Crop protection and pesticide risk assessment Myanmar

Towards sustainable agricultural production and export of high value crops

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For quality of life

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Abstract UK

The government of Myanmar and the Netherlands intend to start a partnership programme in different agricultural sectors, including horticulture. In October 2014 the Director General for Agriculture at the Dutch Ministry of Economic Affairs has fielded a technical expert mission to assess the potential for growth and development. A Dutch team consisting of experts from Alterra, PPO and NVWA have visited Myanmar in November 2014, aiming to provide strategic and operational directions for the development of an Integrated Crop Management and Pesticide Risk Reduction Programme in Myanmar. This report describes their findings and summarizes directions for the future development of this Programme.

Abstract NL

De regering van Myanmar en Nederland beogen gezamenlijk een programma te starten in verschillende landbouw sectoren, onder meer in de tuinbouw. In Oktober 2014 is door de Directeur-Generaal voor Landbouw van het Nederlandse Ministerie van Economische Zaken een technische expert missie gestart, ten behoeve van het beoordelen van mogelijke groei en ontwikkeling. Een Nederlands team bestaande uit experts van Alterra, PPO en NVWA hebben Myanmar in November 2014 bezocht, met het doel strategische en operationele aanwijzingen te formuleren voor de ontwikkeling van een programma op het gebied van Geïntegreerde Gewas Behandeling en een Pesticide Risico Reductie Programma in Myanmar. Dit rapport beschrijft hun bevindingen en geeft een samenvatting van de aanwijzingen ten behoeve van toekomstige ontwikkeling van dit programma.

Keywords: crop protection, pesticides, Myanmar.

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Photo cover: Shutterstock

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Executive summary

Motive and objective of the mission

The Government of Myanmar and the Netherlands intend to start a partnership programme in different agricultural sectors, including horticulture. The Dutch Ministry of Economic Affairs has fielded a technical expert mission in October 2014 to assess the potentials for growth and development in the vegetable, fruit and flower sub-sectors. In this context the Dutch Ministry of Economic Affairs aims to assist Myanmar towards sustainable agricultural production and increased exports of high value crops. Investment in an integrated programme on Plant Health, including Integrated Crop Management and Pesticide Risk Reduction will result in an improved balance between benefits and risks of agricultural production in Myanmar. An expert team of the Netherlands existing of experts of Alterra and PPO of Wageningen-UR and the NVWA have visited Myanmar (3 – 8 November, 2014). The objective of their mission was to provide clear strategic and operational directions for the further development of an Integrated Crop Management and Pesticide Risk Reduction Programme in Myanmar.

Findings

Lack of technical capacity

One of the major findings is the lack of technical capacity in general in Myanmar and specifically in the agricultural sector. In Myanmar only approx. 100 persons in the Agricultural sector have a post-graduate education. The Plant Protection Department (PPD) of the Department of Agriculture of the Ministry of Agriculture and Irrigation, which may be regarded as a central organisation in the mission, was visited several times by the expert team. Also for PPD much more capacity is needed to fulfil all responsibilities and tasks they have.

Pesticide management

At the moment approx. 10,000 metric tonnes pesticides are legally imported per year. Since 2010 imports are quite stable, whereas between 2006 – 2009 the amount of legally imported pesticides varied between 4,000 and 6,000 metric tonnes per year. This figure of 10,000 metric tonnes doesn't include any pesticides imported illegally. One of the present problems is controlling the illegal pesticides crossing the border without a proper registration and some retailers selling mixed, fake or illegally repacked pesticides.

With regard to the international instruments for pesticide management, Myanmar is a Party of the Stockholm Convention on Persistent Organic Pollutants and also of the Montreal Protocol on Substances that deplete the Ozone Layer. Although a number of obligations are more or less fulfilled, for some obligations this is less clear. For instance, DDT is indeed only authorized for malaria control, thus complying with the Convention, but it is unclear if a report on the use of DDT has been drafted.

Although Myanmar is not a Party of the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade it has his own list of banned pesticides and pesticides subject to restrictions. Furthermore Myanmar is not a Party of the Basel Convention on the Control of Trans Boundary Movements of Hazardous Wastes and their Disposal.

In relation to the region a project titled "Assisting countries in Southeast Asia toward achieving pesticide regulatory harmonization" has been executed. As a follow up an APPPC Regional Workshop on Enhancement of Regional Collaboration in Pesticides Regulatory Management in Asia was held in 2012. As a result of the project Myanmar has taken steps to ban or restrict various hazardous pesticides.

As for national pesticide legislation, Myanmar possesses an array of legislation and standards that directly or indirectly regulate pesticide distribution and use. The Pesticide Law was enhanced in 1990 and is clearly outdated. At the moment the Law is under revision. Procedures related to the pesticide

Law are available and the formation of the Pesticide Board was issued by the Government in 1992. Also some additional guidelines are available.

An in-depth study on the content of the Law was not conducted but some observations were made:

- The law needs to be updated according to international standards. A complete review of the pesticide law and pesticide related legislation needs to be carried out with the aim of elaborating a new pesticides management system;
- Within the Law a very global description is included to protect human beings, animals, crops and environment. No criteria and guidance is available on how to assess risks for consumers, public health and the environment;
- Data protection is not mentioned by the Law;
- A fee is required but is only paid after registration.

The authorisation and registration of pesticides is regulated under the Pesticide Law, but its implementation is not worked out in detail. Some relevant observations made during the mission are:

- Capacity building on human resources is needed to get a qualified team with relevant skills to evaluate the dossier. Capacity building on the administration of pesticide registration is also required;
- Involvement of other research institutes/universities in the registration process is advisable;
- There is no guidance available to evaluate effects on human health, consumers and environment;
- Efficacy trials protocols are available and trials are executed, but only for new active ingredients, and only for a certain amount of crop-pest combinations. The label is normally provided for a broad number of crops and pests/ diseases;
- Data requirements are quite clear and complete;
- No guidance is available on how to assess the quality of the data submitted by the applicant;
- Quality of pesticides can (to a limited extent) be analysed by the PPD, only GC and HPLC are available.

More effective pesticide regulation is needed to avoid long-term costs to the sector and damage to the health of farmers and consumers.

Integrated Crop Management

In Myanmar many of the more intensive agricultural practices now employed rely heavily on the input of broad spectrum hazardous pesticides for pest, disease and weed control. Adoption of alternative management strategies, like Integrated Crop Management (ICM) is limited to relatively small groups of farmers. ICM is a 'whole farm approach' which is site specific and includes e.g. the use of crop rotations, appropriate cultivation techniques, careful choice of seed varieties, minimum reliance on artificial inputs such as fertilisers, pesticides and fossil fuels, maintenance of the landscape and the enhancement of wildlife habitats.

Tomato, cauliflower, potato and mung bean growers were visited in Southern Shan and Yangon region. Most important diseases and pests and pesticides used to control them were presented and discussed.

Most growers received training from the Department of Agriculture but frequency was low/incidental and training did not always include up to date technical knowledge regarding pesticide characteristics, spraying technique, personal protection and side-effects on the environment. Although we did not discuss the training of the PPD in detail, we had the impression that the training focusses on the limited definition of Integrated Pest Management (IPM) and does not include all aspects of ICM. Our impression was confirmed by the discussions with the growers. Even IPM was hardly mentioned: they sprayed on the basis of calendar dates and not according to observations in the field and thresholds.

Retailers provided advice regarding product choice and spray frequency to all the growers. Growers were not aware of the characteristics of the pesticides they used. They relied completely on general advice from retail shops and did not know the spectrum of the efficacy of the pesticides. They were

also unaware of the mode of action of the pesticides. Growers hardly read the label with pictograms on toxicity and recommendations for use of Personal Protection Equipment (PPE). PPE used during spraying was very poor: only a simple dust mask and sometimes gloves were used. In retail shops only these simple dust masks were available.

All growers used a knapsack sprayer to apply the pesticides and pesticides and their empty containers were in most cases not kept in a locked area. Empty containers were said to be rinsed and buried on the premises. Retail shops did not collect empty containers.

Tomato growers at Inlay lake were aware that sprayings were harmful for the environment of Inlay lake. Many of the insecticides used are highly toxic and could be replaced by more specific insecticides with less side-effects on the environment. Also the spraying technique can be improved which will increase the efficacy, lower the costs and will result in less pollution of the water of Inlay lake.

Phytosanitary issues

The Plant Protection Department (PPD) is a member of the Asia and Pacific Plant Protection Commission and fully informed on the IPPC agreement and article 4 of this convention. At organisational level a number of elements of a National Plant Protection Organisation (NPPO) have been organised. An inspection level is present, mainly focusing on export inspection, and its focus could be increased. At the PPD premises a few small laboratory facilities are present for diagnostics in nematology, entomology and mycology. The need for a virologist was expressed as no proper identification of viruses could be done in Myanmar. Because of the presence of a number of diagnostic specialists information was collected on a number of major pests present in a number of crops in Myanmar.

Little information is present on phytosanitary requirements of countries of destination. This is also missing in the instructions for the export inspection. Systematic sampling is done, but the diagnostic laboratory has limited possibilities in analysing these samples. The inspections mainly focus on the presence of insects.

Surveillance on pests has only been done when foreign project funds were available; it is not part of a regular annual surveillance plan. Its relevance in relation to pest status reporting, Pest Risk Analysis and establishment of Pest Free Areas is recognised. Less awareness is present on its relevance to the possibility to facilitate international trade and assure a phytosanitary guarantee on the absence of important pests.

PPD was well aware of the phytosanitary risks the country is running in not having sufficient facilities to do a proper inspection at the time of import, lacking support by a good diagnostic laboratory. No list with quarantine pests has been published and importers and exporters do not know which phytosanitary requirements of Myanmar they should comply with, and at the moment of imports pests could very easily be introduced. The financial means for developing a fully fletched NPPO are missing as the already low fees collected are not controlled by the PPD itself, but are collected by the Ministry of Agriculture and Irrigation.

A summary of some relevant findings are indicated below.

- Plant Pest Quarantine Law of Myanmar is under revision;
- There is no published quarantine pest list linked to the current Plant Pest Quarantine Law;
- There is no Pest Risk Analysis team or process present for the establishment of the status of harmful organisms present or absent in Myanmar;
- Submission of Phytosanitary Certificate is based on information of the exporter, not on information available at PPD;
- Diagnostic support of the inspection activities is present at a very basic level for three disciplines: entomology, mycology, nematology; diagnostics for virology and bacteriology are absent;
- There is a growing awareness at PDD that the support for the submission of a phytosanitary certificate at export needs more attention in terms of staff and adaptation of the current phytosanitary legislation and regulations;

- There is a growing awareness that import of new varieties of plant material is needed and phytosanitary requirements need to be established;
- As Myanmar is already importing a lot of fruit and vegetables from many countries, the need for establishing phytosanitary requirements for these plant products destined for human consumption becomes more eminent, as some of these plant products pose a phytosanitary risk as well.

Directions for the future

Step 1: Basic training on Integrated Crop Management (short term, January 2015)

A basic one-week training will be organized for vegetable and mung bean growers, providing ICM training which will include a whole farm approach. This training will include both theoretical and practical training modules. This will also lead to a broader understanding of the field situation.

Step 2: Integrated approach for mung bean, tomato and potato (midterm, 2015 - 2016)

An integrated approach with the aim of increasing the efficacy of control, lowering costs, lowering human health effects, consumers and environmental side effects based on a legal framework. This will be achieved by:

1. Book-keeping of all crop protection activities.
2. Analysis of the data collected under activity 1. Together with growers/advisors after discussions and field visits formulation of the most important constrains and elements to be improved.
3. Formulation of an action plan that could include farmers field schools or other training activities. Demonstrations, participatory evaluation of pests and diseases in the field and designing an overall ICM plan could be elements.

Step 3: Fundamental change and development (long term. 2015 - 2020)

To make a real difference for the Myanmar agricultural sector fundamental change is needed in relation to the registration of pesticides, integrated crop management and phytosanitary issues. The following activities could be part of a fundamental change programme.

Registration of pesticides

- The law needs to be updated according to the international standard;
- Evaluation of the effectiveness of the Board;
- Capacity building on human resources to get a qualified team with relevant skills to evaluate the dossier; Capacity building on the administration of pesticide registration system;
- Development of a procedure manual including fee rate, standard time frame procedure for registrants etc.;
- Involvement of other research institutes / universities in the registration process;
- Development of an evaluation procedure to evaluate efficacy data, effect on human health, consumers and the environment;
- Upgrade of laboratory (quality and residues);
- Development of the management of left-over pesticides and empty pesticide containers.

Integrated Crop Management

- Promoting ICM as the preferred approach to disease and pest control in order to establish sustainable production systems, including the reduction of the reliance on pesticides in the longer term by developing an Agricultural Knowledge infra-structure;
- In this infra-structure the Extension Service of the Department of Agriculture, Universities, advisors of seed companies, agrochemical companies and retail shops should participate;
- The PPD needs to recruit more staff to develop curricula for training on the subject of ICM and must be able to organize training for farmers without being dependent on foreign project funds;
- Development of training packages for the selection of appropriate pesticides and fertilizers and effective and safe (human health & environment) application techniques.

Phytosanitary issues

- In relation to international trade of Myanmar plants and plant products it is important to establish and publish a national plant quarantine list in order to give clarity on the phytosanitary import requirements of Myanmar;
- Verify the pest status of trade relevant pests, by organising a national surveillance plan on these pests;
- Establish a Pest Risk Analysis (PRA) unit to enable the analysis of phytosanitary risks for imports of new plants and plant products in line with the International Standards on Phytosanitary Measures (ISPM's);
- The NPPO should make a multiyear plan with phasing and benchmarks in order to establish a full fletched NPPO according to article 4 of the IPPC-convention;
- Part of this plan should give attention to the upgrading of laboratories and more specifically the pests diagnostic laboratory;
- Furthermore this plan should include the recruitment of more staff including diagnostic specialists, a virologist is urgently needed;
- A regular training program for the inspectors with the formulation of inspection guidelines with possible crop specific phytosanitary issues needs to be formulated.

For more information please contact Floor Peeters, Alterra Wageningen-UR (floor.peeters@wur.nl).

Foreword

This report on crop protection is one in a series of assessments commissioned by the Netherlands Economic Mission in Yangon in an effort to lay the foundation for the intended Myanmar-Netherlands Cooperation Programme in the field of agriculture, livestock and fisheries. It may also help in identifying investment opportunities in the agro-food sector of Myanmar. The Myanmar Government has requested the Netherlands to explore possibilities for support and cooperation in the field of crop protection.

The team of three experts contributed expertise on control of pests in the field, on the regulatory framework for registration and lifecycle management of pesticide and on phytosanitary issues and regulations. The report deals with all these aspects and gives therefore an overview of all the issues related to plant health.

The report suggests a two-stage approach. The first stage, starting immediately, consists of trainings on Integrated Crop Management (ICM). This uses a whole farm approach taking into account crop rotations, land preparation, choice of seeds and minimum reliance on external inputs, like fertilizer and pesticides. The first training will be conducted at the end of January 2015. The second stage consists of preparation and implementation of a solid long-term plan for fundamental improvements in the registration and lifecycle management of pesticides and the phytosanitary regulatory framework and services, along further advancement of ICM .

The observations and findings of the team came about after intensive and pleasant consultations with a range of stakeholders in Myanmar. Together with the authors, I am grateful to the farmers, government staff, researchers and development professionals who so liberally shared their insights and data over the course of the assessment.

I hope this report will be helpful for all stakeholders to further discussions on meaningful development pathways for improving plant health and the safe use of pesticides.

Geert Westenbrink
Agricultural Counsellor
Netherlands Economic Mission, Yangon.

Preface and acknowledgement

The Government of Myanmar and the Government of the Netherlands intend to start a partnership programme in different agricultural sectors, including horticulture. Commissioned by Directorate-General for Agro, Ministry of Economic Affairs, Netherlands a technical expert mission has been taken place in October 2014 to assess the potentials for growth and development in the vegetable, fruit and flower sub-sectors.

In relation to this a technical mission has taken place from 3 – 8 November 2014 and is expected to provide clear strategic and operational directions for the further development of an Integrated Crop Management, Phytosanitary guarantee and Pesticide Risk Reduction Programme in Myanmar.

We like to thank the full staff of the Netherlands Economic Mission in Yangon for their strong support. Especially we like to thank the agricultural counsellor of the Netherlands Economic Mission in Myanmar, Mr. Geert Westenbrink and Mr. Jackson Kalipo, Senior Advisor for Agriculture of the Netherlands Economic Mission, for their expressed interest and support.

Furthermore the Plant Protection Division of the Ministry of Agriculture and Irrigation in Myanmar provided also excellent support. Finally, we would like to thank all the consulted stakeholders, like a number of growers and pesticides traders, the pesticide industry, a Delegation of the European Union to Myanmar and an exporter of mung beans; offering us opportunities to retrieve information, to get ideas for the development of the programme and their needs for support.

We hope that this study will contribute to a prosperous development of the agricultural export sector of Myanmar.

Jos van Meggelen, NVWA
Floor Peeters, Alterra Wageningen UR
Huub Schepers, PPO Wageningen UR

Map of Administrative divisions of Myanmar

Source: http://www.nationsonline.org/oneworld/map/myanmar_map2.htm.

Abbreviations

APPPC	Asia and Pacific Plant Protection Commission
ASEAN	The Association of Southeast Asian Nations
DOA	Department of Agriculture (Government of Myanmar)
GAP	Good Agricultural Practice
PPD	Plant Protection Division of the Department of Agriculture of the Ministry of Agriculture and Irrigation
ICM	Integrated Crop Management
IPM	Integrated Pest Management
IPPC	International Plant Protection Convention
ISPM	International Standard for Phytosanitary Measure
MRL	Maximum Residue Limits
NPPO	National Plant Protection Organisation
NVWA	Nederlandse Voedsel en Waren Authoriteit, Dutch Food Safety Authority
PPE	Personal Protective Equipment
PGR	Plant Growth Regulator
POP	persistent organic pollutant
PPO	Praktijkonderzoek Plant & Omgeving (Applied Plant Research)
SPS	Sanitary and Phytosanitary
UNEP	United Nations Environment Programme
WTO	World Trade Organisation

1 Introduction

1.1 Background

The Republic of the Union of Myanmar and the Netherlands will enhance their cooperation in the horticulture sector. Public and private partners of both countries will work closely together to upgrade the horticulture sector performance in Myanmar and to achieve sustainable economic development thereby also contributing towards enhanced food security, food safety and rural development. In March 2014 the Director General of the Department of Agriculture at the Ministry of Agriculture and Irrigation in Myanmar and the Director General for Agriculture at the Ministry of Economic Affairs in the Netherlands agreed that the bilateral cooperation in the field of horticulture will be stimulated by working together in a partnership. This partnership will contribute to the exchange of information on the development of the horticulture sector in Myanmar. The partnership will also lead to the drafting of promising projects, annual planning and monitoring of progress.

