community IPM Resource center
7. Farmer organization
8. IPM product marketing
9. Awareness programme
10. Plant Clinic

Major IPM Project in Nepal

- *Technical Cooperation Project (FAO/TCP)*
- *Community IPM program*
- *National IPM Program –Phase I*
- *National IPM Program –Phase II*

Technical Cooperation Project -1997

- In 1996, an outbreak of brown planthopper in rice caused an estimated loss value at almost NRs. 23.13 million.
- Realizing this fact Nepal joined Technical Cooperation Project within framework of FAO Global IPM Facility in 1997.
- Main objective was
 - Technical Man Power development- 35 IPM officer level Facilitator
 - 30 FFS in Rice conducted

Community IPM program -1998-2003

• The phase of Regional Community IPM Program (GCP/RAS/172/NOR) in support of Government of Norway as a part of continuity of TCP project.

• Activities were focus on:

- Farmer as IPM Trainers (Farmer TOT, Farmer FFS)
- Participatory planning and implementation
- Farmer to farmer FFS
- Farmer studies

For:

- Farmer as planners
- Farmer as researchers
- Farmer as organizers

Community IPM program -1998-2003

Major activities and output

S.N.	Training/workshop	No	Participants
1	Strategy development, policy, and curriculum workshop	3	MOA, DOA, PPD, NARC, Donors
2	Season long Rice IPM TOT officer level	1	30 APPOS, 1 NARC, NGOs
3	Vegitable IPM TOT	1	30 GOs officers, 4 NGO officer
4	Season long Rice IPM TOT (JT level)	1	17 JT/As (GO) and 17 JTs NGO
5	Training on Participatory planning	2	39 IPM trainers
6	Training on Science by farmers	2	36 IPM trainers
7	Farmer TOT	5	156
8	Rice FFS by official trainer	408	10100 farmers
9	Vegitable FFS by official trainer	23	979 farmers
10	Farmer to farmer FFS	246	6150 farmers
11	Farmer Science	14	350 farmers

National IPM Program –Phase I

- The project began in 2003 and ended in 2007
- Grant from Norway - for the "Support to the National IPM Program in Nepal.
- The main objective was "to contribute to sustainable broad based poverty reduction and food security while contributing to environment protection".
- The specific objectives were
 - (i) to contribute to institutionalize a sustainable national IPM program
 - (ii) to empower farmers to increase production and productivity efficiently, while protecting the environment.

National IPM Program –Phase I....contd

Major activities and output

A. Training of Facilitators

- Officer level (2004) - Total Participants: **35**
- Officer and JT/JTA-Total Participants:**42**
- Tea IPM TOF-Total Participants: **36**,

B. TOF for farmer level

Altogether 339 farmers were graduated among them 40% farmer facilitators were female.

National IPM Program –Phase I....contd

Major activities and output

E. Farmer congress

- Farmer congress was conducted in 16 districts
- Altogether 1257 participants (male-858, female-399) were participated .

F. Workshop, meetings and study tour

- Curriculum development workshop, Regional IPM review and coordination workshop
- Coordination Committee Meetings and Project Tripartite Meeting
- International exposure for twenty six personnel

The first phase has forged the roadmap to second phase of IPM

National IPM Program –Consolidation, Up-Scaling and Institutionalization, Phase II....contd..

Program objectives

Development objective:

Contribution to sustainable broad-based **poverty alleviation** and **food security** while contributing to **human health** and **environmental protection**

Specific objectives

- 1) To contribute to institutionalise a sustainable national IPM Program in Nepal by strengthening the capacity of the PPD, collaborating national, regional and district level training and extension institutions in the government and non-government sectors to integrate IPM training and support program for smallholder farmers.
- 2) To empower subsistence farmers including women to increase production and productivity efficiently, while protecting the environment, conserving the biodiversity and avoiding health hazards for betterment of their livelihood.

IPM Program focus districts

Intensive IPM Pilot Component FAO:

- Total 12 Districts: 5 in Terai (Jhapa, Bara, Kapilvastu, Banke, Kailali)
- 5 in Mid Hills (Ilam, Kavre, Syangja, Surkhet, Dadeldhura),
- 2 in High Mountains (Mustang, Jumla)

Regular and Intensification (PPD):

- Total 63 (High intensive-18; Medium Intensive-16; Low Intensive-18, Non supported districts-11)
- Replication of modules of Intensification in additional 5 Districts (Morang, Chitawan, Dhading, Tanahu and Bardiya)- 2010 onwards
- Further dissemination of modules in other districts (DADOs Regular fund, Government and Other NGOs/ INGOs and)

National IPM Program –Phase I....contd

Major activities and output

C. Farmer Field School

- 845 FFS (Rice:396 and vegetable:449)
- 22725 farmers were trained.
- Among total farmers 58% were female

D. Post FFS activities

- Farmer and Science

Total 82 farmers and science (Rice-19; vegetable-63)

-Post harvest FFS

- 70 FFS on post harvest management on rice, wheat and maize.

