25th Session of the Asia and Pacific Plant Protection Commission (APPPC)
26-30 August 2007, Beijing, People's Republic of China

Country Report
Thailand

1. General Information

The vision of the Ministry of Agriculture and Cooperatives (MOAC) in a 10-year-period (year 2000-2009) is to " develop the quality of life of farmers, support an adequate food production and safe consumption, and be a world leader of food export under the continual environmental and natural resources management." Overall mission statement of the MOAC during year 2003-2006 is: "To increase the production efficiency, enhance the value add from production process, increase a competitive competency level, and strengthen the root economics."

The Integrated Pest Management project (IPM) is executed by MOAC. The overall objective of the project is: "Good agricultural practices (GAP) in order to improve the environment and the safety to farmer and consumer from hazardous uses of agro-chemicals have been promoted."

The Food Safety Programme set by MOAC starting from B.E. 2547(2004). It has been implemented on fruit crops and vegetables. Under the project, GAP and IPM are the main approach; Department of Agriculture (DOA) has taken responsibility on inspection and registration, Department of Agricultural Extension (DOAE) in charge of organizing the training programme for farmers where pesticide is used intensively.

The objectives of the DOA are to study, research and develop economic plants for a well breed, and to transfer that technology to target groups both public and private sectors, as well as farmers. The department provides the analyses, testing and inspection services, and giving the recommendation on the utilization of soil and water, fertilizers, plants, agricultural materials, including also the recommendation of high-quality agricultural goods for the exporting services.

The missions of the DOAE are regarding an increase of farmer's competency on production, transformation of value-add in agricultural goods, determination of measures and approaches on agriculture promotion, quality control of goods and products, including the technological transfer on agriculture to farmers for their better income and stability in production and career.

In 2006, the MOAC signed on 3 Ministerial Notifications on 26 April 2007, as follows 1. Specification of plant pests as prohibited articles 2. Specification of plants and carriers from certain sources as prohibited articles and 3. Specification of plants from certain sources as restricted articles. In addition, 3 Ministerial Notifications were published in Royal Gazette on 1 June 2007 and enter into force 60 days after the dated on their proclamation in the Royal Gazette (31 July 2007)

As a member of the World Trade Organization (WTO), Thailand is committed to observe the agreements and obligations, In this respect, the mandate of the National Bureau of Agricultural Commodity and Food Standards (ACFS) is also to strengthen the rules and regulations on agricultural and food products into effects in both the domestic as well as in the international markets. While emphasis is placed in ensuring quality standards of export products. The protection of Thai consumers is also an equality important mandate of the ACFS.

2. Plant Quarantine

Since the last Session of the APPPC held in 2005, the National Plant Protection Organization (NPPO) has not been changed. The Department of Agriculture (DOA) is recognized as NPPO. Presently, the Plant Quarantine Act B.E. 2507 (1964) amended the Plant Quarantine Act (No. 2) B.E. 2542 (1999) is being enforced. In order to prevent the invasion of plant pests and diseases for outside the country, a number of regulations, notifications and orders are applied to imported plants and plant products.

In 2006, the DOA proposed to revise import regulations of plants and plants products. WTO member countries were notified of the 3 proposed drafts of Ministerial Notifications including; 1. Notification of Ministry of Agriculture and Cooperatives: Re : Specification of plant pests as prohibited articles under the Plant Quarantine Act B.E. 2507 (1964) (No. 6) B.E. 2550 (2007) (Notification No. G/SPS/N/THA/151/Rev. 1/Add. 1); 2. Notification of Ministry of Agriculture and Cooperatives: Re : Specification of plants and carriers from certain sources as prohibited articles, of exceptions and conditions under the Plant Quarantine Act B.E. 2507 (1964) (No. 5) B.E. 2550 (2007) (Notification No. G/SPS/N/THA/152/Rev. 1/Add. 1) and 3. Notification of Ministry of Agriculture and Cooperatives: Re: Specification of plants from certain sources as restricted articles, of exceptions and conditions under the Plant Quarantine Act B.E. 2507 (1964) B.E. 2550 (2007).

The Ministry of Agriculture and Cooperatives signed on all 3 Ministerial Notifications on 26 April 2007. Subsequently, 3 Ministerial Notifications were published in Royal Gazette on 1 June 2007 and enter into force 60 days after the dated on their proclamation in the Royal Gazette (31 July 2007)

Under the Notification of Ministry of Agriculture and Cooperatives: Re : Specification of plant pests as prohibited articles under the Plant Quarantine Act B.E. 2507 (1964) (No. 6) B.E. 2550 (2007) (Notification No. G/SPS/N/THA/151/Rev. 1/Add. 1), a list of 369 organisms are considered as quarantine pests i.e. fungus (68), bacteria (27), protozoa (2), virus (71), rickettsia (1), viroid (15), microplasma (2), phytomasma (7), insect (79), mite (8), nematode (41), weed (39) and unknown etiology (9)

Under Notification of Ministry of Agriculture and Cooperatives: Re : Specification of plants and carriers from certain sources as prohibited articles, of exceptions and conditions under the Plant Quarantine Act B.E. 2507 (1964) (No. 5) B.E. 2550 (2007) (Notification No. G/SPS/N/THA/152/Rev. 1/Add. 1), the following plants are considered as prohibited articles; fresh fruits of plants in 27 species, 25 genera and 2 families; all parts of plants in 8 species, 11 genera and 1 family; soil organic fertilizer and agricultural micro-organisms, animal pests of plant, earthworms, insects, mites, nematodes, snails, slugs, weeds, parasites and predators.