Both parties also agreed that the Myanmar – Netherlands Horticulture Partnership will comprise the participation of Government agencies, private sector and knowledge institutes of both countries. The joint activities to be developed and implemented may include a variety of support activities related to, for example, the exchange of information between experts, horticultural training and education, business-to-business matchmaking, support for farmer organisations, strengthening of plant protection and plant quarantine, etc. Horticulture in this context will include the fruit, vegetable and floriculture sub-sectors.

In this context the Directorate-General for Agro, Ministry of Economic Affairs, Netherlands aims to assist Myanmar towards sustainable agricultural production and increased exports of high value crops. Investment in an integrated programme on Plant Health, Integrated Crop Management (ICM) and Pesticide Risk Reduction will result in an improved balance between benefits and risks of agricultural production in Myanmar. An expert team of the Netherlands has been asked by the Ministry to make an inventory and analysis of the current status of crop protection and pesticide use, regulation and risks and sanitary and phytosanitary measures in Myanmar. A mission has been taken place from 3 – 8 November and this report presents the mission findings and the direction for the future which can be used to formulate a future integrated programme.

1.2 Problem analysis

Agriculture is the main economic sector of Myanmar, responsible for approx. 36% of the national GDP, and employing the majority of the labor force. Its share of export earnings is about 30%. Moreover, food security for the people and raw material production for domestic agro-based industries are heavily dependent on the agricultural sector (Kudo et al. 2013), (FAO, 2012).

Export of high value agricultural products is of significant importance for the Myanmar economy. In the past the country was Asia's largest exporter of rice. However, over the past ten years total agricultural exports have been at lower levels. In order to better meet national demands, while also increasing agricultural exports and improving competitiveness in an international market, Myanmar strives to increase agricultural production, while maintaining and, where possible, improving sustainability. Increasing agricultural production for export in a sustainable way can only be achieved through careful consideration of natural resources, the health of farmers, consumers and surrounding communities.

In Myanmar many of the more intensive agricultural practices now employed rely heavily on the input of broad spectrum hazardous pesticides for pest, disease and weed control. Uptake of alternative

management strategies, like Integrated Crop Management (ICM) is limited to relatively small groups of farmers. The development of ICM is crucial to enhance the opportunities in the production of safe and high quality products. Essential elements of ICM are growing a healthy crop by using a good crop rotation scheme and using the appropriate cultivation techniques, sanitation and biological control. Pesticides and fertilizers are also included in ICM, but their use should be well-reasoned and limited to the necessary minimum.

At the same time, Myanmar lacks an effective and fully operational system for pesticide regulation and control and for support to farmers regarding best practices in sustainable pest management and pesticide use. Banned, unregistered or counterfeit products are often widely available on the pesticide market and widespread overuse, misuse, mishandling and mismanagement of pesticides are all too common.

Some facts about Myanmar and the use of pesticides

- Pesticides are still relatively little used compared to countries like Vietnam, Thailand, China and India (Myo Myint, 2014).
- At the same time use of pesticides has increased from 2,874 metric tonnes in 2002-03 to 11,101 metric tonnes in 2011-12 (Phu Thit, 2012).
- The use of pesticides will likely increase further in the near future, with Myanmar applying more and more to the production of quality agriculture produces and striving for crop intensification (UN, 2014).
- A baseline survey (Aung et al., 2012) among 600 rice farmers conducted in the Yangon and Naypyitaw region in May 2012 showed that pesticides most used by farmers were organophosphates and organochlorine compounds, particularly dimethoate, phenthoate and endosulfan. These substances are banned or under restricted use in most countries. The survey also stated that with the economical opening-up of Myanmar the import and promotion of insecticides will probably increase which might lead to further misuse and overuse. The lack of knowledge of farmers on proper pesticide handling and use was a matter of deep concern.

Possible adverse effects of pesticide use have to be minimized and risk reduction is crucial for a more sustainable pest management approach. This can be accomplished through (OECD, 1991) :

1. Promoting ICM as the preferred approach to disease and pest control in order to establish sustainable production systems including the reduction of the reliance on pesticides in the longer term.
2. Strengthening policies, regulation and capabilities to improve pesticide management in the medium and longer term. Possible introduction of an early warning system on a number of selected important pests.
3. Ensuring good practices when using pesticides in order to reduce the environmental, occupational and consumer health hazards connected with the use of pesticides to the absolute minimum.

Export of high value crops depends on maintaining strict standards (and a good reputation) and (inter)national trade relies on safe food. Since 1995 Myanmar is a member of the World Trade Organization for which the Sanitary and Phyto-Sanitary (SPS) agreement is an important instrument. The country is also a member (contracting party) of the International Plant Protection Convention (IPPC) since 2006, implying that a National Plant Protection Organization is in place. Plant quarantine stations are established at points of entry since 1995 (FAO, 2007). With Myanmar increasing its international trade in the ASEAN region and beyond, an increasing need for quality standards relevant to food safety and phytosanitary status is pertinent.

1.3 Overall goal

Together with the Myanmar government and stakeholders a programme will be formulated to stimulate export of high value agricultural products by implementing a sustainability concept. Specific objectives are:

1. To contribute to sustainable agricultural production in Myanmar through improving plant health, integrated crop management (ICM), food safety and reducing risks of pesticide use.
2. To stimulate ICM and regulate pesticide use by farmers, taking into account the whole of the pesticide life cycle.

3. To enhance the economic performance of the agricultural sector of Myanmar while protecting the health of growers and the surrounding community, and maintaining natural resources.
4. To enhance the phytosanitary measures needed for the international trade of vegetables and fruit from Myanmar by strengthening the Myanmar National Plant Protection Organisation (NPPO).
5. To promote Good Agricultural Practices (including IPM) with the aim to ensure that the international trade of fruit and vegetables will comply with the Maximum Residue Limits (MRL) of pesticides set in the country of destination.

Close cooperation between public and private stakeholders will be encouraged in the programme as a means of achieving widely supported results.

By contributing to a sustainable pest and pesticide management system the programme will enhance the economic performance of the agricultural sector and improve the environment, protect the health of growers, surrounding community and consumers and promote food safety as well.

Principles of the programme
- Involvement of all stakeholders, private and public;
- Develop public-private-partnerships, where relevant and possible;
- Respond to expressed needs of stakeholders;
- Integrate bottom-up (farmer-driven ICM) and top-down (regulatory improvements).
- Multidisciplinary execution of the project, through different government and non-government sectors;
- Use aid to strengthen trade.

1.4 Objective and outputs of the mission

The objective of the mission is to provide clear strategic and operational directions for the further development of an Integrated Crop Management and Pesticide Risk Reduction Programme in Myanmar.

Specific outputs of the assignment will comprise the following:

1. Inventory of the current situation related to the pesticide registration system (from different perspectives).
2. Inventory of the current situation related to the pesticide post registration system (from different perspectives).
3. To identify the farmers' perspective regarding the protection of his/her crops against diseases and pests. Inventory of their knowledge on diagnosis of pests and diseases and the relevant best practices. Inventory of their knowledge on pesticides, application techniques and health risks.
4. Formulate the elements of practical crop protection strategies of the farmers that have to be improved to "get the basics right": diagnosis of pests & diseases, knowledge of best practices, knowledge of pesticides and application techniques.
5. To identify, with local partners and stakeholders, systemic bottlenecks regarding 'plant health' for achieving sustainable, inclusive and safe growth of local markets and export markets.
6. To provide an overview of the landscape of regulations, actors, responsibilities and the involvement of development partners regarding 'plant health'.
7. To identify and reach consensus with local partners and stakeholders on priority topics regarding 'plant health'.
8. To formulate with local partners and stakeholders objectives, purpose, theory of change, themes and activities for a coherent plan for 'crop protection and pesticide risk reduction', as part of a horticulture programme. Within the horticulture programme, the export-chain of one or two products will probably be further developed and improved.

The objectives were very ambitious in relation to the period of the mission. For that reason it was not possible to go in-depth on all specific issues.

1.5 Team of experts

Alterra and PPO of Wageningen-UR and the NVWA have implemented this technical support mission. The following experts have contributed to this technical support mission:

- Ms Floor Peeters, team leader of the Environmental Risk Assessment team at Alterra; responsible for the issues related to the pesticide life cycle management;
- Mr Jos van Meggelen, senior advisor international cooperation of the NVWA, responsible for the development of phytosanitary projects with capacity building;
- Mr Huub Schepers, senior plant pathologist at the team Crop Protection of Applied Plant Research, working in applied crop protection projects in many crops and countries.

2 Plant Protection Division - organisation

The Plant Protection Division of the Department of Agriculture of the Ministry of Agriculture and Irrigation (PPD) had a central role in the mission, based on their duties and responsibilities. Therefore the PPD was visited three times by the expert team. The PPD is located in Yangon, the former capital of Myanmar and Mr. Tin Aung Win is the Director of the PPD.

The vision of the PPD is described as follows in *Activities of Department of Agriculture, Republic of Union of Myanmar (MOA):*

- To maintain the health problem of consumers and users, and environmental pollution by using chemicals for the sake of plant protection;
- To behave integrated pest management pattern for each crop and basically carrying out integrated pest management control system;
- To produce and export the crops according to the rules of international plant protection standards;
- To produce the crops and foods for the consumers without suffering health problem;
- To transfer the knowledge of updated plant protection technologies to reach the farmer's level.

The PPD has nine sections:

	Name Section	Research areas
1	Integrated Pest Management	Rearing of natural enemies (beneficial insects) Registration of pesticides Research to control the cabbage Diamondback Moth and crucifer pests in farmers' fields Field researches
2	Postharvest and Weed Section	Weed collection Reading and checking document Conduct the research demonstration plots Efficacy test of herbicide Technology transfer to extension worker and farmer
3	Entomology Section	Control label Area for pest infestation Collection of fruit flies Evaluation of the requirements for pesticide registration Management of Quarantine pests Conducting trainings
4	Plant Pathology Section	Crop disease management and farmer education trainings Identification of crop diseased samples Seed health testing Field visit Disease survey Identification of nematode diseases Seed health testing for nematode disease
5	Rodent management Section	Study and collection of rodent damage condition Early warning distribution
6	Pesticide Analytical Laboratory	Testing of pesticide residues Testing of pesticide quality Testing of heavy metals Testing of mycotoxines
7	Pesticide Registration Board / Registration office	Pesticide registration Board meeting Pesticide registration Licensing Certification of export commodity fumigation permit Certified pesticide applicator training Technical discussion of pesticide law Pesticide inspector training
8	Quarantine Section	Mass Rearing of fruit flies to conduct thermal treatment (Vapour heat treatment) for lifting import ban to Japan Certification of Phytosanitary Certificate according to ISPM 12
9	Finance Section	

About 400 employees are working for the PPD, 200 in the Head office in Yangon and 200 in the different regions.

Figure 2.1 *Meeting at PPD, head office Yangon.*

In general Myanmar is lacking technical capacity. In Myanmar only about 100 persons in the Agricultural sector have a post-graduate education. A related challenge to this is to get the best students in the Agricultural university. Agriculture studies are not very popular among the best students; they prefer studies like economics and accountancy.
Also for PPD more capacity is needed to fulfil all responsibilities and tasks they have. PPD has only about 12 persons working on registration issues and there are only about 400 inspectors available for the whole country.

3 Pesticide Management - findings

3.1 Present pesticide distribution and use

Pesticide imports and manufacturing

The value of imports of pesticides in Myanmar are shown in Figure 3.1. Data were obtained from the Plant Protection Division. On a total volume basis, pesticide imports increased significantly after 2009.

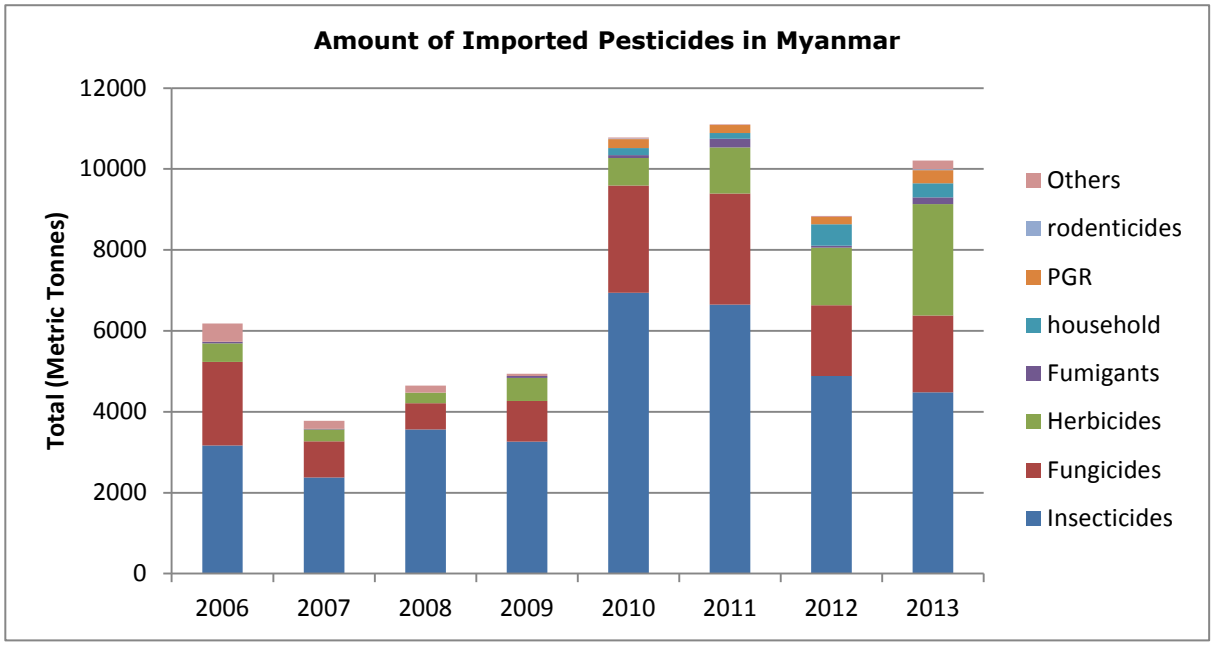

Figure 3.1 *Amount of imported Pesticides in Myanmar.*

Note: a year runs from April to March the next year (see Annex 3)

From Figure 3.1 it can clearly be seen that the total volume of insecticides decreased after 2010 and the total volume of herbicides increased.

No data were available on the values of the imported pesticides in Kyat.

Various companies formulate pesticides in Myanmar, mostly on the basis of imported active ingredients. These include multinational companies such as Syngenta, Bayer Crop Science, Dow AgroSciences, Dupont and Sumitomo. In addition, several local pesticide formulators are active in the country, such as Ova.

Formulated products are sold in Myanmar itself. A considerable fraction of the pesticides that are used in Myanmar are locally formulated, but exact national figures are lacking. No data were available either on quantities or values of imports of active ingredients which are used for the local formulation of pesticides.

Figure 3.1 gives an overview of the amount of legally imported pesticides in Myanmar. It doesn't show the total amount of imported pesticides (the legal ones plus the illegal ones). One of the present problems is controlling the illegal pesticides crossing the border without a proper registration and some retailers selling mixed or fake ones or illegally repacked pesticides.

Pesticide distribution, sales and pesticide use
No complete statistics exist in Myanmar of pesticide distribution, sales and pesticide use, neither on a volume nor on a value basis. No detailed study has been done on this topic.

Information documented in "A Strategic Agricultural Sector and Food Secruity Diagnostic for Burma" (MSU, 2013) shows that pesticide use appears to have grown sharply in Burma in recent years, particularly in the years following cyclone Nargis in 2008. The increased use raises concerns about misuse and possible negative environmental and health impacts. Evidence from several countries in Southeast Asia indicates that inappropriate use of pesticides can lead to worsening of pest problems, most notably planthoppers (Denning et al. 2013). Interviews done (MSU, 2013) with farmers revealed widespread pesticide use. However, farmers were uniformly unclear about their efficacy and risks. Many noted that instructions on imported pesticides were often printed in Chinese or Thai and so farmers relied heavily on retailers for advice on pesticide use. This is in accordance with our own experiences in the field.

Another recent report of the Asian Development Bank (Asian Development Bank, 2014) describes that in Myanmar, agriculture has involved little use of pesticides traditionally. However, this is changing fast due to massive imports of pesticides from the People's Republic of China. Large increases in pesticide application rates are being observed, with official statistics reflecting a tenfold increase in quantities used from FY2005 to FY2010 (CSO 2012). Pesticide application levels are already approaching those of other countries in the region, although the use of fertilizer trails them substantially. One worry is that pesticides imports are poorly documented, and barely regulated, and their application is not well-understood by farmers. This is likely to lead to problems of environmental contamination and ecological disruption over longer time frames. More effective pesticide regulation is needed to avoid long-term costs to the sector and damage to the health of farmers and consumers.

3.2 International instruments for pesticide management

Legally binding instruments
There are five international conventions which are generally considered to have direct implications for pesticide management in a country which is a Party to that convention.

The five conventions are:

- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade;
- Stockholm Convention on Persistent Organic Pollutants;
- Montreal Protocol on Substances that Deplete the Ozone Layer;
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal;
- World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures (SPS).

The status of implementation of these conventions in Myanmar and their implications for pesticide management and regulation, are briefly discussed below.

Rotterdam Convention
The objective of the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (UN, 1998) is to promote shared responsibility and cooperation among Parties in the international trade of certain hazardous chemicals. At the moment the Rotterdam Convention was signed by 72 participants (countries) and 154 participants are now registered as a Party to the Convention. Myanmar is not a Party in this Convention.

The chemicals listed in Annex III of the Convention include pesticides and industrial chemicals that have been banned or severely restricted for health or environmental reasons by two or more Parties and which the Conference of the Parties has decided to be subject to the PIC procedure. There are a total of 47 chemicals listed in Annex III, of which 33 are pesticides (including 4 severely hazardous pesticide formulations) and 14 industrial chemicals.

Myanmar has its own list of banned pesticides (annex 4) and pesticides with restrictions (annex 5). In fact the list exists only of active ingredients, not of formulations. All active ingredients listed in the Rotterdam Convention Annex III are also listed in the list of Myanmar. One exception is the active ingredient azinphos-methyl which is listed in the Convention and not in the notification of Myanmar.

In annex III of The Rotterdam Convention also four formulations are listed. These formulations are not listed in Myanmar as formulations are not listed in Myanmar.

Stockholm Convention on Persistent Organic Pollutants
The objective of the Stockholm Convention on Organic Pollutants (UNEP, 2001) is to protect human health and the environment from persistent organic pollutants (POPs). The Department of Environmental Affairs and Tourism acts as Focal Point for information exchange under the Convention. As a Party to the Convention, Myanmar has to fulfil a number of obligations, the most important ones of which will be briefly discussed as far as they concern pesticides.