National IPM Program –Consolidation, Up-Scaling and Institutionalization, Phase II

- **Agreement Signed :**
 - GoN and Go Norway: 27 October 2008
 - GoN (MoAD) and FAO: 27 October 2008
- **Intensive IPM Pilot Component through FAO**
Regular and Intensive IPM Component through PPD
- **Executing Agency:** GoN, Ministry of Agriculture and Development
- **Implementing Agency:** Plant Protection Directorate of DoA
- **Technical Assistance Support and Cooperating Agency:** FAO
- **Project Duration:** 27 October 2008- 31 October 2013
- **No cost extension:** 1 November 2013 – 31 January 2014

National IPM Program –Consolidation, Up-Scaling and Institutionalization, Phase II....contd..

Major thrust

- Consolidation, intensification and institutionalization of the outcomes of first phase of IPM
- Holistic and sustainable management production management
- Major focus: Developing and spreading successful IPM technologies
- Increase agriculture production, promote marketing to IPM crop products

Flow chart for program institutionalization



Major Achievements....

Training Module development:

- Seasonlong FFS
- Yearlong FFS
- Postharvest FFS



Training Curriculum development:

- ToF curriculum for farmer, JT/JTAs and officers
- Curriculum matrices to develop IPM-FFS curricula for various crops
- Yearlong IPM-FFS Curriculum
- IPM-FFS Curriculum Schedule for Citrus, apple, large cardamom, tea, zinger, coffee.
- IPM-Post FFS Curriculum Schedules



Major Achievements.....

Institutionalization of IPM FFS

- IPM FFS Course Internalization in University and CTEVT
- Establishment of Coordination and monitoring approach
- Development of IPM Farmer association and their network
- Development of Community IPM Resource Centre
- Module of FFS in Other Project



Policy and Standards

- IPM Policy drafted
- IPM Standards (IPM GAP) drafted



Major Achievements....

Certification system and marketing of IPM Product:

- Development Self monitoring for Quality Control and certification system of IPM Products.
- Initiation of market out let of IPM product in different districts.



Overall IPM Achievement

Facilitators development:

- Officer level :- 257
- Assistance level :- 399
- Farmer level :- 1239
- Total: 1895

FFS conduction:

- Project basis : 2207
- Yearlong FFS: 180
- Season long FFS: 2027
- Government budget :- 452
- INGO/NGO:- 1139

Farmer Graduated:

- Project basis: M: 25219 F: 33247
- Yearlong : M 1706 & F 2897
- Season long : M 23513 & F 30368

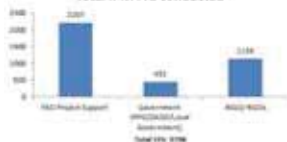
- Government budget :- M: 4937
- F: 6583

- INGO/NGO:- M: 9379
- F: 21338

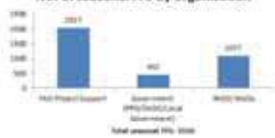
- Grand total: M: 39535 F: 61168
- Total: 100703



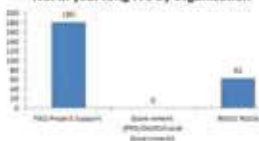
Total IPM FFS conducted



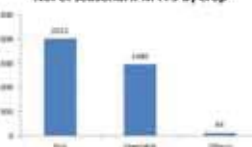
No. of seasonal FFS by organization



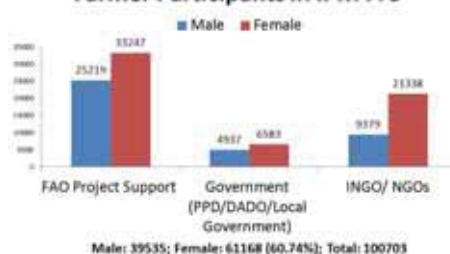
No. of year long FFS by organization



No. of seasonal IPM FFS by crop



Farmer Participants in IPM FFS



Gender Composition in IPM FFS



Coordination Committees

- District IPM Coordination Committee
- Regional IPM Coordination Committee (IPM RCC)
- National IPM Coordination Committee (IPM NCC)



Networking and institutionalization of IPM groups

- IPM Group at village level,
- IPM Committee at VDC level,
- IPM District Committee,
- IPM Regional Committee
- National IPM Committee



Activities and achievements

- IPM practices has been given high priority in National program.
- Bio-pesticide promotion directives prepared.
- IPM production area is increasing
- IPM Product is coming in the market.
- It created awareness among the farmers on the concept principles and methods of IPM and has educated them on ecology based crop production especially in rice and vegetables and high value crops (Apple Citrus and Tea)
- It also initiated a process of institutionalization and mainstreaming of IPM within the regular activities of DoA.