Myanmar must prohibit and/or take legal and administrative actions necessary to eliminate the production and use of pesticides listed in Annex A of the Convention, unless it requests an exemption. Presently, eleven out of the fourteen pesticides concerned have been banned. No measures have yet been taken for alpha and beta hexachlorocyclohexane and pentachlorobenzene (see Annex 4). Myanmar must also ensure that these pesticides are only imported or exported for environmentally sound disposal. Furthermore, a pesticide on Annex A of the Convention may be exported from Myanmar only to a Party which is permitted to use that pesticide, or to a non-Party which has provided an annual certification. It is unclear if export restrictions are yet incorporated in the Myanmar policy.

The Stockholm Convention stipulates that DDT can only be produced and used for disease vector control, and that all other uses should be eliminated. In Myanmar, DDT is indeed only authorized for malaria control, thus complying with the Convention. According to the Convention a Party is required to prepare every three years a report on the use of DDT. It is unclear if this report has been drafted by Myanmar. The Convention also encourages Parties using DDT to develop and implement an action plan with the goal of reducing and ultimately eliminating the use of DDT, which should include:

- Development of regulatory and other mechanisms to ensure that DDT use is restricted to disease vector control;
- Implementation of suitable alternative products, methods and strategies; and
- Measures to strengthen health care and to reduce the incidence of the disease.

It is unclear if such an action plan has been explicitly developed by Myanmar.
The Convention further stipulates that Parties should make sure that new pesticides are not registered, or existing ones not re-registered, which exhibit characteristics of persistent organic pollutants as defined by the Convention. As far as could be assessed during the mission, these criteria have not yet been incorporated into the national registration procedure.

The Convention furthermore requests countries to elaborate a national implementation plan (NIP) for the Stockholm Convention. At the time of the mission, a Myanmar NIP had not yet been submitted to the Convention.

Montreal Protocol
Myanmar has acceded to the Montreal Protocol on Substances that Deplete the Ozone Layer (UNEP, 2000) in 1993. The only pesticide included in the Montreal Protocol is the fumigant methyl-bromide.

Under the Protocol, Myanmar being a so-called Article 5 Party should have frozen production and consumption of methyl-bromide at its base level. Subsequently, a 20% reduction should be in place by 2005, and complete elimination (except for certain "critical uses") by 2015. Methyl-bromide in Myanmar is used as agrochemical for fumigation only by certified pesticide applicators. Consumption of methyl-bromide in Myanmar has not further be studied in detail by the expert team.

The Montreal Protocol stipulates that a country like Myanmar should have put in place a licensing system for the import and export of methyl-bromide by 1 January 2002.

No further assessment of the implementation of the Montreal Protocol was carried out during this mission.

Basel Convention
The main objectives of the Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes and their Disposal (UN, 1989) are:

(i.) to reduce transboundary movements of hazardous wastes and other wastes to a minimum,
(ii.) to treat and dispose of hazardous wastes and other wastes as close as possible to their source of generation in an environmentally sound manner; and
(iii.) to minimize the generation of hazardous wastes and other wastes.

Initially the Basel Convention was signed by 53 participants (countries) and 181 participants are now registered as a Party to the Convention. Myanmar is not a Party in this Convention.
However, in the future Myanmar will likely have to deal with the Convention if any obsolete pesticides are to be exported for disposal. Also, if at some stage Myanmar will receive pesticide waste from neighbouring countries for environmentally sound recycling or disposal, the provisions of the Convention will apply.

Sanitary and Phytosanitary Agreement
Myanmar is a member of the World Trade Organization, and the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS) (WTO, 1994) is therefore applicable.

The overall objective of the SPS Agreement is to ensure that consumers are supplied with food which is safe and that at the same time strict health and safety regulations are not being used as an excuse for protecting domestic producers. Procedures for setting and reporting pesticides maximum residue limits (MRLs) are part of the SPS Agreement. MRLs can greatly influence the type and dose of pesticides being used in specific crops or on livestock. The implementation of the SPS agreement is described in detail in Chapter 5 of this report.

Regional Harmonisation
For the past 30 years, FAO has assisted countries in the Asia and Pacific region in establishing pesticide legislation and regulations, and in managing these products in accordance with the International Code of Conduct on the Distribution and Use of Pesticides (FAO, 2010). From 2009 – 2011 a project titled "Assisting countries in Southeast Asia toward achieving pesticide regulatory harmonization" has been executed (FAO, 2012). Seven countries, including Myanmar, participated in this project and agreed on five regional guidelines for the harmonisation of various aspects of pesticide management; establishing common standards for registration requirements and practices:

- Harmonisation of pesticide registration;
- Harmonisation of requirements for bio-pesticides;
- Harmonisation of pesticide labelling;
- Monitoring of pesticide residues in agricultural products;
- Updated guidelines for the preparation of bio-efficacy protocols.

As a follow up one year after the end of the programme, an APPPC Regional Workshop on Enhancement of Regional Collaboration in Pesticides Regulatory Management in Asia was held in 2012 in Thailand (FAO, 2013). The workshop was attended by 20 participants from 16 Asian countries who reviewed their national pesticide regulatory management systems in relation to the 2010 Code of Conduct Guidelines for Registration of Pesticides (FAO, 2010) and the five regional harmonization guidelines that were developed in 2011.

As a result of the project Myanmar has taken steps to ban or restrict various hazardous pesticides (see annex 4 and 5).

At the moment PPD does not have any project with FAO.

3.3 National pesticide legislation

A complete review of Pesticide Legislation in Myanmar was not part of the terms of reference of this mission. The overview in this Section may for that reason not be complete.

Myanmar possesses an array of legislation and standards that directly or indirectly regulate pesticide distribution and use.

The Pesticide Law was enacted on 11th May 1990 as the state Law and Restoration Council Law No. 10/90 (MOA, 1990). The Law was enhanced in 1990 and is clearly outdated. At the moment the Law is under revision. Besides the Law itself, Procedures related to the pesticide Law are available and were issued by Ministry of Agriculture and Forests on 8th July 1991 by Notification No. 4/91 (MOA, 1991). The formation of the Pesticide Board was issued by the Government of the Republic of the Union of Myanmar on 25th February 1992 by Notification No. 2/92 (MOA, 1992).

The Procedures exist of the following Chapters:

- Title and definition
- Exercise of the duties and powers of the registration board
- Application for and issuance of registration license
- Conditions for compliance by pesticide importer
- Conditions for compliance by license holder
- Conditions for compliance by pesticide user
- Exercise of the duties and powers of the managing director, state/division/township managers of inspectors
- General provisions.

Furthermore the following guidelines are available:

Guideline for preparation of bio-efficacy test protocols (annex 10)
Safety Guidelines for pesticide formulation, repacking and storage (annex 11)
Guideline for pesticide labelling (annex 12).
An in-depth study on the content of the Law was not conducted. Some relevant observations in relation to the Law are:

- The law needs to be updated according to international standards. A complete review of the pesticide law and pesticide related legislation needs to be carried out with the aim of elaborating a new pesticides management system. This needs to be done in close collaboration with other ministries and organisations;
- Within the Law a very global description is included to protect human beings, animals, crops and environment. No criteria and guidance is available on how to assess risks for consumers, public health and the environment;
- Data protection is not mentioned by the Law; This fact can contribute to the availability of low quality products on the market;
- A fee is required but is only paid after registration.

3.4 Registration of Pesticides

The process

The authorisation and registration of pesticides is regulated under the Pesticide Law (MOA, 1990), but its implementation is not worked out in detail. The Registration Board takes decisions on all applications for registration or for amendment of registration of any type of pesticide. The system of the Pesticide Registration is given in Figure 3.2.

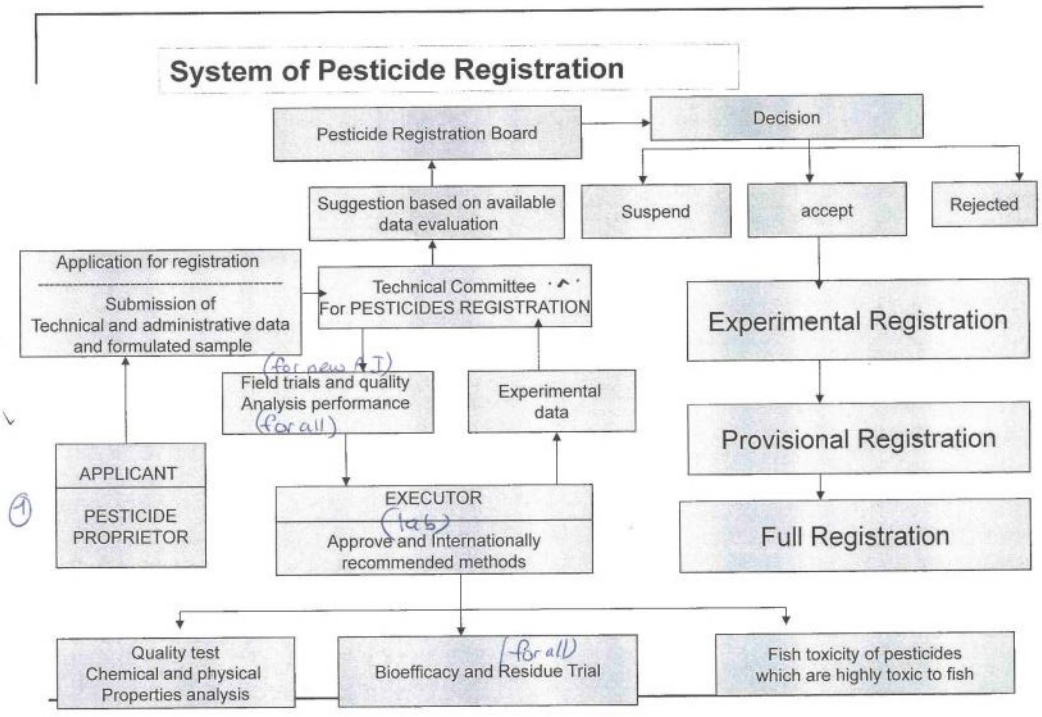

Figure 3.2 *System of Pesticide Registration.*

There are five types of registration. The validity period of registration certificates vary with the type of the registration:

1. Experimental registration; this registration is valid for a period of 2 years.
2. Provisional registration; valid for a period of 5 years.
3. Full registration; this registration is valid for 10 years, costs are 1000 US dollar.
4. Amended registration.
5. Special use permit, if one cannot follow the normal procedure (experimental --> provisional --> full registration), e.g. due to pesticide law, occurrence of any unexpected pest incidence.

The system (Figure 3.2) will be step-wise described in *the process to grant the Pesticide Registration* (see annex 6). Some additional information is given below (step by step):

1. The applicant submits the registration following the requirements (see Annex 7: Data requirements, annex 8: application for registration or amendment of registration of pesticide and annex 9: guidelines to the applicant).
    a. Completed application form, one original + 4 copies;
    b. Letter of consent from manufacturer, one original + 4 copies;
    c. One original and two copies of technical supporting documents;
    d. Three copies of proposal label with Myanmar translation;
    e. Formulated product in sufficient amount for carrying out supervised trials and quality control of the product;
    f. 25 grams of technical active ingredient for the Pesticide Analytical Laboratory.
2. The secretary of Pesticide Registration Board office will check the completed application form and technical dossiers and will contribute to the technical members.
3. An internal PPD Technical Meeting will be organised.
    a. PPD expertise consists of pathology, analytical laboratory expertise, entomology, weed and post harvesting;
    b. A very basic level of expertise is available on human health, residues, and environmental (data are obtained from applicant and e-Pesticides Manual (2006);
    c. Registration is mainly based on Stockholm and Rotterdam Convention and WHO classification (1a and 1b);
    d. The Technical Committee (6 persons) will meet 3-5 times before giving their advice (including completeness check).
4. Efficacy trials are required for registration.
    a. Protocols are available and trials are executed;
    b. Trials are only required for new active ingredient (a.i.), and only for a certain amount of crop-pest combinations (e.g. if application for 10 crops and 10 pest / diseases, only 2-3 efficacy trials will be executed);
    c. A booklet entitled "Guideline for preparation of bio-efficacy test protocols" was developed under the FAO Technical Cooperation Program (TCP), a project implemented to assist countries in ASEAN in achieving pesticide regulatory harmonization in the region (see annex 10);
    d. One efficacy trial carried out together with a governmental research station costs $ 400-$ 500.
5. The pesticide laboratory analyses and tests pesticides or any a.i. received as samples as to conformity with the content of ingredient as claimed on the label.
6. An external Technical Meeting will be organised.
    a. Plant Protection Division (PPD) of the Department of Agriculture (DoA) of the Ministry of Agriculture and Irrigation, together with other Ministries advises the Registration Board on the registration of pesticides;
    b. Evaluation is based on the pesticide analytical results and the review on the technical documents.
7. Submission to the Pesticide Registration Board.
8. The Registration Board after evaluation of the application for registration of formulated pesticides or active ingredients to be imported into Myanmar has the right either to accept or to reject the applications.
    a. At present the Board will have its 25th meeting;
    b. Board members meet approximately twice per year and discuss around 500 applications per meeting;
    c. about 200 out of 500 applications will be rejected or postponed because of missing data (analytical data);
    d. Only banned pesticides will be rejected; all other pesticides will be registered.
9. The secretary of the PRB issues the letter to the company to deposit the respective registration fees in USD.
10. Companies deposit the fees (only if the pesticide will be registered).
11. Registration Certificate will be issued.

Some more observations made during the mission are:

- Capacity building on human resources is needed to get a qualified team with relevant skills to evaluate the dossier. Also capacity building on administration of pesticide registration is required;
- Involvement of other research institutes/ universities in the registration process is advisable. For instance for the risk assessment of the environment;
- There is no guidance available to evaluate the effects on human health, consumers and environment;
- Efficacy trials protocols are available and trials are executed, but only for new a.i., and only for a certain amount of crop-pest combinations (e.g. if application for 10 crops and 10 pests/ diseases, only 2-3 trails will be executed);
- Data requirements are quite clear and complete;
- No guidance is available on how to assess the quality of the data submitted by the applicant;
- The label is normally provided for a broad number of crops and pests/ diseases;
- Quality of pesticides can (to a limited extend) be analysed by the PPD, only GC and HPLC are available.

Figure 3.3 *Meeting with staff of Plant Protection Division.*

Registered pesticides
Based on a list of registered pesticides of March 2013 of the PPD:

- 1774 pesticides were registered in Myanmar on list 1. List 1 exist of provisional, experimental and amended registrations;
- 498 pesticides were registered in Myanmar on list 2. List 2 exists of provisional and full registration.

Myanmar has notified a list of banned pesticides; pesticides containing one of the 39 active ingredients in the list are banned (see annex 4), mainly based on the Rotterdam Convention, the Stockholm Convention and WHO class 1a and 1b (FAO, WHO, 2006). Furthermore Myanmar has notified list of pesticides with restrictions; pesticides containing one of the 7 active ingredients in the list can only be used with restrictions.

"Profile of Pesticides: Registered in Myanmar 2012" (MoH, 2012) contains information regarding 1460 pesticides. Information is given about:

- Active ingredient name
- Trade name
- Group
- Use
- LD50 (mg/kg rats)
- WHO Hazard Class

It is remarkable that many active ingredients are registered in up to 48 different products, for example imadacloprid (867-914). Also many organophosphorous and carbamate insecticides are registered with the WHO Class II (moderately hazardous). New active ingredients already registered in Western Europe are not (yet) registered in Myanmar.

Obsolete pesticides and empty container management
No in-depth research was done on obsolete pesticides and empty container management.

Stock piles of pesticides
Myanmar does not have many stock piles of obsolete pesticides in the country. Some of the reasons for this are:

- Pesticides are only marketed after 1990s;
- Pesticides over time (expiry date) are still sold in the stores;
- Manufacturing or expiry dates are often not available on the products.

4 Integrated Crop Management - findings

Tomato, cauliflower, potato and mung bean growers were visited in Southern Shan and Yangon region. Most important diseases and pests and pesticides used to control them were presented and discussed.

- Most growers received training from the Department of Agriculture but frequency was low/incidental and training did not always include up to date technical knowledge regarding pesticide characteristics, spraying technique, personal protection and side-effects on the environment;
- Farmers Field School projects have been carried out by the Department of Agriculture but only when foreign project funds were available. We did not have the possibility to discuss the curricula of the Farmers Field Schools training;
- ICM (Integrated Crop Management) is a 'whole farm approach' which is site specific and includes: the use of crop rotations, appropriate cultivation techniques, careful choice of seed varieties, minimum reliance on artificial inputs such as fertilisers, pesticides and fossil fuels, maintenance of the landscape and the enhancement of wildlife habitats. Although the definition of IPM is broader and would fit within ICM, it is usually restricted to suppress pest populations below the economic injury level. Although we did not have the opportunity to discuss the training of the PPD in detail, we had the strong impression that the training focusses on the limited definition of IPM and does not include all aspects of ICM. Our impression was confirmed by the discussions with the growers: in their control strategy of pests & diseases only the use of pesticides was mentioned and NO non-chemical elements from ICM were mentioned such as hygienic measures, cultivar resistance, crop rotation. Even IPM was hardly mentioned: they sprayed on the calendar and not according to observations in the field and thresholds (IPM);
- Retailers provided advice regarding product choice and spray frequency to all the growers. Growers were not aware of the characteristics of the pesticides they used. They relied completely on general advice from retail shops and did not know the spectrum of efficacy of the pesticides (against which insects or diseases is it effective). They were also unaware of the mode of action of the pesticides. This information is important to alternate different groups of pesticides to prevent the development of resistance of pests or diseases to the pesticides. In the case of white fly control in tomato we got the impression that by continuous use of one group of insecticides (pyrethroids) the white flies had indeed developed resistance and could no longer be controlled by these insecticides;
- Growers hardly read the label with pictograms on toxicity and recommendations for use of Personal Protection Equipment (PPE). PPE used during spraying was very poor: only a simple dust mask and sometimes gloves were used. In retail shops only these simple dust masks were available;
- Most growers did not record (book-keeping) the spray applications and were not aware of the total costs of pesticides in one growing season;
- One grower used an illegal insecticide with a non-Myanmar label;
- All growers used a knapsack sprayer to apply the pesticides. We did not have the opportunity to see the spraying operation in action. We did not get the impression that efficient spray application had been an important topic in the training received. Nozzles, droplet size, spray volume are important aspects of an efficient application and will have to be part of future training programmes. Especially the use of water sensitive paper has proved to be a very good and simple tool that will visualize the spray distribution pattern on the crops. In other projects we have experienced that spray technique is often neglected in training programmes and can be strongly improved resulting in better efficacy, less cost and less side-effects on the environment;
- Pesticides and their empty containers were in most cases not kept in a locked area. Empty containers were said to be rinsed and buried on the premises. Retail shops did not collect empty containers;
- Tomato grower in Inlay lake was aware that sprayings were harmful for the (water)-environment of Inlay lake. Tomatoes in the Inlay lake are grown on floating beds and contamination of the water with pesticides is inevitable. In a report of the Institute of Intern Development "Inlay Lake Conservation Project: a plan for the Future" (2012) this serious situation regarding the pollution of

the lake with pesticides and fertilizers used in the tomato crops was also mentioned. In the report it is recommended to develop training for the farmers to design better control strategies. We fully agree with this recommendation: many of the insecticides used are highly toxic and could be replaced by more specific insecticides with less side-effects on the environment. Also the spraying technique can be improved. Although we could not observe their spraying operation we have the impression that too large water volumes are used which will result in run-off of the pesticides in the water of the lake. Optimisation of the spraying technique (lower volume) will increase the efficacy, lower the costs and will result in less pollution of the water of Inlay lake;

- Potatoes varieties with resistance to late blight and mung bean varieties with a higher resistance to pests and diseases were available but this resistance was not used in the control strategies;
- Detailed reports of interviews with tomato, cauliflower, potato and mung bean growers are presented in Annex 14.