Major Achievements in context on empowering farmers in IPM FFS

Social impact

- * Women empowerment: Sixty one percentage of women farmer graduated from FFS, 34% FFS, 40% to total group chairpersons.
- * Increase in Literacy: The literate population found to be increased by 300% in FFS households compared to the baseline value
- * Better livelihood: households with better roofing materials, electronic goods and bicycle
- * Imparted knowledge, skills and attitude: working in groups, sharing knowledge, expert in own farm management, working in groups, sharing knowledge, observation, analytical and decision making skill, team building and leadership skills.
- * Advocacy and lobbying: acting as pressure group, capable for bargaining and negotiation, promote healthy IPM product

Economic impact

Almost 35 percent increase in the income was reported in the FFS households.
Benefit cost ratio of crop is also increased.



Major Achievements in context on empowering farmers in IPM FFS

Reduction of pesticide use:

Reduction in use of pesticide Frequency : FFS (-77.24%) and NFFS (-51.93%) farmers under intensive program, followed by FFS (-36.86%) and NFFS (-29.26%) under regular program than baseline and control.

Reduction of pesticide amount: -79.53% in regular, FFS, and -15.84% in intensive, FFS farmers as well as highest reduction in Class 1b pesticides in both intensive and regular programs

Decrease in annual expenditure on pesticides: (-96.60%) with intensive, FFS farmers,, NFFS (-89.22%), and regular FFS (-88.44%)

Reduction on Mean field EIQ values of pesticides: reduction was from 34.73 to 13.57 (-60.93%) of intensive, FFS farmers, followed by intensive NFFS, i.e. from 42.04 to 21.86 (-48.00%) and regular, FFS farmers, i.e. from 61.00 to 46.35 (-24.76%).

Lesson Learnt

- ☐ IPM-FFS is more effective in educating the farmers on IPM for better management of crops
- ☐ IPM-FFS contributed to gradual reduction of hazardous chemical pesticides use,
- ☐ System of regular monitoring and backstopping support should be in place to maintain the quality of program interventions
- ☐ Inclusion of IPM curriculum in pre- and in-service training courses provided cost effective approach to develop human resource
- ☐ Availability of substitutes for chemical pesticide is pre- requisite for the promotion of IPM technology and production of biopesticides in country would suffice the availability and its reliability

Lesson Learnt

- ☐ There is a need for concerted efforts from both government and development partners to out scale the module in the country for wider benefit.
- ☐ IPM Farmers are able to produce bio pesticide in local level
- ☐ IPM FFS is more useful to small and middle farmers rather than large farmers

Major Achievements in context on empowering farmers in IPM FFS

Cropping pattern, intensity & Crop management

- * Increase in Cropped area: Increase in cropped area under FFS households and Non FFS (Spilled over effect) than control.

Increase in Cropping intensity: Cropping intensity was increased more in FFS HH and than Non FFS HH as compared to control FFS HH.

Area under key crops increased: The area under major crops like rice, potato, tomato, cole crops and cucumber was found increased in FFS type of households

Increase in area under vegetable farming: There was remarkable increase in the area under vegetable (50%) in the FFS household under intensive program.

- *Crop management:
 - Balance use of fertilizer
 - Quality seed
 - Cultural and irrigation practices

Major issue and challenge

- ☐ Up-scaling of IPM technology and production area and Marketing of IPM Product
- ☐ Sustainability of Field activities
- ☐ Resource Trapping
- ☐ Approval of IPM Policy and IPM GAP Standard
- ☐ Bio and botanical pesticide
- ☐ Use of trained manpower
- ☐ Regularize the developed institution
- ☐ Norms and module
- ☐ Coordination and cooperation of line agencies

Lesson Learnt

- ☐ Formation of IPM farmer's and facilitators networks provided legal basis for exchange of information, planning, resource seeking with an effective approach in institutionalization
- ☐ Linkage and cooperation is required among all the development actors working in agriculture and marketing
- ☐ FFS is found to be a good entry point to initiate other development interventions as it respects and promotes the human capital as change agent for overall development.
- ☐ Project developed an adaptive model of sustainable agriculture to integrate local capitals and resources efficiently and wisely to meet the development objectives.

Community IPM Resource Center

1. Resource center - an answer for

- Healthy seeds, seedlings and saplings
- Non-chemical fertilizers and micronutrients
- Various bio-agents, microbial bio-pesticides

2. Driving force for IPM up scaling

- Group mobilization and strengthening
- Exploration of resources
- Technical and financial outsourcing.
- Update IPM knowledge and skills
- Plan, implement and review of IPM activities



Objectives

1. Production, packaging and promotion of bio-pesticides, botanicals, bio-agents and inputs in the resource centre in commercial scale and sell to the IPM growers as alternative to chemical pesticides.



1. Provide IPM friendly advisory services in order to sustain IPM achievements for long run.



1. Establish IPM information unit; equipped with modern information and services, recent publications of agri. research and extension on eco-friendly crop and pest management.

Some glimpses of IPM

IPM ToF and Refresher Training

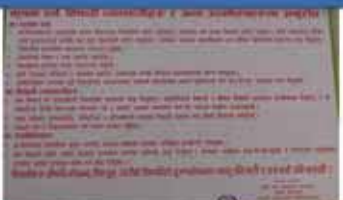
IPM II Phase

- IPM ToF and Refresher Training maintained
- Farmer Facilitators: 642
- Junior Technicians: 234
- Officers: 124



Publications and Awareness

- Hoarding boards
- FM radios
- TVs
- Study materials (Books, leaflets, booklets, brochures etc)
- IPM Market stalls
- Participation in agri. fairs
- Training and Visits
- Group meetings
- Workshops and seminars

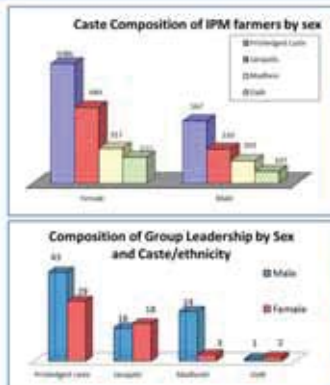


Monitoring wing established

- MCC
- RCC
- DCC
- Farmer group



Gender and ethnic group empowerment in IPM FFS



IPM Product marketing: sensitization and advocacy

- Workshop on IPM marketing
- Committees (DDC, VDC, DADO,)
- Traders (Chamber of commerce, retailers, wholesalers, Market Management Committee)
- Training on group strengthening
- Enterprise development
- Local Agriculture Good Practice (LAGP) on IPM Products
- Advocacy rally and market stalls



Journalists Capturing IPM Activities



Kantipur and ABC TV



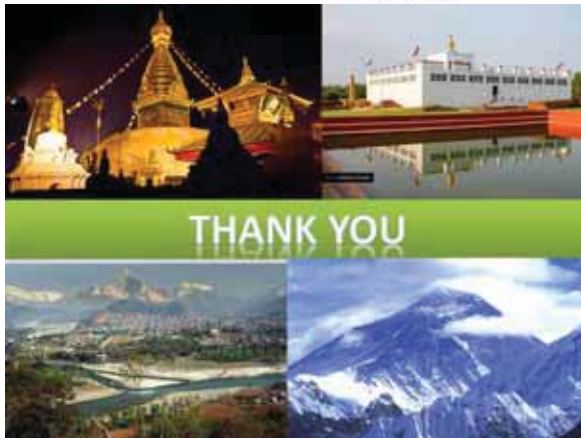
Avenues TV Report in IPM field



OCHA IRIN Journalist in Banke



Sagarimath and Kantipur radio journalists with farmer facilitator



Crop inspection, group certification and marketing

System Introduced for

- Individual Farm Plan
- Group monitoring and planning
- Need based trials and demonstrations
- Farmers record book
- Joint inspection (Farmer Facilitators and Technical Sub Committee)
- Group meeting
- Product certification
- Recommendation
- Marketing



IPM Program in mass media

Home-made solutions



RISING NEPAL



विषादी प्रयोगलाई निरुत्साहित आइपीएम किसान पाठशाला

विषादी प्रयोगलाई निरुत्साहित आइपीएम किसान पाठशाला

कृषक रोहता खाद्य फसल बजारमा ल्याउने तयारी



Plant doctors come into focus

Plant doctors come into focus

2.8 PAKISTAN

by Muhammad Ishaque Mastol



MISSION STATEMENT
To achieve environmentally sound and sustainable agricultural production ensuring food security, social equity, self-reliance and economical welfare of the producer.

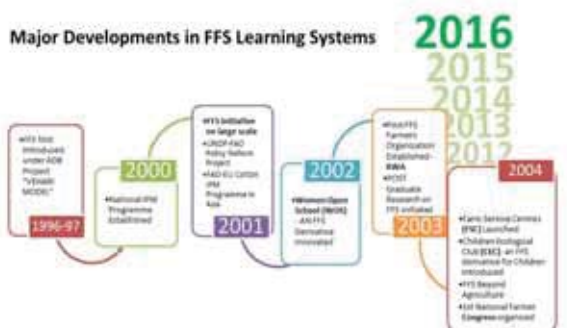
GOAL
Large scale and sustainable implementation of IPM in Pakistan, rationalizing the use of pesticide while maintaining production levels and increasing farmer's profit.

OBJECTIVES

- Enhance communication, coordination and strengthen collaboration among IPM stakeholders.
- Make efforts to promote ecologically sound and river oriented IPM approaches for the benefit of the society.
- Facilitate the foundation and execution of projects, advocating optimum use of available resources to enhance productivity of cropping system.
- Communicate the results of these efforts, the benefits of IPM and relevant policy decisions to the public widely.
- Establish international linkages.

EXISTING MANPOWER
Dr. Tahira Yasmin
Dr. M. Ishaque Mastol
Mr. Tahir Sohail Faris

Major Developments in FFS Learning Systems



How its possible???