Figure 4.1 *Cauliflower in the field.*

Figure 4.2 *Discussion with DOA, mung been exporter and farmers.*

5 Phytosanitary issues - findings

As laid down in the ToR of the mission, a component of the mission is to evaluate the phytosanitary capacity of the PPD at Yangon.

The PPD is member of Asia and Pacific Plant Protection Commission (APPPC) and fully informed on the IPPC agreement and article 4 of this convention describing the responsibilities of a National Plant Protection Organisation (NPPO).

At organisational level a number of elements of a NPPO have been organised. An inspection level is present, mainly focusing on export inspection, but its focus could be increased. At the PPD premises a few small laboratory facilities are present on the diagnostic disciplines of nematology, entomology and mycology.

Little information is present on phytosanitary requirements of countries of destination. This is also missing in the instructions for the export inspection. Systematic sampling is done, but the diagnostic laboratory has limited possibilities in analysing these samples. The focus is mainly on storage insects which require a in most cases a fumigation, mostly done with Aluminium Phosphide and in some case Methyl Bromide.

Surveillance on pests has only been done when foreign project funds were available and is not part of a regular annual surveillance plan. Its relevance in relation to pest status reporting, Pest Risk Analysis and establishment of Pest Free Areas is recognised. Less awareness is present on its relevance to the possibility to facilitate international trade and assure a phytosanitary guarantee on the absence of important pests.

Because of the presence of a number of diagnostic specialists information was collected on a number of major pests present in number of crops in Myanmar. In rice two important plant parasitic nematodes were reported and are causing a lot of yield problems: *Ditylenchus angustus* (Ufra Disease) and *Hirschmaniella oryzea*. The golden nematode, *Globodera rostochiensis*, is declared absent in Myanmar. The nematologist was trained in Belgium.

On entomology the main problem was white fly, *Bemisia tabaci*, in many crops as a vector of a number of viruses. In tomato cultivation this insect caused serious problems in relation of the presence of Tomato Yellow Leaf Curl Virus (TYLCV). Insecticides were apparently not effective anymore and a possible resistance to the insecticides might have been developed.

The entomologist was currently developing a rearing program for fruit flies from the Bactrocera-family. Mayanmar has a good mango production and is willing to export them. However they are faced with an additional phytosanitary requirement of the country of destination of a heat treatment of the mango fruits. The rearing program on the three species, *Bactrocera cucurbitae*, *B. dorsalis* and *B. correcta* is already well developed on fruit extracts and not yet on much more expensive artificial growing medium. The equipment for the heat treatment still needs to be acquired. The expert indicated a similar development of a program in Vietnam, where the equipment is present. Maybe teaming-up could be an initiative.

The need for a virologist was expressed as many virus problems are present and no proper identification of the viruses could be done in Myanmar.

The director of PPD was well aware of the phytosanitary risks his country is running in not having sufficient facilities to do a proper inspection at import, with a good diagnostic laboratory support. An introduction of a pest could very well occur, on top of the fact that no list with quarantine pests has

been published and importers and exporters do not know which phytosanitary requirements of Myanmar to comply with.

The financial means for developing a full fletched NPPO are missing as the already low fees collected are not to be controlled by the PPD itself, but are collected by the Ministry of Agriculture and Irrigation.

A summary of the findings is indicated below.

- The PPD is part of the Ministry of Agriculture and Irrigation and the PPD should be seen as the phytosanitary authority of Myanmar. However the PPD is responsible for many more issues: plant protection product registration, pesticide residue control, quality of pesticide control, heavy metal control, extension service on Good Agricultural Practices;
- Plant Pest Quarantine Law of Myanmar is under revision;
- There is no published quarantine pest list linked to the current Plant Pest Quarantine Law;
- There is no Pest Risk Analysis (PRA) team or process present for the establishment of the status of harmful organism present of absent in Myanmar;
- Submission of Phytosanitary Certificate is based on information of the exporter, not on available information at PPD;
- Diagnostic support of the inspection activities is present at a very basic level for three disciplines: entomology, mycology and nematology;
- The diagnostic disciplines of virology and bacteriology are absent;
- There is a growing awareness at PDD that the support for the submission of a phytosanitary certificate at export needs more attention in terms of staff and adaptation of the current phytosanitary legislation and regulations;
- There is a growing awareness that import of new varieties of plant material is needed and phytosanitary requirements need to be established;
- As Myanmar is already importing a lot of fruit and vegetables from many countries, not just from neighbouring countries, the need for establishing phytosanitary requirements for these plant products destined for human consumption become more eminent, as some of these plant products pose a phytosanitary risk as well.

Figure 5.1 *Phytosanitary requirements.*

6 Pesticide retail shops – findings

Retail shops were visited in Southern Shan and Yangon district. The following observations were made:

- Retailers get their licence after training for a 5 year period. After this period the licence will be extended without any further training;
- The ventilation and absence of food and drinks was NOT according to international standards;
- Expiry dates were not mentioned on all products, some products were in containers of more than 1 litre;
- Approximately 90% of the available products is imported by local Myanmar companies and 10% of the products is imported by multinational agrochemical companies;
- Products from multinational agrochemical companies are approximately 30 – 40% more expensive than products imported by local Myanmar companies (with products of China, Thailand etc.)
- Hardly any products were observed with a specific mode of action while these products are normally less toxic and more environmentally friendly than the older products found in Myanmar.
- Labels are very broad in Myanmar, not specific for a certain crop in combination with a certain pest.

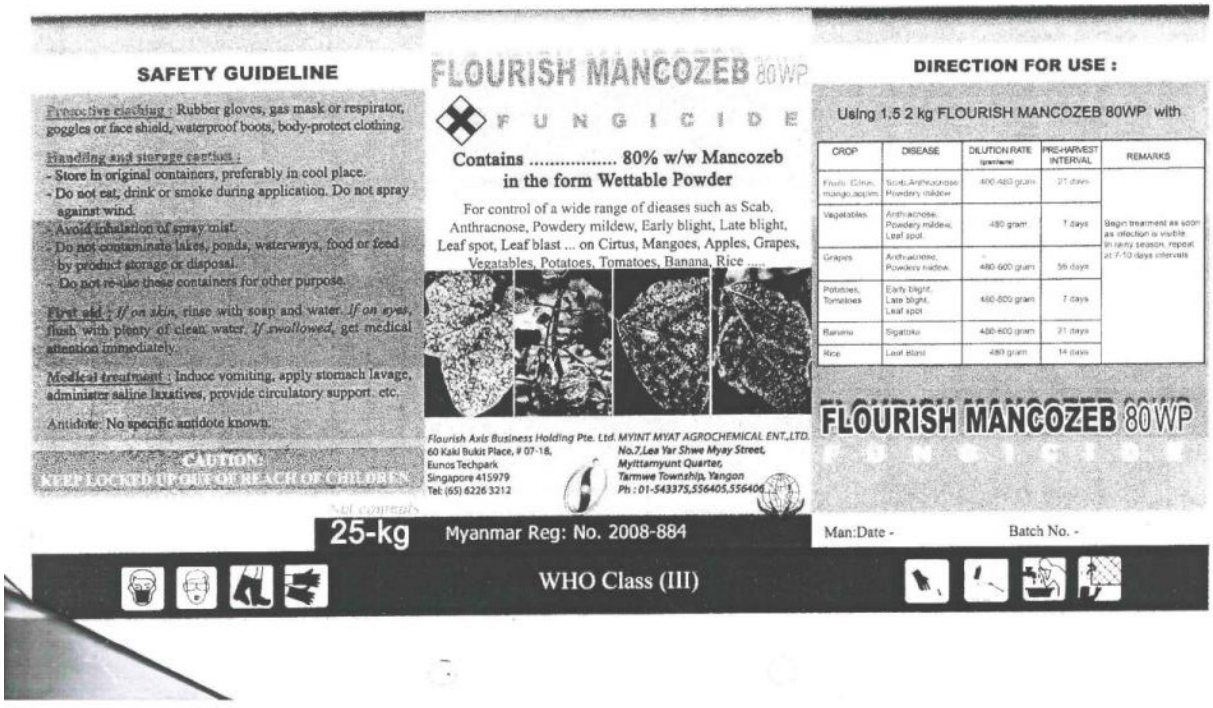

Figure 6.1 *Label for Flourish Mancozeb.*

Figure 6.2 *Pesticides in a pesticide shop.*

- Many growers are aware that quality of products can differ and that this is reflected in the price. Growers tend to buy the cheaper products although they know that these products can be less effective;
- There is a lack of good qualitative Personal Protective Equipment (PPE) in the shops. According to the retailers growers are not interested to buy these PPEs;
- The quality of the pesticides is tested based on technical a.i. provided during the registration process. This doesn't mean that the same product (with the same quality of a.i.) is present in the shops;
- There is a lot of attractive and aggressive advertisement for pesticides, including lottery.

Figure 6.3 *Buy and use pesticides and you will be rich!*

7 Monitoring data – findings

Data on the importation of Pesticides are available at PPD. Pesticide use data are not systematically collected by PPD.

8 Financial arrangements

Most growers are captured in the financial system of Myanmar. Based on a good relationship with the retailer they often can obtain credit from the retailers to buy inputs like pesticides and fertilizers. This often means that they have to go back to them, again and again and again. This report does not go into details about the financial arrangements. Although it is something to keep in mind!

9 Directions for the future

The expert team proposes the following three step approach:

- Step 1: Short term (January 2015): basic training on ICM
- Step 2: Midterm (2015 – 2016): integrated approach for mung bean, tomato, potato
- Step 3: Long term (2015 – 2020): fundamental change and development

Basic training on Integrated Crop Management (short term)
A basic one-week training will be organized for vegetable and mung bean growers, providing ICM training which will include a whole farm approach. This training will include both theoretical and practical training modules. This will also lead to a broader understanding of the field situation (including financial arrangements etc./ credit).

The following issues will be part of the training:

1. Crop rotation, hygienic measures (e.g. removal of infested crop residues), appropriate cultivation techniques.
2. Variety choice, healthy seed.
3. Targeted input of pesticides and fertilizers
   - book-keeping of applied pesticides and fertilizers
   - diagnoses of pests and diseases and their life cycles,
   - targeted (not calendar) spraying,
   - spraying techniques (knapsack or spraying boom)
   - personal protection equipment (PPE),
   - understanding the labels of pesticides,
   - resistance management to prevent development of resistance of pests and diseases to pesticides,
   - storage of pesticides, removal of empty containers.

Integrated approach for mung bean, tomato and potato (midterm)
An integrated approach with the aim of increasing the efficacy of control, lowering costs, lowering human health effects, consumers and environmental side effects based on a legal framework (registered pesticides and phytosanitary requirements).

This will be achieved by the following activities:

1. Book-keeping of all crop protection activities like product choice, dosage rate, spray volume, price etc.
2. Analysis of the data collected under activity 1. Together with growers and advisors after discussions and field visits formulation of the most important constrains and elements to be improved.
   - Seed quality
   - ICM strategy
   - Spraying technique
   - Risks on human health, consumers and environment
   - Registration of desired pesticides which are not available on the Myanmar market (involvement of pesticide industry, quick scan on human health, consumers and environmental risks together with PPD).
3. Formulation of an action plan that could include farmers field schools or other training activities. Demonstrations, presentations, participatory evaluation of pests and diseases in the field and designing an overall ICM plan are elements that could be included in these training activities.

Figure 9.1 *Tomato harvest at Inlay lake.*

Fundamental change and development (long term)
To make a real difference for the Myanmar agricultural sector fundamental change is needed in relation to the registration of pesticides, integrated crop management and phytosanitary issues. An integrated approach will result in a sustainable pest and pesticide management system and enhances the economic performance of the agricultural sector and improve the environment, protect the health of growers, surrounding community and consumers and promote food safety as well.
To further strengthen pesticide registration more education is needed about the global developments, new technologies and new guidelines. It could be strengthened through a greater use of available resources and through greater cooperation, particularly on a regional level. Close collaboration with organisations already active in the region is essential (e.g. FAO).

Registration of pesticides

- The law needs to be updated according to the international standard, to assess the possibility to carry out a complete review of Pesticide Law and pesticide related legislation with the aim of elaborating a new pesticides management system. This needs to be done in close collaboration with the other Ministries and organizations;
- Evaluation of the effectiveness of the Board;
- Capacity building on human resources to get a qualified team with relevant skills to evaluate the dossier;
- Capacity building on administration of pesticide registration system;
- Develop a procedure manual including fee rate, standard time frame procedure for registrants etc. (link with legislation);
- Involvement of other research institutes / universities in the registration process. For instance on risk assessment of the environment;
- Development of an evaluation procedure to evaluate efficacy data, effect on human health, consumers and the environment;
- Upgrade of laboratory (quality and residues);
- Development of the management of leftover pesticides and empty pesticide containers.

Note: Close collaboration is needed with other programmes or initiatives on this topic.

Integrated Crop Management

- Promoting ICM as the preferred approach to disease and pest control in order to establish sustainable production systems, including the reduction of the reliance on pesticides in the longer term by developing an Agricultural Knowledge infra-structure;
- In this infra-structure the Extension Service of the Department of Agriculture, Universities, advisors of seed companies, agrochemical companies and retail shops should participate;
- The PPD needs to recruit more staff to develop curricula for training regarding ICM (including IPM) and must be able to organize training for farmers (eg. Farmers Field Schools) without being dependent on foreign project funds;
- Develop training packages for the selection of appropriate pesticides and fertilizers and effective and safe (human health & environment) application techniques.

Figure 9.2 *Grower showing the use of PPE.*

Phytosanitary issues

- In relation to international trade of Myanmar plants and plant products it is important to establish and publish a national plant quarantine list in order to give clarity on the phytosanitary import requirements of Myanmar;
- Verify the pest status of trade relevant pests, by organising a national surveillance plan on these pests;
- Establish a Pest Risk Analysis (PRA) unit to enable the analysis of phytosanitary risks for imports of new plants and plant products in line with the International Standards on Phytosanitary Measures (ISPM's);
- The NPPO should make a multiyear plan with phasing and benchmarks in order to establish a full fletched NPPO according to article 4 of the IPPC-convention;
- Part of this plan should give attention to the upgrading of laboratories and more specific the pests diagnostic laboratory;
- Furthermore this plan should include the recruitment of more staff including diagnostic specialists, a virologist is urgently needed;

- A regular training program for the inspectors with the formulation of inspection guidelines with possible crop specific phytosanitary issues needs to be formulated.

Context and conditions needed for a successful programm

A fundamental change and development programme as described in this Section should be part of a larger / broader programme in general, also when it comes to the intended Myanmar-Netherlands cooperation in the Vegetable Sector. The overall Horticulture Cooperation Program should meet the following conditions so that a real difference in relation to the registration of pesticides, integrated crop management and phytosanitary issues can be successfully implemented.

Some of the preconditions for success to be included in the major Horticulture Programme are:

- ICM enter as a central focus of the entire program, not only for pest management;
- Integrated approach towards agricultural input distribution channels (more than pesticides);
- Strengthening agricultural extension and (possibly) private agricultural advisory services - more than just pest management;
- Solid funding mechanisms of both extension and inspection / control;
- Organization of producers (cooperatives, farmer organisations, buyers / traders, etc.).

These are some of the important conditions that are of influence of the success of the suggested interventions on improving crop pest management in Myanmar. Therefor it is crucial that a programme on improving crop management is part of a broader program on improving the agriculture sector.

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Annex 1 - Programme of the mission (3 - 8 November 2014)

Sunday, 2 November	*Travel Netherlands – Bangkok, Thailand*
Monday, 3 November	*Travel Bangkok Thailand – Yangon, Myanmar* Introduction with Senior Advisor for agriculture of Netherlands Economic Mission. Introduction and Discussion at Plant Protection Division, Department of Agriculture, Ministry of Agriculture and Irrigation. Meeting with Agricultural Attaché of the Dutch Embassy,
Tuesday, 4 November	Meeting at Plant Protection Division: discussion and laboratory visits. Visit at pesticide shop. Meeting with General Manager of Bayer, Myanmar Diner with Delegation of European Union to Myanmar, Agricultural Extension Manager of East-West Seed International Limited and the Agricultural Attaché of the Dutch Embassy
Wednesday, 5 November	*Travel Yangon – Heho* Meeting with Plant Protection Division of Shan State and some retailers of pesticides in Taunggi Introduction with Carola Baller
Thursday, 6 November	Meeting with Tomato grower at Inle Lake Meeting with cauliflower grower Meeting with potato grower *Travel Heho - Yangon*
Friday, 7 November	Wrap-up meeting at Plant Protection Division
Saturday,8 November	Meeting with staff of DoA, mung bean growers and exporter of mung beans in Thon Gwa Township, Yangon Region. Visit at pesticide shop
Sunday, 9 November	Work on the report *Travel Yangon, Myanmar – Bangkok, Thailand*
Monday, 10 November	*Travel Bangkok, Thailand - Netherlands*

Annex 2 – Organisations and Persons visited or contacted

Organisation	Name	Function
Dutch Embassy	Geert Westenbrink	Agricultural Attaché
Embassy of the Kingdom of the Netherlands in Bangkok Thailand	Joan Boer	Ambassador of Embassy Thailand, responsible for Thailand, Myanmar, Cambodia and Laos
Embassy of the Kingdom of the Netherlands in Bangkok Thailand	Carola Baller	Head of Netherlands Economic Mission, Yangon, Burma/Myanmar
Dutch Embassy – Netherlands Economic Mission	Saw Jackson	Senior Advisor for Agriculture
Plant Protection Division, Ministry of Agriculture and Irrigation, Department of Agriculture, Yangon	Tin Aung Win	Director, head of Division
	Dr. Khin Khin Mana Myint	Entomologist
	Dr. Pyone Pyone Ky	Nemotologist, head of quarantine, deputy Director
	Daw Seng Raw	Staff officer
	Daw Moe Thida	Deputy Staff officer
	Daw Mya Myint Mo	Assistant supervisor
	Daw San San Lasin	Pesticide Registration Board
	Daw Aye Aye Mar	Weed and post-harvest expert
	Daw Myint Wu Twin	Pathologist, Assistant Director
	U Tin Win	Head of Pesticide Analytical Laboratory, assistant Director
PPD, Taunggi	U Sai San Wang	District Manager
	Daw Thin Thin Lei	Head of PPD, Shan State
	Daw Mie Mie Hlring	Deputy head of PPD, Shan State
DoA Thon Gwa Township, Yangon Region	U Zaw Weit	Former head of Agri department
Lucky 7	Daw Shwe Yin	Retailer Shan state
Khun Yar Zar Shop	U Tun Thein	Retailer Shan state
EU – Delegation of the European Union to Myanmar	Alberto Menghini	Programme Manager – Trade and Private Sector
East-West Seed International	Stuard Joseph Morris	Agricultural extension Manager
Bright Light Co., LTD.	Brother of Ko Maung Myint	Managing director, Exporter of mung beans
Bayer CropScience	Hla Kyi	General Manager
CDI, Wageningen UR	Joep van den Broek	Project leader
	Abishkar Subedi	Genetic Resources and Seed System Specialist
Project Uitzending Managers (PUM)	Frans Jongelen	Senior seed and plant pathologist

Names of staff of DoA Thon Gwa Township are not indicated. Also the names of all growers are not known.

Annex 3a – Amount of Imported Pesticides in Myanmar 2006 - 2012

Pesticide consumption in Myanmar

Year	Pesticide	Government		Private		Total Tons
		M.Tons	Total Yearly	M.Tons	Total Yearly	
2006-2007	Insecticide	-	-	3165.62	6186.49	
	Fungicide	-	-	2065.66		
	Herbicide	-	-	462.08		
	Fumigant	-	-	40.00		
	Others	-	-	453.13		
2007-2008	Insecticide	-	-	2377.506	3775.87	
	Fungicide	-	-	891.978		
	Herbicide	-	-	292.486		
	Fumigant	-	-	16		
	Others	-	-	197.9		
2008-2009	Insecticide	-	-	3565.05	4646.92	
	Fungicide	-	-	647.15		
	Herbicide	-	-	260.66		
	Fumigant	-	-	-		
	Others	-	-	174.06		
2009-2010	Insecticide	-	-	3265.59	4940.39	
	Fungicide	-	-	1004.29		
	Herbicide	-	-	570.4		
	Fumigant	-	-	48.0		
	Others	-	-	52.1		
2010-2011	Insecticide	-	-	6941.58	10778.19	
	Household	-	-	172.5		
	Fungicide	-	-	2652.93		
	Herbicide	-	-	676.5		
	Fumigant	-	-	75.38		
	PGR	-	-	217.3		
	Rodenticide	-	-	20		
	Others	-	-	22		
2011-2012	Insecticide	-	-	6652.16	11101.41	IE = 542
	Household	-	-	136.56		
	Fungicide	-	-	2742.1		
	Herbicide	-	-	1136.6		
	Fumigant	-	-	219.58		
	PGR	-	-	199.4		
	Rodenticide	-	-	-		
	Others	-	-	15		

-

Annex 3b – Amount of Imported Pesticides in Myanmar 2012-2013

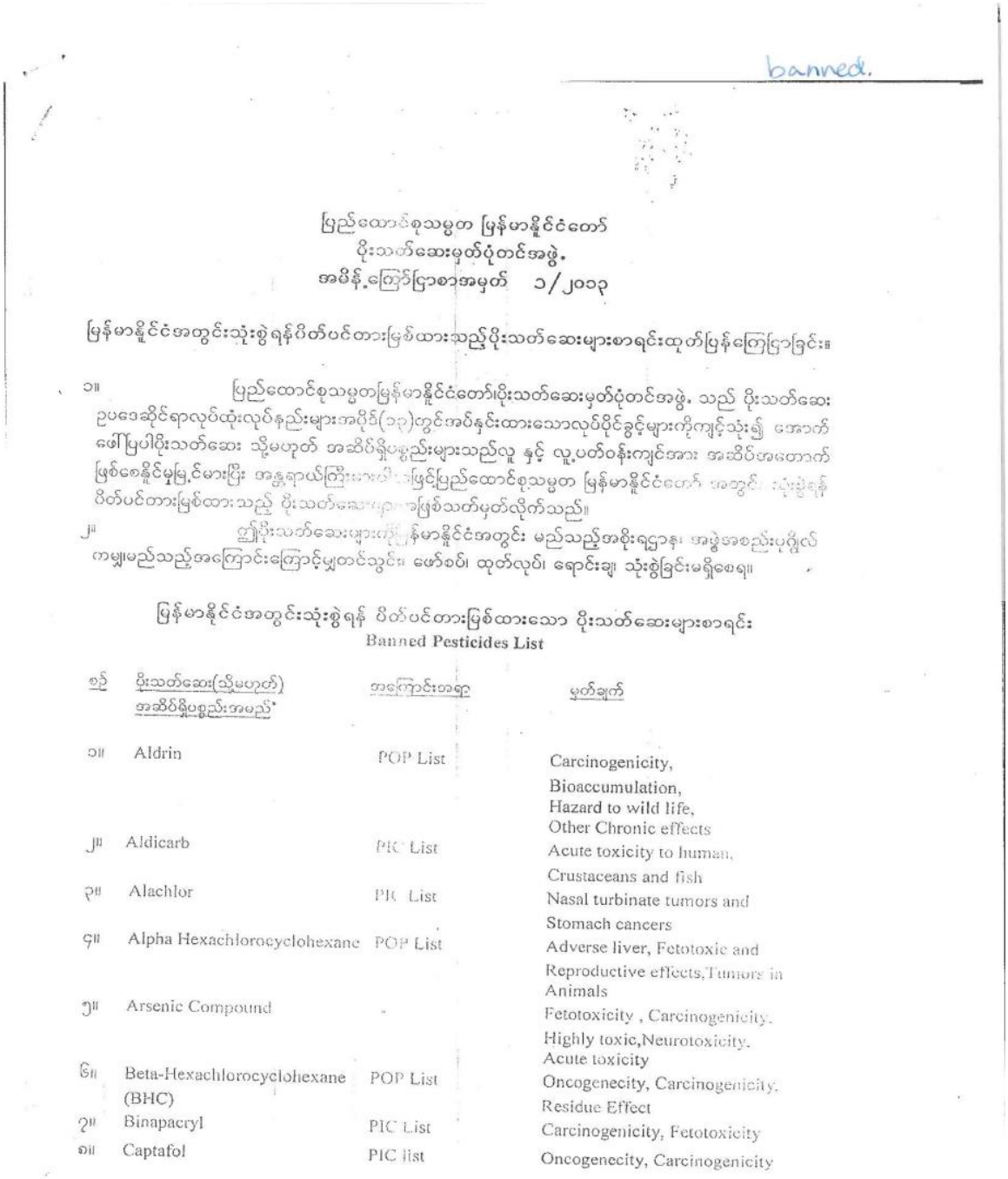
	Amount of Imported Pesticides in Myanmar (2012-13)							megaton			
	Insecticide	Fungicide	Herbicide	House Hold	PGR	Fumigant	Others	Total (MT)			
April	326.1	100.5	97	90		20		633.6			
May	485.44	22	36	79.92	1.2			624.56			
June	255	140	133					528			
July	400.44	125	166	19.8	41.5			752.74			
August	693.82	435	115					1243.82			
September	475.26	111.9	233	79.92	1.2	9.984		911.264			
October	611.6	140.8	219		41.2			1012.6			
November	407.08	142.5	70		45			664.58			
December	99.02	105	40					244.02			
January	86	75	15	139.95				315.95			
February	919.96	329.5	258.18	89.2	21.2	21		1639.04			
March	123	20	45	30.44	30		20	268.44			
	4882.72	1747.2	1427.18	529.23	181.3	50.984	20	8838.614			

Annex 3c – Amount of Imported Pesticides in Myanmar 2013-2014

metric ton

	Amount of Imported Pesticides in Myanmar (2013-14)									
	Insecticide	Fungicide	Herbicide	House Hold	PGR	Fumigant	Rodenticide	Others	Total (MT)	IE
April	119.24	53	20		20				212.24	20
May	238.2	121	68.18		2	20			449.38	31
June	393	286.5	125		11.2	9.6		20	845.3	38
July	439.54	136	218.25	20	60				873.79	52
August	613.639	115	243.18	72.2	114.9916	80		60	1299.0106	76
September	387.04	142.1	212	40.32		20		90	891.46	54
October	669.4	149	205.12	0.12	55				1078.64	66
Nov	257.421	139.2	257	124	1.5	21.008			800.129	57
Dec	469.9	143	481		40		19.98		1153.88	60
Jan	206.08	177	211.36	79.66					674.1	35
February	458.0244	238.9	436.2			10		40	1183.1244	53
March	226.5	199	281	17.85	20				744.35	38
	4477.9844	1899.7	2758.29	354.15	324.6916	160.608	19.98	210	10205.404	580

Annex 4 – List of banned pesticides in Myanmar, June 2013



banned.

ပြည်ထောင်စုသမ္မတ မြန်မာနိုင်ငံတော်
ပိုးသတ်ဆေးမှတ်ပုံတင်အဖွဲ့
အမိန့်ကြော်ငြာစာအမှတ် ၁/၂၀၁၃

မြန်မာနိုင်ငံအတွင်းသုံးစွဲရန် ပိတ်ပင်တားမြစ်ထားသည့် ပိုးသတ်ဆေးများစာရင်းထုတ်ပြန်ကြေငြာခြင်း။

၁။ ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်၊ပိုးသတ်ဆေးမှတ်ပုံတင်အဖွဲ့ သည် ပိုးသတ်ဆေး ဥပဒေဆိုင်ရာလုပ်ထုံးလုပ်နည်းများအပိုဒ်(၁၃)ကွင်းအပ်နှင်းထားသောလုပ်ပိုင်ခွင့်များကိုကျင့်သုံး၍ အောက် ဖော်ပြပါပိုးသတ်ဆေး သို့မဟုတ် အဆိပ်ရှိပစ္စည်းများသည်လူ နှင့် လူ့ပတ်ဝန်းကျင်အား အဆိပ်အတောက် ဖြစ်စေနိုင်မှုမြင့်မားပြီး အန္တရာယ်ကြီးမားပါသဖြင့်ပြည်ထောင်စုသမ္မတ မြန်မာနိုင်ငံတော် အတွင်း သုံးစွဲရန် ပိတ်ပင်တားမြစ်ထားသည့် ပိုးသတ်ဆေးများအဖြစ်သတ်မှတ်လိုက်သည်။

၂။ ဤပိုးသတ်ဆေးများကို မြန်မာနိုင်ငံအတွင်း မည်သည့်အစိုးရဌာန၊ အဖွဲ့အစည်းပုဂ္ဂိုလ် ကမျှမည်သည့်အကြောင်းကြောင့်မျှတင်သွင်း၊ ဖော်စပ်၊ ထုတ်လုပ်၊ ရောင်းချ၊ သုံးစွဲခြင်းမရှိစေရ။

မြန်မာနိုင်ငံအတွင်းသုံးစွဲရန် ပိတ်ပင်တားမြစ်ထားသော ပိုးသတ်ဆေးများစာရင်း
Banned Pesticides List

စဉ်	ပိုးသတ်ဆေး(သို့မဟုတ်) အဆိပ်ရှိပစ္စည်းအမည်	အကြောင်းအရာ	မှတ်ချက်
၁။	Aldrin	POP List	Carcinogenicity, Bioaccumulation, Hazard to wild life, Other Chronic effects
၂။	Aldicarb	PIC List	Acute toxicity to human,
၃။	Alachlor	PIC List	Crustaceans and fish
၄။	Alpha Hexachlorocyclohexane	POP List	Nasal turbinate tumors and Stomach cancers Adverse liver, Fetotoxic and Reproductive effects,Tumors in Animals
၅။	Arsenic Compound	-	Fetotoxicity , Carcinogenicity.
၆။	Beta-Hexachlorocyclohexane (BHC)	POP List	Highly toxic,Neurotoxicity. Acute toxicity Oncogenecity, Carcinogenicity. Residue Effect
၇။	Binapacryl	PIC List	Carcinogenicity, Fetotoxicity
၈။	Captafol	PIC list	Oncogenecity, Carcinogenicity

๕๒	Chlordimeform	PIC List	Oncogenecity, Carcinogenicity
๕๓	Chlordane	POP List	Carcinogenicity, Long Residual Effect, Hazard to Living Organism
๕๔	Chlordecone	POP List	Carcinogenicity
๕๕	Chlorobenzilate	PIC List	Carcinogenicity, Adverse testicular Effects
๕๖	Cyhexatine	PIC List	Teratogenecity, High risk to the Environment
๕๗	Dieldrin	POP List	Carcinogenicity, Bioaccumulation, Hazard to wild life, Other Chronic effect, Long Residual effect, Bioaccumulation
๕๘	Dinoseb	PIC List	Teratogenicity,Reproductive effects, Acute effects, Carcinogenicity, Possible Teratogen
๕๙	DNOC	PIC List	Highly acute toxicity, Highly risk to users
๕๑๐	Ethylene Dibromide(EDB)	PIC List	Oncogenecity,Mutagenecity, Reproductive effects, Carcinogenicity, Fetotoxicity
๕๑๑	Ethylene Dichloride	PIC List	Neurotoxicity,High risk to user, Persistent in environment, Chronic toxicity
๕๑๒	Endosulfan	POP List	Volatile and Persistent, Bioaccumulation in fatty tissues
๕๑๓	Endrin	POP List	Oncogenecity, Teratogenecity, Reduction in endangered and non-target species, Long residual effects
๕๑๔	EPN	-	Neurotoxicity, Hazard to aquatic Organisms, Cholinesterase inhibitor,Dermal toxicity
๕๑๕	Ethylene Oxide	PIC List	Carcinogenicity, Mutagenecity
๕๑๖	Fluoroacetamide	PIC List	Highly acute Toxicity, highly risk to user
๕๑๗	Hexachlorobenzene(HCB)	POP List	Carcinogenicity, Persistent in environment

๋๋	Heptachlor	POP List	Long residual effect, Bioaccumulation
๋๖	Lindane(Gama Hexachlorocyclohexane)	POP List	Persistent in Environment, Bioaccumulation, suspected Carcinogen
๋๗	Methomyl	-	Acute toxicity-humans, Cholinesterase inhibitor, Highly toxic-crustaceans, Moderate toxic to fish
๋๘	Mercury Compounds	PIC List	Highly acute toxicity, Persistent in environment, Toxic to aquatic Organisms
๋๙	Methamidophos	PIC List	Highly acute toxicity, Highly risk to user
๏๐	Methyl Parathion	PIC List	Highly acute toxicity, Dermal toxicity
๏๑	Monocrotophos	PIC List	High acute toxicity, Affects the Nervous system by inhibiting Acetyl Cholinesterase, Plasma Cholinesterase was inhibited
๏๋	Mirex	POP List	Carcinogenicity, Persistent in environment, Biomagnifications in food chain
๏๒	Parathion Ethyl	PIC List	Acute toxicity, Toxic to aquatic Organisms, High acute toxicity to human
๏๓	Pentachlorophenol (PCP)	PIC List	Highly acute toxicity, Skin Injury, Persistent in environment,
๏๔	Phosphamidon	PIC List	Highly acute toxicity, High risk
๏๕	Strobane	-	Oncogenecity, Persistant in Environment, Bioaccumulation, Carcinogenicity
๏๗	2,4,5 – T and 2,4,5-TP	PIC List	Oncogenecity, Carcinogenicity, Fetotoxicity, Long residual effect

၃၈။	Toxaphene	POP List	Oncogenecity , Population reduction in non-target species, Acute toxicity to aquatic Organism, Chronic effects to wildlife, Carcinogenicity, Long residual effect
၃၉။	Tributyltin Compound	PIC List	Highly toxic to aquatic organism, Acute toxicity, Fetotoxicity, Bioaccumulation

(ကျော်ဝင်း)

ဥက္ကဌ

စာအမှတ် - ပမဖ - ၃/၂၀၁၃ (၂၅၉)

ရက်စွဲ - ၂၀၁၃ ခုနှစ်၊ ဇွန် လ (၂၇) ရက်

27, JUNE, 2013.

ဖြန့်ဝေခြင်း

မိတ္တူကို-

(၁) ရှေ့နေချုပ်ရုံး။
(၂) တရားသူကြီးချုပ်ရုံး။
(၃) စာရင်းစစ်ချုပ်ရုံး။
(၄) ဝန်ကြီး ဌာနအား လုံး ။
(၅) ပြည်နယ်/တိုင်းဒေသကြီးအစိုးရအဖွဲ့ အားလုံးထံ(သက်ဆိုင်ရာခရိုင်/မြို့နယ် အုပ်ချုပ်ရေးမှူး အဖွဲ့ရုံးများသို့ ထပ်ဆင့်ဖြန့်ဝေပေးပါရန်မေတ္တာရပ်ခံချက်ဖြင့်)။
(၆) ညွှန်ကြားရေးမှူးချုပ်၊ နိုင်ငံတော်သမ္မတရုံး။
(၇) ညွှန်ကြားရေးမှူးချုပ်၊အကောက်ခွန်ဦးစီးဌာန။
(၈) ရဲချုပ်၊ မြန်မာနိုင်ငံရဲတပ်ဖွဲ့ဌာနချုပ်။
(၉) ရန်ကုန်မြို့တော်/နေပြည်တော်/မန္တလေးမြို့တော် စည်ပင်သာယာရေးကော်မတီ။
(၁၀) ညွှန်ကြားရေးမှူးချုပ် ၊ ကျန်းမာရေးဦးစီးဌာန။
(၁၁) ညွှန်ကြားရေးမှူးချုပ်၊ ပါမောက္ခချုပ်၊ ဦးဆောင်ညွှန်ကြားရေးမှူး (ဦးစီးဌာန၊ တက္ကသိုလ် (အားလုံး)၊မြန်မာ့လယ်ယာဖွံ့ဖြိုးရေးဘဏ်)၊ လယ်ယာစိုက်ပျိုးရေးနှင့်ဆည်မြောင်း ဝန်ကြီးဌာန။
(၁၂) ညွှန်ကြားရေးမှူး (အားလုံး) ၊ စိုက်ပျိုးရေးဦးစီးဌာန ၊ လယ်ယာစိုက်ပျိုးရေးနှင့်ဆည်မြောင်း ဝန်ကြီးဌာန။
(၁၃) ပြည်နယ်/တိုင်းဒေသကြီးဦးစီးမှူး အားလုံးထံ(သက်ဆိုင်ရာခရိုင် ၊ မြို့နယ်ဦးစီးမှူး အားလုံး သို့ဖြန့်ဝေပေးပါရန်မေတ္တာရပ်ခံချက်ဖြင့်)။
(၁၄) ပိုးသတ်ဆေးမှတ်ပုံတင်အဖွဲ့၊ (အဖွဲ့ဝင် အားလုံး)။
(၁၅) ဦးဆောင်ညွှန်ကြားရေးမှူး၊ ပုံနှိပ်ရေးနှင့် စာအုပ်ထုတ်ဝေရေးလုပ်ငန်း။
(မြန်မာနိုင်ငံပြန်တမ်းတွင်ထည့်သွင်းကြော်ငြာပေးပါရန်မေတ္တာရပ်ခံချက်ဖြင့်မိတ္တူ(၁၀)စောင် ကိုပေးပို့အပ်ပါသည်။)

Annex 5 – List of pesticides in Myanmar with restrictions

restricted.