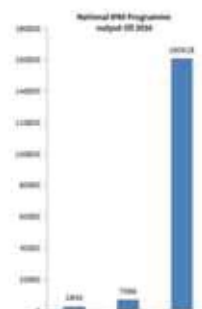
Involvement of Agriculture Extension, Agriculture Universities and Agriculture Research Organizations in implementation of FFS approach

Formation of FFS based farmer organizations throughout the country as well as establishment of FFS based community network at national level named "Society of Facilitators and Trainers"

Incorporation of FFS approach in National Agriculture University, Agriculture Extension Curricula and in National Policy-Vision 2030.

FFS Based Implementation Models

MODELS	AGRI. CROP	COMMODITIES
1. Farmer Field School (FFS) non residential model	➤ Rice	➤ Dairy
2. Women Open School (WOS)	➤ Cotton	➤ Livestock
3. Children Ecological Club (CEC)	➤ Vegetables	➤ Poultry
4. Farm Family Field School (FFFS)	➤ Sugarcane	➤ Enterprises
5. Shift from commodity to system	➤ Wheat	➤ Health & Hygiene
6. Farmer Business School	➤ Maize	➤ Tractors
	➤ Fruits	➤ School Children



Organizations implementing FFS as learning tool

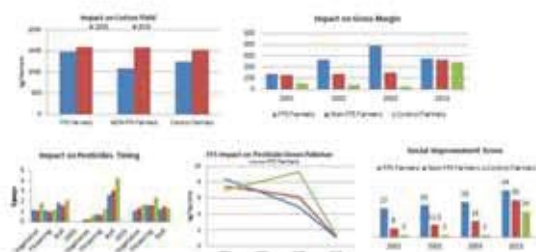
- Public**
- Federal Government
 - MARS
 - Provincial Governments
 - Agriculture Extension
 - Pest Warning
- Development Partners**
- NGOs (National & International)
 - WFP
 - CAB
 - World Bank
 - Plan Pakistan
 - UNAD
 - European Commission
 - Belgium & Spanish Fintech
 - AUSA
 - SATI
 - Lok Sangh
 - Cotton Connect
 - WFP Pakistan
 - Farmer Organizations
 - FAO
 - UNDP
 - IFAD

FFS Community Network in Pakistan

FFS Community Network represents 43 organizations emerged as a result of IPM-FFS Programme throughout Pakistan.



Short and Long Term Impact of FFS



Success Factors (What really worked?)

- ✓ Stakeholders on board
- ✓ Influential leadership
- ✓ FFS as a learning tool- at private and public level
- ✓ Organizational development and movement
- ✓ Effective bottom up approach attracted farming communities



Challenges faced

CHALLENGE	OVERCOMING APPROACH	
Technical	<ul style="list-style-type: none">Resource PersonsCurriculumFarm levelProgramme	<ul style="list-style-type: none">Familiarisation WorkshopsReview & development at Institutional/Community levelLocal knowledge and resource material developedHuman Resource Development
Policy	<ul style="list-style-type: none">Stakeholder ownershipProgram CostFFS Inclusion in National Policy	<ul style="list-style-type: none">Bureaucrats and Government officials taken on boardEstablishment of Nat-IPM ProgrammeFarmer to Farmer learning system introducedFFS Community network establishedAdvocacy awareness workshop and consultation
Institutional	<ul style="list-style-type: none">Gender MainstreamingFFS Knowledge ManagementStakeholders CollaborationSustainability	<ul style="list-style-type: none">WOS and CEC developCompilation of scattered data, research studiesEngage Universities, school teachersConsultative workshops, meeting and committeesFarmer and facilitator organizationsExtension personnel trained

Major Weaknesses

- ❖ Regular funding for FFS programme
- ❖ Human resource development
- ❖ Regular impact assessment
- ❖ Monitoring & evaluation system
- ❖ Coordination among FFS implementing organizations/stakeholders



Way Forward

- ❑ Research on scaling out the FFS Methodologies
- ❑ Development of Training modules for different level of facilitators
- ❑ Proactive advocacy for Policy Reforms
- ❑ National FFS Certification body



IPM FFS Approach



Thank you



2.9 PHILIPPINES

by Wilma Cuaterno



FAO Regional Rice Initiative Pilot Project: PHILIPPINES

BACKGROUND & RATIONALE



RICE:

Philippine's most important staple crop:


- ❑ Rice accounts for around 20% of the GVA of agriculture and employs 2.5 M households.
- ❑ Rice accounts for 25% of food expenditures of the poorest 30%. A 25% increase in rice prices results into a 7-10% drop in real incomes of poor households.

RICE TRENDS

Growth rates in consumption outpacing production, area and yields:

YEAR	GROWTH RATE			
	PRODUCTION	AREA	YIELD	CONSUMPTION
1991-2001	3.39	1.87	1.28	5.36
2001-2011	2.88	1.16	1.54	3.66

SOURCE: Bureau of Agricultural Statistics.




GOALS:

- ❑ Food Security
- ❑ Poverty Alleviation
- ❑ Zero Hunger



THREATS :

- n Increasing input costs & declining real farm incomes.
- n Competitiveness under liberalized trade environments.
- n Global warming & climate change.