ပြည်ထောင်စုမြန်မာနိုင်ငံတော်အစိုးရ
ပိုးသတ်ဆေးမှတ်ပုံတင်အဖွဲ့
အမိန့်ကြော်ငြာစာအမှတ် ၁/၉၄

"ကန့်သတ်ထားသောပိုးသတ်ဆေးစာရင်းထုတ်ပြန်ကြေညာခြင်း"

၁။ ပိုးသတ်ဆေးမှတ်ပုံတင်အဖွဲ့သည် ပိုးသတ်ဆေးဥပဒေဆိုင်ရာလုပ်ထုံးလုပ်နည်းများအပိုဒ် (၁၃) ပါလုပ်ပိုင်ခွင့်များကိုကျင့်သုံးလျက် အောက်ဖော်ပြပါအဆိပ်ရှိပစ္စည်းများနှင့်ဖော်စပ်ထားသောပိုးသတ်ဆေးများကို၊ လက်မှတ်ရပိုးသတ်ဆေးသုံးစွဲသူများကိုယ်တိုင်ဖြစ်စေ / ယင်းတို့၏ကြီးကြပ်မှုဖြင့်သာဖြစ်စေသုံးစွဲရန်ဖြစ်သည့် ကန့်သတ်ထားသောပိုးသတ်ဆေးများအဖြစ်သတ်မှတ်လိုက်သည်။

၂။ အမှတ်စဉ် (၇) ပါ DDT ပိုးသတ်ဆေးကိုမူ သီးနှံများစိုက်ပျိုးရာတွင်ဖျက်ပိုးကာကွယ်နှိမ်နင်းခြင်းကိစ္စမှအပ၊ မြို့ရွာသန့်ရှင်းရေး၊ ခြင်၊ ယင်၊ ကြွက်နှင့်အိမ်တွင်းပိုးမွှားများ၊ အခြားပိုးမွှားများနှိမ်နင်းရာတွင်၊ အစိုးရဌာန/အဖွဲ့အစည်းများ၊ စည်ပင်သာယာရေးကော်မီတီများနှင့် စည်ပင်သာယာရေးအဖွဲ့အစည်းများကသာသုံးစွဲနိုင်သည့် ကန့်သတ်ထားသောပိုးသတ်ဆေးအဖြစ်သတ်မှတ်လိုက်သည်။

ကန့်သတ်ထားသောပိုးသတ်ဆေးများစာရင်း

စဉ်	ပိုးသတ်ဆေးတွင်ပါဝင်သော အဆိပ်ရှိပစ္စည်းအမည်	ဆေးအုပ်စု	မှတ်ချက်
(၁)	မီသိုင်းဗရိုမိုက် (Methyl Bromide)	အဆိပ်ငွေ့မှိုင်းတိုက်ဆေး (Fumigant)	
(၂)	ဖော့စ်ဖင်း (Phosphine)	အဆိပ်ငွေ့မှိုင်းတိုက်ဆေး (Fumigant)	
(၃)	ဗရိုမာဒိုင်ယိုလုန်း (Bromadiolone)	ကူမာရင် (Coumarin)	
(၄)	ဇင့်ဖော့စ်ဖိုဒ် (Zinc Phosphide)	အင်န်ဩဂဲနစ် (Inorganic)	
(၅)	ဗရော့ဒီဖာကွမ် (Brodifacoum)	ကူမာရင် (Coumarin)	
(၆)	ဖန်နံသီယွန် (Fenthion)	ဩဂဲနိုဖော့စ်ဖရပ်စ် (Organophosphorous)	
(၇)	ဒီဒီတီ (D D T)	ဩဂဲနိုကလိုရင်း (Organochlorine)	

၃။ ပိုးသတ်ဆေးမှတ်ပုံတင်အဖွဲ့သည် အပြည်ပြည်ဆိုင်ရာအဖြစ်မျှ ချက်များ၊ ပိုးသတ်ဆေးဖော်စပ်ထုတ်လုပ်သူမှရင်းကုမ္ပဏီများ၏သုတေသနတွေ့ရှိချက်များ၊ မြန်မာ့စိုက်ပျိုးရေးလုပ်ငန်း၊ သီးနှံကာကွယ်ရေးဌာနစုံ၏သုတေသနရလဒ်များ အပေါ် အခြေခံလျက် ထပ်မံစီစစ်ရရှိသည့်ကန့်သတ်ထားသောပိုးသတ်ဆေးများ စာရင်းကို အများပြည်သူသို့ အခါအား လျော်စွာထုတ်ပြန်ကြေညာ အသိပေးသွားမည်ဖြစ်ပါသည်။

ပုံ-
ဒေါက်တာမြမောင်
ဥက္ကဋ္ဌ
ပိုးသတ်ဆေးမှတ်ပုံတင်အဖွဲ့

စာအမှတ်-ပမဖ-၃/၉၄(၀၀၉၂)
ရက်စွဲ-၁၉၉၄ခုနှစ်၊မတ်လ (၂၇)ရက်။

မိတ္တူကို -
(၁) ရွှေနေချုပ်ရုံး
(၂) တရားသူကြီးချုပ်ရုံး
(၃) စာရင်းစစ်ချုပ်ရုံး
(၄) ဝန်ကြီးဌာနအားလုံး
(၅) ပြည်နယ်/တိုင်းဒေသကြီးပြားမှုတည်ဆောက်ရေးအဖွဲ့ရုံးအားလုံး(သက်ဆိုင်ရာခရိုင်/မြို့နယ်ဒေသကြီးပြားမှုတည်ဆောက်ရေးအဖွဲ့ရုံးများသို့ကပ်ဆင့်ဖြန့်ဝေပေးပို့ရန်မေတ္တာရပ်ခံချက်ဖြင့်)
(၆) ညွှန်ကြားရေးမှူးချုပ်၊နိုင်ငံတော်ဒေသကြီးပြားမှုတည်ဆောက်ရေးအဖွဲ့ရုံး၊
(၇) ညွှန်ကြားရေးမှူးချုပ်၊အကောက်ခွန်ဦးစီးဌာန၊
(၈) ရဲချုပ်၊ပြည်သူ့ရဲတပ်ဖွဲ့ဌာနချုပ်၊
(၉) ရန်ကုန်မြို့တော်စည်ပင်သာယာရေးကော်မတီရုံး၊
(၁၀) ပိုးသတ်ဆေးမှတ်ပုံတင်အဖွဲ့၊အဖွဲ့ဝင်အားလုံး
(၁၁) အထွေထွေမန်နေဂျာ(အားလုံး)၊မြန်မာ့စိုက်ပျိုးရေးလုပ်ငန်း၊
(၁၂) ပြည်နယ်/တိုင်းမန်နေဂျာအားလုံး၊မြန်မာ့စိုက်ပျိုးရေးလုပ်ငန်း(သက်ဆိုင်ရာခရိုင်/မြို့နယ်မန်နေဂျာများအားလုံးသို့ဖြန့်ဝေပေးပို့ရန်မေတ္တာရပ်ခံချက်ဖြင့်)
(၁၃) ဦးဆောင်ညွှန်ကြားရေးမှူး၊ပုံနှိပ်ရေးနှင့်စာအုပ်ထုတ်ဝေရေးလုပ်ငန်း(မြန်မာနိုင်ငံပြန်တမ်းတွင်ထည့်သွင်းကြော်ငြာပေးပို့ရန်နှင့်မိတ္တူ(၁၀)စောင်ကိုပေးပို့ပေးပို့ရန်မေတ္တာရပ်ခံချက်ဖြင့်)

အဓိနှစ်အရ

(ဒေါက်တာသိမ်းငွေး)
အတွင်းရေးမှူး

Annex 6 – Process to grant the Pesticide Registration

Process to grant the Pesticide Registration

Any companies (Foreign of local companies) desirous of importing formulated pesticide and active ingredients to control the agricultural pests or for domestic use shall apply the pesticide registration to the Pesticide Registration Board. An application in the prescribed from (PLF-1) shall be submitted the registration as the requirements as follow: -

(a) Fill up the application form (PLF-1) payable with the respective fees.
- Completed Application form one original + 4 copies
- Letter of consent from manufacturer one original + 4 copies
- One original and two copies of technical supporting documents
- Three copies of proposal label with Myanmar translation will be submitted to PRB secretary office and
- Formulated product in sufficient amount for carrying out supervised trials and quality control of the product
- 25gms of technical active ingredient or ingredients will also be submitted to Pesticide Analytical Laboratory.

(b) The secretary of Pesticide Registration Board office will check the completed application form and technical dossiers and will contribute to respective technical members.

(c) The pesticide laboratory analyze and test pesticides or any active ingredient received as samples as to conformity with the content of ingredient as claimed on the label.

(d) The technical committee under the Plant Protection Division evaluate the technical documents.

(e) With the pesticide analytical results and the review on the technical documents the external technical meeting shall evaluate the pesticide.

(f) According to the results of the evaluation the pesticide are submitted to the Pesticide Registration Board.

(g) The Pesticide Registration Board make decision with respect to the application for the following type of registration
- Experimental registration
- Provisional registration
- Full registration
- Amended registration
- Special use permit

(h) The secretary of PRB issue the letter to the companies to deposit the respective registration fees in US$.

(i) The companies deposit the registration fees to the Myanma Foreign Trade Bank (MFTB) as the following means:-
   - In hand (for foreigner)
   - Account transfer
   - Telegraph transfer

(j) The MFTB issue the credit advice (Yellow colour) to the PRB

(k) After receiving the credit advice the Secretary of Pesticide Registration Board issue the registration certificate. Base on the pesticide registration certificate the companies shall apply the import endorsement at the secretary.

Annex 7 – data requirements

Data Requirement for Registration of Pesticides

Sr. No	Particulars	House Hold Use	Agriculture Use		
			Full Reg	Prov Reg	Exp Reg
	The applicant wishing to have its product registered shall send the required information in English in three copies. It is the reponsibility of the applicant applying for registration or having a product registered, to state any additional data or information which are considered relevant for the efficient and safe use of its product,and should be taken into account either during the registration procedure or at the time of field application. The following information should be provided:				
1.	General information				
1.1	Name, address, telephone and telex number of the firm wishing to register the product.	✓	✓	✓	✓
1.2	Proprietary name or designation of the product, proposed distinguishing name, Trade names registered in other countries.	✓	✓	✓	✓
1.3	Name, address, telephone and telex number of the firm (s) synthesizing and formulating the pesticide.	✓	✓	✓	✓
1.4	Physical condition and nature of the formulation; e.g. (emulsifiable concentrate, wettable powder, tablets, baits etc.)	✓	✓	✓	✓
1.5	Use category (e.g insecticide, fungicide etc.).	✓	✓	✓	✓
1.6	Field of use (e.g. agriculture, horticulture, forestry, household, veterinary, food storage, rodent control etc.).	✓	✓	✓	✓
1.7	Crops, plants to be protected.	X	✓	✓	✓
1.8	Active ingredient (s).	✓	✓	✓	✓
1.9	Nature and size (s) of packing:	✓	✓	✓	✓
	Filling weight and volume; detailed information is required on the proposed packaging and method of closure for the formulated product and for any over-packing e.g. fibreboard cartons, drums etc.must be specified. The type of plastic used for inner liners etc. must be specified.				
1.10	Classification of toxicity (WHO classification).	✓	✓	✓	✓
1.11	Hazard classification in international transport.	✓	✓	✓	✓
1.12	Storage stability between-5°C and 50 °C, Sate permissible, storage time under given storage condition indication the range of temperature .	✓	✓	✓	✓
2	Properties of the active ingredient (s).				
2.1	Identity				

Data Requirement for Registration of Pesticides

Sr. No	Particulars	House Hold Use	Agriculture Use		
			Full Reg	Prov Reg	Exp Reg
2.1.1	Common name proposed by ISO, if it is not available other proposed name;	✓	✓	✓	✓
2.1.2	Structural formula;	✓	✓	✓	✓
2.1.3	Chemical name (according to internationally agreed nomenclature; preferably IUPAC;)	✓	✓	✓	✓
2.1.4	Empirical formula and molecular mass;	✓	✓	✓	✓
2.1.5	Manufacturer's development code number(s);	✓	✓	✓	✓
2.2	Physical and Chemical Properties of the Pure Active Ingredient				
2.2.1	Appearance (physical state, color, odour);	✓	✓	✓	✓
2.2.2	Melting/decomposition/boiling point (s);	✓	✓	✓	✓
2.2.3	Vapour pressure (figures should be given at stated temperature preferaby in the range of 20 - 45 °C, but only when above 10^{-3} Pascal);	✓	✓	✓	✓
2.2.4	Solubility in water and organic solvents (at a stated temperature preferably in the range of 20 -25 °C);	✓	✓	✓	✓
2.2.5	Partition coefficient between water and an appropriate non-miscible solvent (e.g. n-octanol);	✓	✓	✓	✓
2.2.6	Density, surface tension (for liquids only)	✓	✓	✓	✓
2.2.7	Hydrolysis rate under stated relevant conditions;	✓	✓	✓	✓
2.2.8	Photolysis under stated relevant conditions;	✓	✓	✓	✓
2.2.9	Absorption spectra, e.g. ultraviolet, visible, and infra-red, etc.;	✓	✓	✓	✓
2.2.10	Thermal stability and degradation products;	✓	✓	✓	✓
2.2.11	Other information.	✓	✓	✓	✓
2.3	Technical grade material				
2.3.1	Appearance (physical state, colour and odour);	✓	✓	✓	✓
2.3.2	The minimum (and maximum) active ingredient content expressed as g/ Liter or g/Kg;	✓	✓	✓	✓
2.3.3	Identity and amount of isomers, impurities and other by-products, together with information on their concentration ranges expressed as %w/w. (The chromatogram of technical grade material indicating	✓	✓	✓	✓

Data Requirement for Registration of Pesticides

Sr. No	Particulars	House Hold Use	Agriculture Use		
			Full Reg	Prov Reg	Exp Reg
	well resolved sepatation of each compound must be submitted and supported by Mass Spectrum.) List impurities which are more toxic than the parent compound sepatately.				
2.3.4	Absorption spectra: UV-VIS and IR;	✓	✓	✓	✓
2.3.5	Other information	✓	✓	✓	✓
3	Properties of the formulated product				
3.1	Composition:				
3.1.1	Content (s) of active ingredient (s) (min and max);	✓	✓	✓	✓
3.1.2	Content and nature (identify if possible) of components included in the formulation e.g. adjuvant (fillers, stickers, surfactants) inert components, solvents, dyestuff, anti - corrosion agents in percentage (w/w);	✓	✓	✓	✓
3.1.3	Water content (where relevant);	✓	✓	✓	✓
3.2	Physical/Chemical Properties of the Formulated Product;				
3.2.1	Appearance;	✓	✓	✓	✓
3.2.2	Storage stability (in respect to composition and physical properties related to use);	✓	✓	✓	✓
3.2.3	Freezing point;	✓	✓	✓	✓
3.2.4	Density, viscosity (for liquids only)	✓	✓	✓	✓
3.2.5	Flammability: liquids - flash - point solids - a statement must be made as to whether the product is flammable. The recommended way of extinguishing fire shall be given for all flammable products.	✓	✓	✓	✓
3.2.6	Acidity (where relevant);	✓	✓	✓	✓
3.2.7	Alkalinity (where relevant);	✓	✓	✓	✓
3.2.8	Wettability (for dispersible powders);	✓	✓	✓	✓
3.2.9	Persistent foam (for formulation applied in water);	✓	✓	✓	✓
3.2.10	Suspensibility (for dispersible powders and suspension concentrates);	✓	✓	✓	✓
3.2.11	Wet sieve test (for dispersible powders, suspension concentrates);	✓	✓	✓	✓

Data Requirement for Registration of Pesticides

Sr. No	Particulars	House Hold Use	Agriculture Use		
			Full Reg	Prov Reg	Exp Reg
3.2.12	Dry sieve test (for granules, dusts);	✓	✓	✓	✓
3.2.13	Emulsion stability (for emulsifiable concentrates);	✓	✓	✓	✓
3.2.14	Corrosiveness (when necessary);	✓	✓	✓	✓
3.2.15	Known incompatibilities with other products, e.g. pesticides, fertilizers;	✓	✓	✓	✓
3.2.16	Other properties.	✓	✓	✓	✓
3.3	Methods of analysis of formulated product and technical active ingredient.	✓	✓	✓	✓
	Gas and liquid chromatographic methods should be applied if possible. In addition, specific methods should be provided for the qualitative and quantitative analysis of toxic impurities. The description of all methods enclosed should include;				
	- the procedure for elimination of interferences caused by the components of the product.				
	- the accuracy, reproducibility and selectivity of the methods.				
4.	Intended uses and methods of application				
4.1	Mode of action on pests and diseases. e.g. contact, systemic etc.	✓	✓	✓	✓
4.2	Types of pests controlled and/or types of crops, materials or premises to be protected;	✓	✓	✓	✓
4.3	Application rate, (e.g. Kg active ingredient/ha, mg/kg commodity or mg/m^3 air etc.) and/or concentration of spray;	✓	✓	✓	✓
4.4	Number and time of applications, season or stage of growth.	✓	✓	✓	✓
4.5	Method of application. e.g. high of low volume spraying, ULV, fumigation, soil treatment;	✓	✓	✓	✓
4.6	Phytotoxicity; necessary waiting periods to avoid phytotoxic effects;	X	✓	✓	✓
4.7	Information on resistance;	✓	✓	✓	✓
4.8	Recommendation for uses in combination with other chemicals;	✓	✓	✓	✓
4.9	Registered use patterns established or proposed for the same product in the producing country and other countries where relevant including Maximum Residue Limits and pre-harvest intervals (days);	✓	✓	✓	✓
5.	Assessment of efficacy of pesticides				