THREATS :

- n Urbanization & increasing consumption of water.
- n Decreasing farm size & inadequate farm incomes & nutrition.
- n Aging farmers & farming communities.

IMPACTS OF RICE TRADE LIBERALIZATION :

- n Bring down farmgate rice prices by 25%.
- n Inflict a 29% drop of gross income on rice farmers.
- n Increased imports due to an 8% drop in rice production and a 10% increase in rice consumption.

SOURCE: James E. (2014) Trade Liberalization



COP BENCHMARKS

ECOSYSTEM	BASELINE COP (g/hm ² /g)	COP BENCHMARKS (%)		
		SHORT TERM	MEDIUM TERM	LONG TERM
IRRIGATED RICE (DRY)	11.06	5.06↓	18.54	32.37
IRRIGATED RICE (WET)	11.17	5.10	18.53	32.32
NON-IRRIGATED RICE (DRY)	11.48	8.71	21.60	34.67
NON-IRRIGATED RICE (WET)	11.61	8.70	21.62	34.71↓

CHALLENGES

- ❑ Attaining rice self-sufficiency to feed a growing population.
- ❑ Raising rice productivity and making the Filipino farmer profitable, globally competitive and climate-resilient :

BY PRODUCING MORE WITH LESS.

FAO Regional Rice Initiative Pilot Project: PHILIPPINES

MAJOR OBJECTIVE

- ❑ Gather evidences of increasing production efficiencies by promoting ecosystem-based farming practices.
- Rice farmers must learn how to SAVE for production to GROW.**

SPECIFIC OBJECTIVES

- ❑ Increase rice productivity by 10%.
- ❑ Increase cost efficiencies by reducing production costs by 15%;
- ❑ Increase farm incomes by 15%.

STRATEGIES

- ❑ OBJ. 1: Good Agricultural Practices
- ❑ OBJ. 2: Cost-Reducing Technologies
- ❑ OBJ. 3: Integrated Rice-Livestock/Fishery & Multi-cropping Systems

MANAGEMENT PRACTICES

- ❑ Thorough land preparation and land leveling;
- ❑ Use of appropriate quality seeds with good seedbed preparation;
- ❑ Modified (System of Rice Intensification) SRI technologies;
- ❑ Soil analysis and Site-Specific Nutrient Management (SSNM);
- ❑ Balanced fertilization and use of farm-sourced organic fertilizers - vermicast & compost;

MANAGEMENT PRACTICES USED:

- ❑ Water management thru intermittent flooding and alternate wet & dry water saving techniques;
- ❑ Integrated Pest Management or IPM;
- ❑ Harvest and post-harvest management;
- ❑ Multi-cropping technologies (rice-vegetables);
- ❑ Diversified farming technologies (rice-duck and rice-fish cultures);
- ❑ Seed purification and plant breeding.

FAO Regional Rice Initiative Pilot Project: PHILIPPINES

PHASE I: 2013; PHASE 2: 2014-2015



MAJOR OUTPUTS

- ❑ Conduct of 48 FFS-SG, including Aqua-biodiversity and Trees Outside Forests.
- ❑ Training of 100 LGU-based Agricultural Technicians on SIRP
- ❑ Development of FFS Field Guide on Sustainable Rice Crop Intensification: Field Guide for the Conduct of FFS-SG.



Farmer Field Schools in Save & Grow: Phases 1 & 2

REGION	FFS S&G	MALE	FEMALE	TOTAL
PHASE 1: 2013				
Northern Mindanao	8	110	148	258
Central Mindanao	4	63	68	130
Caraga	8	117	140	257
SUB-TOTAL	20	289	354	643
PHASE 2: 2014-2015				
Bicol	2	33	33	66
Eastern Visayas	2	16	20	36
Northern Mindanao	10	153	188	340
Davao	2	45	25	70
Central Mindanao	3	57	42	99
Caraga	8	82	88	170
ARMM	2	28	36	64
SUB-TOTAL	28	331	376	707
TOTAL	48	620	730	1,350

SOURCE: Data from 48 FFS in S&G in Regions V, VII, X, XI, XII, XIII and ARMM.

Economic Data from Farmer Field Schools in Save & Grow: PHASE 1

ITEM	Unit	Farmer's Practice	FFS in S&G	% Increase (Decrease)
Average Yield	Kilo/Hec	4,400	5,730	30.41
Total Cost	Peso/Hec	33,985	28,112	-16.32
Net Income from Rice	Peso/Hec	41,179	69,506	68.11
Cost of Production	Peso/Hec	7.96	5.73	-35.94
Additional Income	Peso	0	40,660	N.A.
Total Farm Income	Peso	41,179	110,165	167.50

SOURCE: Data from 18 FFS in S&G in Region X, XII and XI.

Economic Data from Farmer Field Schools in Save & Grow: PHASE 2

ITEM	Unit	Farmer's Practice	FFS in S&G	% Increase (Decrease)
Average Yield	Kilo/Hec	5,150	8,560	27.48
Total Cost	Peso/Hec	35,026	30,718	-12.30
Net Income from Rice	Peso/Hec	54,883	82,903	51.61
Cost of Production	Peso/Hec	6.80	4.68	-31.18
Additional Income	Peso	0	8,001	N.A.
Total Farm Income	Peso	54,883	90,904	65.89

SOURCE: Data from 24 FFS in S&G in Region V, X, XII, XIII & ARMM.

RRI PHASE 3: 2016-2017

RRI PHASE 3 ACTIVITIES

- ❑ Conduct of 100 Expanded Farmer Field Schools in Save and Grow (FFS-SG) in partnership with local governments and funded by the Philippine Agri - Pinoy National Rice Program :
 - Luzon: Cordilleras, Ilocos & Bicol Regions
 - Visayas: Central & Eastern Visayas Regions
 - Mindanao: Davao, Northern & Central Mindanao, Caraga & ARMM Regions

FFS S&G ACTIVITIES

Across all Farmer Field School in S&G: Rice Productivity and Cost Efficiency :

- Aqua-biodiversity: Assessment, Conservation & Use with Agricultural High School Partners.
- Climate Change Resiliency and Adaptation.
- Farming Systems and Family Nutrition.
- Trees Outside Forests: Assessment, Conservation and Use.
- Soil Health and Conservation.

RRI PHASE 3 ACTIVITIES

- ❑ Philippine Rice Industry Road Map : Finalization of the draft Country Rice Road Map for presentation to the National Rice Summit. Road Map will focus on cost efficiencies.
- ❑ Results Assessment Study by Xavier University.
- ❑ Field Validation of TOT SIRP Field Manual: Finalization of TOT SIRP Field Manual Exercises among FFS S&G farmers.

RRI PHASE 3 ACTIVITIES

- ❑ Validation of TOT SIRP Field Manual: Finalization of TOT SIRP Field Manual Exercises among FFS S&G farmers.
- ❑ Aquatic Biodiversity and Child Nutrition: Development and testing of agricultural schools-based modules on Aquatic Biodiversity Assessment, Use and Conservation for Enhancing Child Nutrition aligned with Zero Hunger Challenge.

RRI PHASE 3 ACTIVITIES

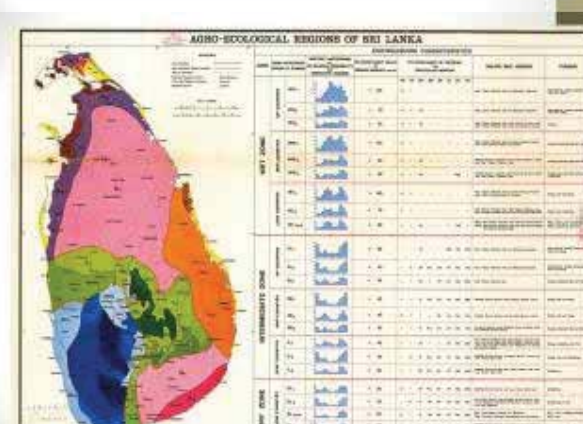
- ❑ Season-long Training for Master Trainers on SIRP. Capacity building to establish a core of SIRP TOT/FFS facilitators for scaling-up of FFS S&G.
- ❑ Regional Synergies: Exchange of knowledge and experiences in Mechanization (Efficiency); Farming Systems technologies (Livelihood, Resiliency); Value Chain (Efficiency and Incomes) .



THANK YOU.

2.10 SRI LANKA

by S.S. Weligamage



Species richness of selected fauna of Sri Lanka
Reference: The National Red List 2012 of Sri Lanka

Taxonomic group	Number of species	Number of endemic species
Spiders	501	256
Centipedes	19	---
Dragonflies	118	47
Ants	194	33
Bees	130	---
Reptiles	211	125





Integrated Pest Management (IPM) in Sri Lanka

- Department of Agriculture (DOA) started work on IPM since early 80's
- Sri Lanka is a participant of FAO inter- country program for Rice IPM since 1984
- This was made a significant impact
- Community IPM program with FFS and season long training of trainers (TOT) were started in 1994
- **At present IPM has become very important with the increase of a number of non transmittable diseases which are suspected because of the heavy use of agrochemicals as a one reason.**

Rice IPM program

- Plant Protection Service (PPS) of the DOA is the responsible institute
- Ten day and season long training programs
- About 400 agriculture extension officers are trained per year
- About 1000 farmers are trained by these officers per year as FFS



Rice IPM training program

- Introduction to IPM
- Different IPM techniques such as Cultural, Biological, Physical, Host plant resistance, Chemical, etc.
- Identification and conservation of natural enemies
- Identification of rice pests
- Selection of IPM and Non-IPM fields
- Study of the morphology and life cycle of rice plant
- Group dynamics
- Field observation and monitoring
- Field comparison and field day