Data Requirement for Registration of Pesticides

Sr. No	Particulars	House Hold Use	Agriculture Use		
			Full Reg	Prov Reg	Exp Reg
	The laboratory tests and field trials should be carried out preferably with methods recommended by EPPO. If such methods are not available then with other internationally recognized standard procedures. Detailed description of methods used and the statistical evaluation of data should be presented.				
5.1	Laboratory experiments	✓	✓	✓	✓
5.2	Experiments under practical conditon including test with reference product(s) from field trial carried out at recommended and higher dosage rates at different locations and under various circumstances covering wide ranges of - agricultural practices - crops and pests - climatic and geographic conditions Data provided should be sufficeint for the proper estimation of the behabior of the pesticide under largely varying condition of the country including high altitude, large number of sunny hours, intensive UV radiation, relative humidity, long dry season, regular irrigation (in case of pesticides applied into the soil). The results have to be enclosed in a systematically presented complete dossier. The presentation of the results should be standardized in order to facilitate the evaluation and should contain the following information; - pest, disease or weed, against which tested - name of responsible experimenter - objective and the locatin of the trial - chemical name and formulation - crop and cultivars - plant growth stage - soil type (organic matter, clay, sand and silk content, pH, cation exchange capacity, etc.) - experimental design, size and number of plots treated - application dates and rates	✓	✓	✓	✓

Data Requirement for Registration of Pesticides

Sr. No	Particulars	House Hold Use	Agriculture Use		
			Full Reg	Prov Reg	Exp Reg
	- application methods and equipment - volume of spray liquid or other - weather condition during and after treatment. - treatment of the plot with other crop protection materials, fertilzer and other products, including application dates - prevailing crop (s) - asessment dates - quantity and quality of the yield of the harvested crop - any results of crop safety including intervals to be observed in order to avoid phytotoxic effects - interpretation and discussion of the results of the experiment in comparison with similar trials				
6.	Toxicology All data submitted for the purpose of the registration of a pesticide should be obtained in accordance with internationally accepted guidelines of good laboratory practice and methodology It is sufficient to enclose the brief description of experiments including essential of execution and the evaluation of the results. However, if considered necessary the PRD may require full documentation of Experiments including photocopies of individual test reports at any time before or after the registration of a pesticide. It is the responsibility of the applicant to submit the results of appropriate toxicological examinations, together with their evaluation which allows consideration of the following; - the possible short and long term hazards to field workers handling a product and appropriate precautionary measures necessary to allow safe working condition - the diagnosis and most effective methods for treatment of accidental poisoning - the estimate of an Acceptable Daily Intake for men (ADI) in food commodities - the hazard classification of the formulated product for sale	✓	✓	✓	✓
6.1	Experimental data on toxicity in animals	✓	✓	✓	✓

Data Requirement for Registration of Pesticides

Sr. No	Particulars	House Hold Use	Agriculture Use		
			Full Reg	Prov Reg	Exp Reg
6.1.1	Acute toxicity;				
6.1.1.1	Oral toxicity:	✓	✓	✓	✓
6.1.1.2	Precutaneous toxicity;	✓	✓	✓	✓
6.1.1.3	Inhalation toxicity;	✓	✓	✓	✓
6.1.1.4	Other routes, e.g. intraperitoneal;	✓	✓	✓	✓
6.1.1.5	Skin and eye irritancy;	✓	✓	✓	✓
6.1.2	Short-term toxicity;				
6.1.2.1	Oral administration;	✓	✓	✓	✓
6.1.2.2	Other routes;	✓	✓	✓	✓
6.1.2.3	Sensitizing effects;	✓	✓	✓	✓
6.1.3	Supplementary toxicological studies;				
6.1.3.1	Toxic effect of metabolites, breakdown products or impurities;	✓	✓	✓	✓
6.1.3.2	Metabolic studies;	✓	✓	✓	✓
6.1.3.3	Long-term toxicity including carcinogenicity;	✓	✓	✓	✓
6.1.3.4	Neurotoxicity;	✓	✓	✓	✓
6.1.3.5	Reproduction studies;	✓	✓	✓	✓
6.1.3.6	Embryotoxicity, including teratogenicity;	✓	✓	✓	✓
6.1.3.7	Mutagenicity;	✓	✓	✓	✓
6.1.3.8	Potentiation;	✓	✓	✓	✓
6.2	Obeservation on men				
6.2.1	Direct observations, e.g. clinical cases;	✓	✓	✓	✓
6.2.2	Health records, both from industry and agriculture.	✓	✓	✓	✓
6.3	Information on diagnosis and treatment				
6.3.1	Diagnosis of poisoning, specific signs of poisoning, clinical tests;	✓	✓	✓	✓
6.3.2	Treatment of poisoning;				

Data Requirement for Registration of Pesticides

Sr. No	Particulars	House Hold Use	Agriculture Use		
			Full Reg	Prov Reg	Exp Reg
6.3.2.1	First-aid measures;	✓	✓	✓	✓
6.3.2.2	Supplementary treatment.	✓	✓	✓	✓
6.4	Experimental data on toxicity to wildlife				
6.4.1	Toxicity to birds;	✓	✓	✓	✓
6.4.2	Toxicity to fish;	✓	✓	✓	✓
6.4.3	Toxicity to bees;	✓	✓	✓	✓
6.4.4	Information on beneficial insects other than bees	✓	✓	✓	✓
6.4.5	Field trials and observations	✓	✓	✓	✓
6.5	Recommendation				
6.5.1	Antidote	✓	✓	✓	✓
6.5.2	Individual protective equipment	✓	✓	✓	✓
6.5.3	Re-entry time	✓	✓	✓	✓
6.5.4	Methods for testing labour fitness and periodical medical control	✓	✓	✓	✓
7	Residue data				
7.1	Statement on principal residues (parent compound, breakdown products and metabolites) in edible crops, food or feedstuff, including suggested metabolic routes.	X	✓	✓	X
7.2	Methods of residue analysis.	✓	✓	✓	X
	Methods for the independent analysis of parent compound and toxic metabolites should be provided including information on sepcificity, accuracy, and limit of determination.				
7.3	Residue level in edible crops, food or feeding stuffs including information on;				
	- localization of residue;	X	✓	✓	X
	- disappearance of residues from treated objects;	X	✓	✓	X
	- uptake of the residues from soil by plants;	X	✓	✓	X
	- residue in food moving in commerce.	X	✓	✓	X
	Note:				

Data Requirement for Registration of Pesticides

Sr. No	Particulars	House Hold Use	Agriculture Use		
			Full Reg	Prov Reg	Exp Reg
	The parent compound and its metabolites shall be measured and reported individually as far as technically possible. The results should preferably be obtained from supervised trials carried out in accordance with the recent FAO guide lines or from specially designed feeding studies. The sampling and preparation of portion of commodity to be analysed should be carried out as far as appropriate according to the latest methods recommended by the Codex Committee on Pesticide Residues. The reports of experiments should include all the details listed in section 5.2 except assessment of biological efficacy. In addition, any deviation from Codex Sampling and Sample Preparation methods, and the analytical procedure used including its characteristic features have to be reported.				
7.4	Effects of industrial processing and/or cooking on residues	X	✓	✓	X
7.5	Recommended MRLs and pre-harvest intervals for crops intended to be treated in the Union of Myanmar.	X	✓	✓	X
8	Environmental data				
8.1	Soil;				
8.1.1	Degradation, including residues (for methods see 7.2);	✓	✓	✓	X
8.1.2	Transport and mobility;	✓	✓	✓	X
8.1.3	Adsorption and desorption characteristics;	✓	✓	✓	X
8.1.4	Biological effects on soil fauna and flora.	✓	✓	✓	X
8.2	Water and water organisms;				
8.2.1	Degradation in water, including residues (for methods see 7.2);	✓	✓	✓	X
8.2.2	Absorption and binding to organic matter in water and bottom sediment;	✓	✓	✓	X
8.2.3	Data on the inhibition of biochemical degradation activity (e.g effects on dissolved oxygen levels);	✓	✓	✓	X
8.3	Methods of decontamination of the environment in case of accidental spillage, misuse, etc.	✓	✓	✓	X
8.4	Other information.	✓	✓	✓	X
8.5	Summary of the evaluation of environmental behavior of the pesticide;	✓	✓	✓	X
9	Disposal of surplus peticides and pesticide containers				

Data Requirement for Registration of Pesticides

Sr. No	Particulars	House Hold Use	Agriculture Use		
			Full Reg	Prov Reg	Exp Reg
9.1	Disposal of unwanted pesticides;	✓	✓	✓	X
9.2	Disposal of containers;	✓	✓	✓	X
9.3	Decontamination of containers;	✓	✓	✓	X
10	Labelling For requesting experimental registration a typewritten label is acceptable, containing information on the type of chemical, and precautions to be taken when handling the pesticide, together with an indicating of pests and situation where the product will be tested. The proposal for the label of containers has to be included in the data set submitted for provisional or full registration. The proposed label should be prepared according to the FAO Guidelines on Good Labelling Practice and it should contain the information outlined hereunder using the standard symbols and phrases.				
10.1	Identification				
10.1.1	Trade name;	✓	✓	✓	✓
10.1.2	The use category of the product (e.g. insecticide, fungicide, herbicide);	✓	✓	✓	✓
10.1.3	The name of all active ingredients (preferably ISO common name, or if not avilable the recommended common name) and their concentration in the product;	✓	✓	✓	✓
10.1.4	The names and address of the distributor and/or company responsible for marketing the product, if available;	✓	✓	✓	✓
10.1.5	Physical nature of the preparation;	✓	✓	✓	✓
10.1.6	Main uses;	✓	✓	✓	✓
10.1.7	Weight of the contents of the pack (or volume for liquid preparations)	✓	✓	✓	✓
10.1.8	Manufacturing lot identification, and date of manufacture;	✓	✓	✓	X
10.1.9	Registration number (where applicable).	✓	✓	✓	X
10.2	Precautions				
10.2.1	Hazard classification	✓	✓	✓	✓

Data Requirement for Registration of Pesticides

Sr. No		House Hold Use	Agriculture Use		
			Full Reg	Prov Reg	Exp Reg
	(Appopriate clear indications of the degree and the type of hazard, using the relevant warning or risk symbols, should appear on the label, when the nature of the formulated product makes it necessary. These should be in keeping with a harmonized classification of pesticides by hazard, proposed by WHO)				
10.2.2	Safety instructions (Appropriate instruction, in the form of standardized safety phrases, for the protection of consumers, operators, livestock, domestic animals, wildlife and third parties)	✓	✓	✓	✓
10.2.3	The recommended first aid, antidote (if any) and other information for physicians, as required by appropriate health authorities when the toxicity of the formulated product warrants it.	✓	✓	✓	✓
10.2.4	For each use and where apropriate there must be a suitable statement to show the period that must elapse between applications of the product and;				
	- sowing or planting	X	✓	✓	X
	- harvestión, use of consumption;	X	✓	✓	X
	- sowing or plantion of subsequent crop.	X	✓	✓	X
10.3	Direction for use Directions for use are supplied by the manufacturer in accordance with the nature of the preparation and the application rate, method, number and time of application, re-entry interval for agricultural workers and pre-harvest interval.	✓	✓	✓	X
10.4	Information are/or advice on storage and disposal Advice should be provided on proper, safe storage, expirty date if one exist or date of manufacture or formulation, disposal of container, disposal of unwanted or contaminated product and similar matters.	✓	✓	✓	✓

* If there is any deviation from the original registration document, submission of additional data will be required for amended registration.

Annex 8 – Application for registration or amendment of registration of pesticides

PLF - 1

APPLICATION FOR REGISTRATION OR AMENDMENT OF REGISTRATION OF PESTICIDE

Date .....

To:

The Secretary
Pesticide Registration Board
Department of Agriculture
Bayintnaung Road, Gyogon
Insein P.O 11011, Yangon.
Fax Number - 95-1-644019
E - mail - ppmas.moai @ mptmail.net.mm.

1. Name and address of the applicant: .....
.....
2. National Identity Card / National Registration / Foreigner Registration Certificate No. .....
.....
3. Type of use permit : .....
4. Name of the formulation : .....
5. Name of active ingredient (s) and concentration: .....
6. Name and address of the manufacturer / formulator:
.....
.....
.....
7. Name and address of proposed distributor / distributing organization if any.
.....
.....
.....
8. Packing size and packing material :
.....
.....

Annex 9 – Guidance to the applicant

GUIDELINES TO THE APPLICANT

1. The applicants are requested to submit one application for each product to be registered.

2. Specified samples are required to submit along with the application as stated in the application form.

3. The application with incomplete information, absence of specified samples, analytical standards may delay the consideration for registration.

4. Payment of the registration fees must be made through the office of the Pesticide Registration Board. " **The Pesticide Registration Board** " will inform the amount of registration fees to be deposited and may issue an office memo to the treasury office requesting to receive such fees.

   Please note that bank transfers such as telex transfer, telegraphic transfer without prior notice from the PRB will not be accepted.

5. The decision of the Pesticide Registration Board will be notified to the applicant at its earliest convenience.

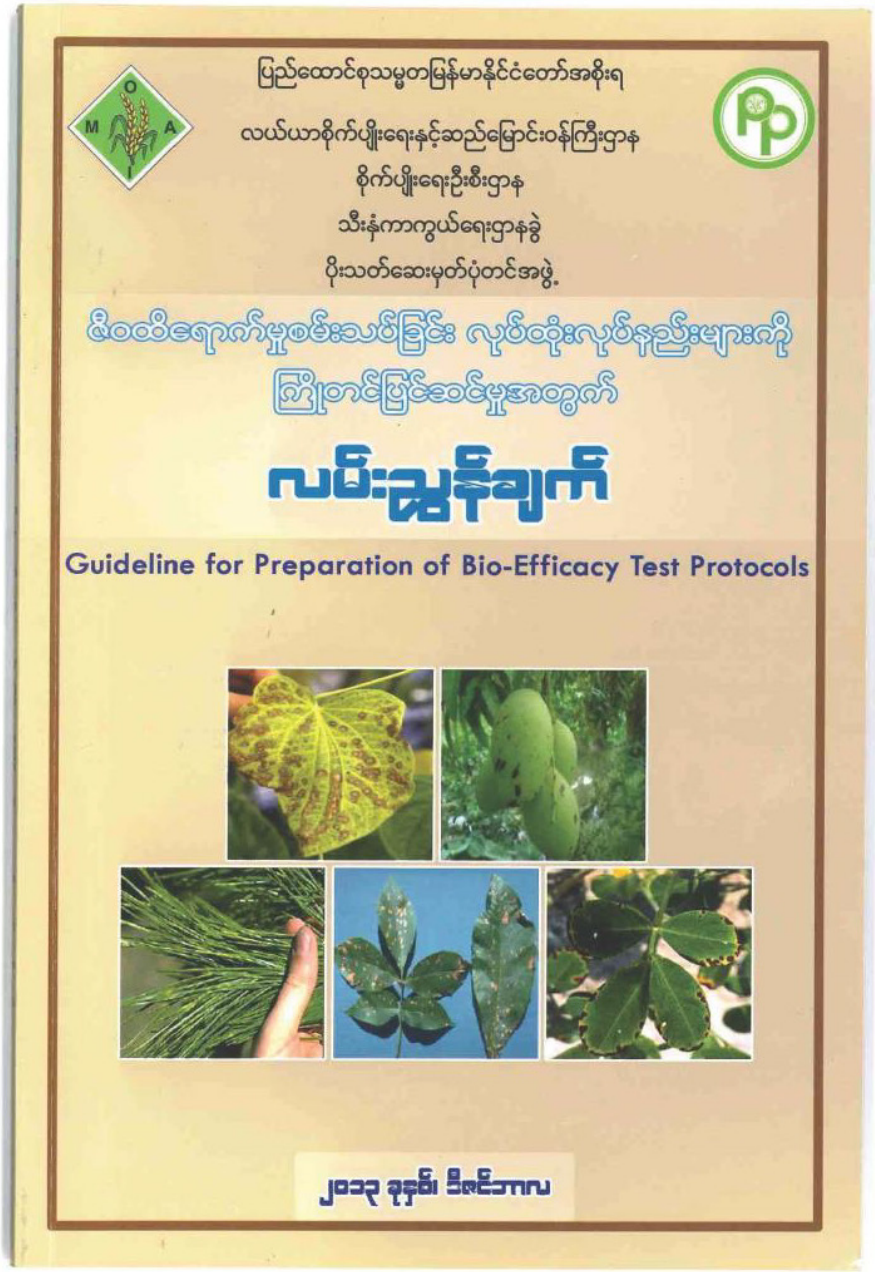
REGISTRATION FEES FOR VARIOUS TYPES OF REGISTRATION & USE PERMITS AS PRESCRIBED BY THE PESTICIDE REGISTRATION BOARD.

Experimental Registration	:	400 US $ for the period of two years.
Provisional Registration	:	600 US $ for the period of five years.
Full Registration	:	1000 US $ for the period of ten years.
Special Use Permit	:	400 US $ for the period of one year.
Amended Registration	:	400 US $.