Fruit and Vegetable IPM program

- Plant Protection Service (PPS) of the DOA is the responsible institute
- IPM packages for cucurbits, capsicum, egg plant, tomato, bean, okra, green gram, leafy vegetables, banana, mango, and papaya
- Two day and season long training programs
- About 400 agriculture extension officers and 1000 farmers are trained per year by Government sector
- About 80 officers and 1000 farmers are trained per year by private and NGOs with technical support of PPS and DOA



Fruit and vegetable IPM training program

- Introduction to IPM
- Management of pest populations before the establishment of new crop
- Identification of natural enemies
- Management of Natural enemy populations before the establishment of new crop
- Improvement of the vigor of the crop by incorporating pest resistant/tolerant crops / varieties
- Improvement of the vigor of the crop by optimum agronomic practices
- Destruction of pests by physical techniques to delay and minimize pesticides
- Destruction of pests by recommended chemical techniques







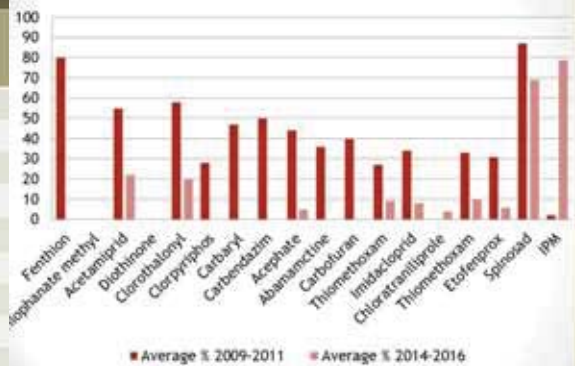
IPM Trainings in 2016

Month	Crop	Trainees	Cost (LKR)
January	Vegetable/Fruit/OFC	191 Farmers	100,000
February	—	—	—
March	Vegetable/Fruit/OFC	111 Farmers	53,000
April	Rice/Vegetable/Fruit/OFC	111 Officers + 189 Farmers	582,000
May	Vegetable/Fruit/OFC	20 Officers + 87 Farmers	133,000
June	Rice/Vegetable/Fruit/OFC	82 Officers + 43 Farmers	378,500
July	Rice/Vegetable/Fruit/OFC	154 Officers + 76 Farmers	708,500
August	Rice/Vegetable	117 Officers	508,000
September	Vegetable	56 Officers	243,000
October	Rice/Vegetable/Fruit/OFC	35 Officers + 265 Farmers	290,700
November	Vegetable/Fruit/OFC	269 Farmers	140,800
December	Vegetable	233 Farmers	122,000
Total		575 Officers + 1464 Farmers	3259,500

FFS and IPM activities in 2016

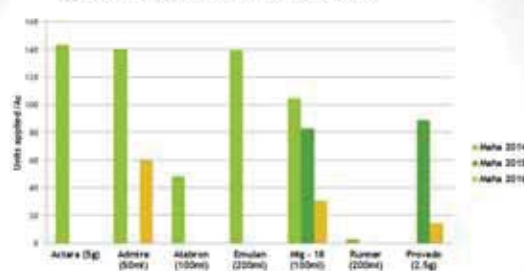
Province	No. of Rice IPM Officers	No. of Rice IPM Farmers	No. of Vegetable/Fruit/OFC IPM Officers	No. of Vegetable/Fruit/OFC IPM Farmers	No. of FFS Officers	No. of FFS Farmers
Central	53	11570	50	380	—	—
Western	36	173	43	142	10	100
North Central	55	650	60	150	—	—
Uva	18	498	47	410	11	153
Sabaramuwa	35	420	23	119	38	336
Eastern	104	635	62	540	53	770
Southern	76	9744	50	1355	79	9708
Northern	—	—	—	—	15	185
North Western	96	1090	65	2675	97	1230
Total	473	34760	400	6791	305	15403

Pesticides used by Gherkin farmers as a % of total farmers



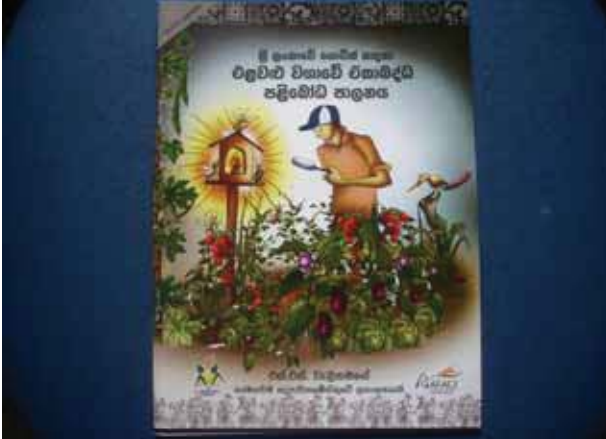
Source: Farmer payment system of Sunroost Pvt. Ltd.

Application of insecticides for Gherkin cultivations



Source: Farmer payment system of Sunroost Pvt. Ltd.





Thank you!