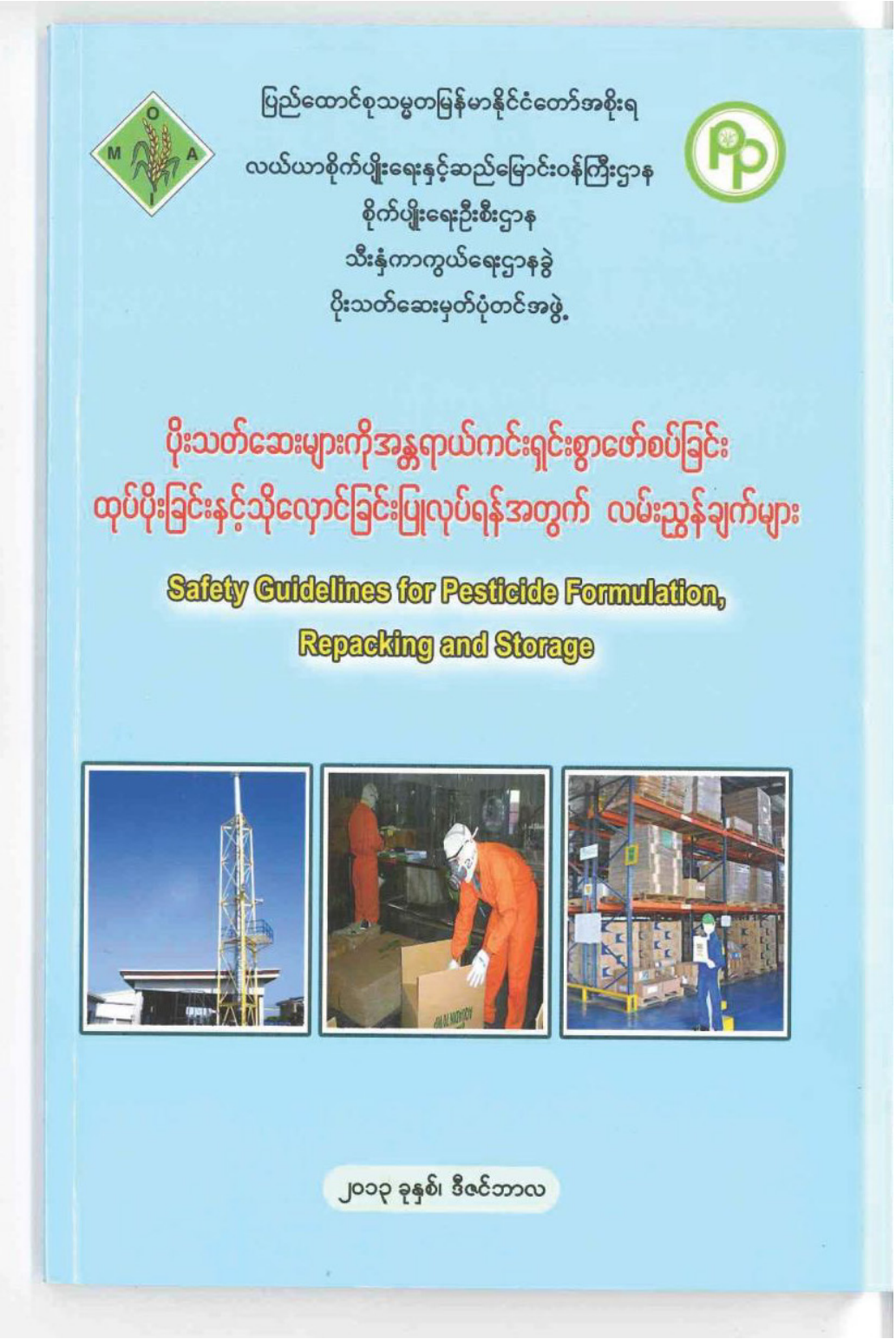
INQUIRIES SHOULD BE MADE TO THE SECRETARY OF THE P.R.B

Telephone	:	95-1-644214, 95-1-640459
Fax	:	95-1-644019
E - mail	:	ppmas. moai @ mptmail. net. mm.

Annex 10 – Guideline for preparation of Bio-Efficacy Test protocols



Annex 11 – Safety guidelines formulation, repacking and storage



Annex 12 – Guideline for Pesticide labelling

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ

လယ်ယာစိုက်ပျိုးရေးနှင့်ဆည်မြောင်းဝန်ကြီးဌာန

စိုက်ပျိုးရေးဦးစီးဌာန

သီးနှံကာကွယ်ရေးဌာနခွဲ

ပိုးသတ်ဆေးမှတ်ပုံတင်အဖွဲ့

ပိုးသတ်ဆေးအညွှန်းစာပြုလုပ်ရန်အတွက်

လမ်းညွှန်ချက်များ

Guideline for Pesticide Labelling

အုပ်စု ၁ အုပ်စု ၂ အုပ်စု ၃ အုပ်စု ၄ အမှတ်အသား မပါ

၂၀၁၃ ခုနှစ်၊ ဒီဇင်ဘာလ

Annex 13 – Plant Pest Quarantine Law of Myanmar

PLANT PEST QUARANTINE LAW
State Law and Order Restoration Council Law No. 8/93 (16 June 1993)

The State Law and Order Restoration Council hereby enacts the following Law:

CHAPTER I
TITLE AND DEFINITION

1. This Law shall be called the **Plant Pest Quarantine Law**.

2. The following expressions contained in this Law shall have the meanings given hereunder:

- **Plant** means the cultivable plant and propagative parts thereof. Such expression also includes seed, tuber, corm, bulb, root or stem part of the plant;
- **Plant Product** means any unprocessed material of plant origin or even though processed which by the nature and that of the processing method may create a risk for the spread of pests. Such expression also includes tuber, corm, bulb, grain, fruit or vegetable for consumption;
- **Non-plant Product** means any material which is not a product of plant and which is contaminated with pest constituting risk of spread. This expression also includes imported materials which have been prescribed for the purpose of this Law by the Ministry for inspection;
- **Pest** means insects, arachnids, rats, moles, snails, weeds that destroy crops, food or commodities or those interfering with human being or animal. Such expression also includes other pests that cause plant disease and living organisms prescribed by the Myanmar Agriculture Service;
- **Quarantine Pest** means pest dangerous to plant but not yet in existence in Myanmar and even those in existence but not widely spread yet that needs to be controlled;
- **Beneficial Organism** means an organism which benefits the agriculture by causing disease to or parasitize its eggs or by predating the pest. Such expression also includes insects, arachnids, fungi, bacteria, viruses, nematodes and various kinds of edible mushrooms which in one way or another benefits agriculture and other organisms prescribed by the Myanmar Agriculture Service;
- **Transit Camp** means a camp being stationed for the purpose of temporary storage of plant, plant product, pest, beneficial organism or soil from the arriving carrier to Myanmar before being transferred to the outgoing carrier destined to any foreign country;
- **Import Certificate** means the certificate issued by the Myanmar Agriculture Service for the purpose of importing from abroad, plant, plant product, pest, beneficial organism or soil;
- **Phytosanitary Certificate** means an internationally recognized certificate issued by the Myanmar Agriculture Service after phytosanitary inspection in accordance with the model prescribed in the 1951 International Plant Protection Convention.
- **Ministry** means the Ministry of Agriculture;
- **Minister** means the Minister for the Ministry of Agriculture;
- **Managing Director** means the Managing Director of the Myanmar Agriculture Service.

CHAPTER II
OBJECTIVES

3. This Law shall be implemented in accordance with the objectives given hereunder:

a. to prevent quarantine pests from entering into Myanmar by any means;
b. to suppress effectively the spread of quarantine pests;
c. to carry out, if necessary, disinfestation, disinfection treatment of plant or plant product to be exported and the issuance of phytosanitary certificate;

CHAPTER III
IMPORT AND EXPORT

4. Plant, plant product, pest, beneficial organism or soil:

a. shall be imported by a person on application for an import certificate from the Myanmar Agriculture Service before obtaining licence or permit from the department or organization concerned;
b. when on arrival by importing or when brought personally shall be subject to inspection by the Myanmar Agriculture Service;
c. shall be subject to payment of fees as prescribed for import certificate and to payment of inspection fees by the person who imports or brings along with him.

5. A person, who has been permitted to export plant or plant product, if desirous of obtaining phytosanitary certificate or disinfestation or disinfection treatment may apply to the Myanmar Agriculture Service after payment of the prescribed fees.

6. In re-exporting plant, plant product, pest, beneficial organism or soil through transit camp to abroad:

a. the Myanmar Agriculture Service has the right to inspect;
b. if quarantine pests are found while inspecting under sub-section a, the Myanmar Agriculture Service has the right to carry out disinfestation or disinfection treatment. The person so concerned shall incur the costs;
c. if desirous of obtaining phytosanitary certificate, application may be made to the Myanmar Agriculture Service after payment of the prescribed fees.

CHAPTER IV
INSPECTION CAMPS

7. In order to carry out inspection works under this Law, the Myanmar Agriculture Service shall establish inspection camps at the following places:

a. Yangon International Airport;
b. Yangon Port;
c. Myanmar Posts and Telecommunications; Foreign Mail Service;
d. Transit Camp.

8. The Ministry may extend the establishment of pest inspection camps.

CHAPTER V
THE DUTIES AND POWERS OF THE MANAGING DIRECTOR

9. The duties and Powers of the Managing Director are as follows:

a. prescribing methods of inspection in respect of plant, plant product, pest, beneficial organism, non-plant product or soil imported from abroad as to whether they are infested or infected with quarantine pests;
b. prescribing conditions relating to the temporary custody in the transit camp, transferring from one vehicle to another of plant, plant product, pest, beneficial organism or soil for re-export;
c. prescribing necessary measures for inspection in accordance with the requirements of the receiving country in respect of plant, plant product, pest, beneficial organism or soil for re-export;
d. prescribing necessary measures for the effective suppression of quarantine pest in case of outbreak of such pests in the country;
e. permitting or refusing after scrutinizing the applications for import certificate made in respect of plant, plant product, pest, beneficial organism or soil;
f. making arrangements for carrying out disinfestation or disinfection treatments;
g. permitting or refusing after scrutinizing the applications for phytosanitary certificate;
h. issuing order preventing the transportation from one place to another within the country of plant, plant product, pest, beneficial organism or soil that is infested or infected with quarantine pest;
i. imposing administrative penalty;
j. carrying out duties as are assigned by the Minister.

10. The Managing Director:

a. shall assign the duty of Inspector General and Inspectors to the suitable personnel from the Myanmar Agriculture Service;
b. shall prescribe the duties and powers of the Inspector General and the Inspectors;
c. may assign his powers to the Inspector General or any officer of the Myanmar Agriculture Service;
d. may assign on suitable officers of the Myanmar Agriculture Service the power to impose administrative penalty.

CHAPTER VI
PROHIBITION AND PENALTY

11. No person shall, without obtaining the import certificate, import plant, plant product, pest, beneficial organism or soil.

12. No person, who imports plant, plant product, pest, beneficial organism or soil with import certificate or who brings along with him from abroad, shall fail to submit to inspection and control of the Myanmar Agriculture Service.

13. An importer of non-plant product which has been prescribed by the Myanmar Agriculture Service for inspection shall not fail to submit to inspection.

14. No person shall, knowingly transport from one place to another within the country, plant, plant product, beneficial organism or soil which has been declared to be infested or infected with quarantine pest by the Myanmar Agriculture Service.

15. No person shall violate any provision of the rules, procedures, made under this Law.

16. A person who violates any of the provisions contained in section 11 or section 12 shall be liable to the following administrative penalty:

a. in the case of a first offence, imposition of a fine which may extend from a minimum of kyats 1,000 to a maximum of kyats 5,000;
b. in the case of a subsequent offence, imposition of a fine which may extend from a minimum of kyats 5,000 to a maximum of kyats 10,000.

17. A person who violates the provisions contained in section 13, section 14 or section 15 shall be liable to the following administrative penalty:

a. in the case of a first offence, imposition of a fine which may extend from a minimum of kyats 500 to a maximum of kyats 3,000;
b. in the case of a subsequent offence, imposition of a fine which may extend a minimum of kyats 3,000 to a maximum of kyats 5,000.

18. In respect of the administrative penalty imposed under section 16 or section 17 may require the exhibits involved in the offence to be destroyed or after payment of prescribed fee may require them to be disinfested or disinfected.

CHAPTER VII
APPEAL

19. A person dissatisfied with the order or decision made by the Managing Director under this Law may appeal to the Minister within 60 days from the date such order or decision was made.

20. The decision of the Minister shall be final.

CHAPTER VIII
MISCELLANEOUS

21. The respective government department or government organization shall, in respect of plant, plant product, pest, beneficial organism, soil or non-plant product on arrival from abroad:

a. promptly inform the Myanmar Agriculture Service for inspection;
b. permit an importer to take delivery only when it has been found to be free from pest on inspection by the Myanmar Agriculture Service.

22. The inspection work under this Law shall be done:

a. without affecting the smooth and steady flow of trade;
b. without delay in inspection.

23. Any organization recognised by the Pesticide Registration Board formed under the Pesticide Law may carry out the disinfestation or disinfection treatment under this Law.

24. The Ministry may exempt any government department or government organization from complying with any of the provisions of this Law apart from the inspection of plant, plant product, pest or soil.

25. The government department or the government organization that is authorized to issue import licence or permit in respect of plant, plant product, pest, beneficial organism or soil imported from abroad may issue the licence or permit only on submission of the import certificate granted by Myanmar Agriculture Service.

26. The Myanmar Agriculture Service may recover the fine payable under this Law as if it were arrears of land revenue.

27. For the purpose of carrying out the provisions of this Law:

a. the Ministry may, issue rules and procedures as may be necessary, with the approval of the government;
b. the Ministry and the Myanmar Agriculture Service may issue orders and directives as may be necessary.

28. The Insects and Pests Act, 1914 is hereby repealed.

(signed) Than Shwe
Senior General
Chairman, The State Law and Order Restoration Council

Annex 14 – Interviews with tomato, cauliflower, potato and mung bean farmers

Tomato farmer/small retailer in Inlay lake
Grows tomatoes on floating islands in Inlay lake on approximately 1 acre and runs a small retail shop to provide products and advice to 40 farmers in the village. Main diseases and pests are late blight (*Phytophthora infestans*), early blight (Alternaria), Fusarium wilt, white fly. Problem of white fly is that it transmits the Tomato Yellow Leaf Curl Virus (TYLCV) which is very damaging to the tomato plant. Farmer has contact with Extension Service of Department of Agriculture regarding questions on diagnosis and control strategies. Farmer does not spray himself, the person he contracts does not wear gloves or mask but takes care that the wind direction is in his back to prevent contact with spray droplets. Farmer is aware that pesticides used to control pests and diseases on his tomato crop are not only deposited on the tomato crop but also pollute the water. Empty bottles are buried in the soil. Farmer has a book-keeping of the products he uses and is aware of the costs. When tomato prices are low, he reduces costs by no longer controlling pests and diseases. We observed the heavily infected crops which form a tremendous infection source and should be removed to reduce the possibilities of diseases and pests to survive until the next season. Irrigation is not applied. We did not discuss the tomato varieties he uses but these are probably local varieties.

Pesticides mentioned and observed in the shop:

- Late blight: mancozeb, chlorothalonil, dimethomorph, cymoxanil, copperhydroxide
- Early blight: chlorothalonil, tebuconazole, propiconazole
- Powdery mildew: hexaconazole
- Root diseases: thiram, carbendazim
- White fly: several pyrethriods, profenofos, imadacloprid, malathion
- Fruitborer: pyridaben

Control strategy is calendar based: once a week a fungicide is sprayed to control late and early blight, insecticides and foliar fertilizers are added to the spray tank. White fly is the main pest and continuous use of pyrethroids probably resulted in resistance development of the white fly to this group of insecticides. Farmer is anxiously searching for good advices to control white fly.

In the report "Inlay lake conservation project: a plan for the future" published by the Institute of International Development in 2012, similar observations are reported and recommendations are given to develop training for the farmers to design better control strategies.

Cauliflower farmer/South Shan
Farmer grows cauliflower in rotation with maize and tomatoes. Main disease and pests mentioned are blight (*Peronospora parasitca*), damping-off and insects. Has no contact with Extension Service of Department of agriculture. The retail shop provides him with advice and pesticides. Sprays with knap sack sprayer, wear simple mouth cap but no gloves. Washes hands after spraying. Clean the empty bottle with water and then removes them with other thrash. Does not have a book-keeping of pesticides he uses but is aware of costs: 150,000 kyat for one cauliflower crop on approximately 2000 m^2.

Pesticides used:

- Blight: copperoxychloride
- Insects: cypermethrin, chlorpyrifos, monocrotophos
- Damping-off: carbofuran (Furadan). The use of this toxic insecticide is questionable because damping-off is usually caused by fungi and not pests.

Control strategy is calender based: once a week under wet conditions, every 2 weeks when the weather conditions are dryer. Uses an East West variety of cauliflower that produces a high quality crop compared to local varieties.

Potato farmers/Heho

The four farmers interviewed have a good relation with the CDN consortium of Dutch NGOs. Main pests and diseases mentioned are: late blight, bacterial wilt, aphids, tuber moth, cutworm, beetle?. Late blight is the main problem in the rainy season, tuber moth is the main pest in winter season. Farmers sometimes have contact with Extension Service of Department of Agriculture. Advice regarding control strategies and choice of pesticides is mainly provided by retail shop.

Pesticides mentioned:

- Late blight: mancozeb, metalaxyl (Ridomil)
- Insects: systemic insecticides

Strategy to control late blight starts 15 days after emergence and is calendar based: one spray every 7 days and when conditions are critical sometimes 2 sprays per week. In total 10 sprays are applied. They are not satisfied with the efficacy of the control strategy. It could be possible that the local late blight population developed resistance to metalaxyl. Control strategies are the same in susceptible variety Up-to-Date and the more resistant CIP-variety L-11. We did not have the opportunity to discuss fertilisation and irrigation strategies.

Mung bean/Thon qwa township

Thon qwa township is one of the main townships producing mung beans. About 12.000 – 13.000 farmers in the region are producing mungbeans.

Mung Bean is a very important crop for this township. We asked several times if no other crops where grown after rice and the answer was no. They clearly stated that the returns of Mung Beans is much higher than of rice. After some group discussions they come up with the following figures: Mungbean $ 400/acre and paddy rice $ 100 Gross Margin. The average yield is 500 kg/ha average price is $ 1,1, but fluctuates quite a lot. There are different varieties used, but the main one is Yezin nr? and Golden Mungbean (originating from Thailand, but now multiplied trough farmer exchange). NPK fertilizer is used, but quite often low dose due to lack of money.

Due to uneven ripening mung bean requires a lot of labour for harvesting and is labour is getting more scare, this is considered as upcoming constraint. Farmers are very keen on trying new varieties that perform better on yield, disease resistance and ripening.

Main diseases and pests mentioned are powdery mildew, downy mildew, damping-off, Mung Bean Yellow Mosaic Virus (MYMV), thrips, army worms, pod borers, aphids and leaf miners. The advice mainly comes from retail shops and Extension Service of Department of Agriculture. Training for Good Agricultural Practice (GAP) has not yet been given but is planned for the near future. Crops are sprayed with knapsack sprayer or power sprayer. The personal protection during spraying was demonstrated (see photo) but in practice only a simple dust mask and gloves are used. Farmers have a book-keeping (on the calendar) of the pesticides they use. Pesticide costs ($ 30-$ 50 per acre) add up to approximately 30% of total costs.

Pesticides mentioned and present in local retail shop:

- Damping-off: seed is treated with fungicides & insecticides
- Thrips: imidacloprid
- Weed control: paraquat, glyphosate, 2,4 D, oxadiazole
- Fungicides: mancozeb, carbendazim, thiofanate-methyl
- Insecticides: fipronil, cypermethrin + profenofos, phenthoate, dimethoate, acephate, carbofuran, diazinon
- Plant Growth Regulator (PGR): Litosen

Control strategy is calendar based: 15 days after emergence the first spray is applied. Thereafter sprays are applied every week. A PGR is sprayed probably to synchronize flowering and ripening of seed.

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