To continue export of prohibited articles into Thailand after this regulation enter into force, the transitory provisions stated that the prohibited articles has been imported into Thailand in the form of trade prior to the enforcement of this notification are subjected to

exemption and allowed to be imported until such time that the pest risk analysis for the prohibited article concerned has been completed. In this regard, the NPPO of the exporting countries has to make an importation request in writing with the evident document (such as total volume of export, invoice, Phytosanitary certificate etc.) of previous importation within a period of the last 5 years to the Director-General of the Department of Agriculture within the period of 60 days from the day after this notification has entered into force (1 August -29 September 2007).

In addition, the NPPO of exporting countries must submit technical information of prohibited articles concerned for the pest risk analysis within 120 days after the end of application period for import exemption (30 September 2007- 27 January 2008). This notification does not include plants that their importation have been granted on trade obligations by government sectors before this notification enter into force, except that there is reliable scientific information about the outbreak of new plant pests or the detection of new plant pests in the imported commodities, that are threat to the country's agriculture.

Regarding the Notification of Ministry of Agriculture and Cooperatives: Re: Specification of plants from certain sources as restricted articles, of exceptions and conditions under the Plant Quarantine Act B.E. 2507 (1964) B.E. 2550 (2007), several commodities including dry tea leave, fresh coffee bean, cotton lint, white rice, broken rice and par-boil rice, plants in specific species and genera are listed as restricted articles. The importation of restricted articles into Thailand has to accompany with a Phytosanitary Certificate. However, The importation of certain restricted articles shall comply with conditions stipulated by the Director-General of the Department of Agriculture before import.

Recently, 2 proposed drafts of Ministerial Notifications were notified to WTO member countries on 27 April 2007. The Ministry of Agriculture and Cooperatives Re: Specification of plant pests as prohibited articles under the Plant Quarantine Act B.E. 2507 (1964) (No. 7) B.E. 2550 (2007) (Notification No. G/SPS/N/THA/159) proposed additional 103 organisms as quarantine pests for Thailand. The Notification of Ministry of Agriculture and Cooperatives: Re : Specification of plants from certain sources as prohibited articles, of exceptions and conditions under the Plant Quarantine Act B.E. 2507 (1964) (No. 8) B.E. 2550 (2007) (Notification No. G/SPS/N/THA/160) proposed to prohibit the importation of silkworm, silkworm eggs and silkworm cocoons from any source.

As one of IPPC members, MOAC has designed ACFS "IPPC official Contact Point". ACFS has updated the report obligations under the IPPC such as, Description of NPPO, Points of entry, Phytosanitary restrictions on the International Phytosanitary Portal (IPP).

3. Surveillance, Pest Outbreaks and Invasive Species Management

Since 2001, First serious infestation of weedy rice was found in paddy field in the Western region (Kanjanaburi province) and in the Eastern region (Nakornnayok and Prajinburi province). The infested area at the beginning was estimated about 200 acres in 2001 but at present the infested area was 800,000 acres covering 21 provinces, even though DOA and DOAE have launched eradication programmes. It is reported that the infestation is potentially creeping to the North Eastern region which is the area of growing best quality rice.

The recommended control treatment is the use of chemical application with 2 separate treatments , firstly before planting using butachlor(60%EC) at 300 ml/20 l.of water or oxyfluorfen(23.5%EC) at 240 ml/20 l.of water applied to water and keep it for 2 days, then drain water out before planting, and secondly after planting using oxyfluorfen/2,4-D (2.7%G) at 10 kg/acre or butachlor /2,4-D (7%G) at 10 kg/acre broadcast through out the planting area.

4. Pest Management

Integrated Plant Management (IPM)

National IPM Policy

MOAC has put the IPM programme as the national policy. DOA and DOAE are the implementing agencies. The Project implementation has been emphasized on the economic importance crops. The IPM Training for the trainers and the farmers (Farmer Field Schools, FFS) programmes has closely collaborated among 2 departments. The programmes also involve with the other Organization units under MOAC including the Highland Agricultural Development Division (HADD) and the Royal Project Foundation (RPF) which plan and implement the activities in the Royal Project areas.

IPM programs, sources and amount of inputs

IPM researches in Thailand has been principally directed towards scouting for key pest density, utilized the economic threshold level for decision making in controlling with selective and friendly to natural pesticides ie. botanical insecticides, bio-agents (i.e. NPV, Bt, nematodes, predators, and parasites). During the year 2006-2007, technology of IPM developed by Plant Protection Research and Development Office (PPDRO), IPM has been emphasized on three an economic crops which are okra, asparagus and orchid. Under the programmes, revisions of the Good Agricultural Practice (GAP) booklets have been rewritten and printed namely apple, citrus, grave vine, potato, onion, shallot, garlic, tomato seed and corn seed.

Impact of implementation of IPM

Government extension and crop protection services are interested by the lack of IPM experience among their staff and by budget limitations which affect their ability to contact farmers.

Outstanding results from research and the programs concerned

For the last two years, the optimal technology of IPM on okra, asparagus and orchid were obtained. By using the IPM technology on those crops the numbers of pesticide application were significantly reduced. Farmers are realized that IPM technology provided effectively control the right target pests and safe use as well. Nevertheless, some farmers are still use the highly toxicity pesticides. IPM technology is not only provide the standard quality of yield but also increase in farmer's income. In addition, the IPM

technology plays an important role as an effective tools for reducing pest population, safe for consumers and environment.

DOAE has conducted the project “Promotion of Safety Agricultural Product” with aim to assist farmers to understand the principle and the framework of Good Agricultural Practices (GAPs).The GAPs has been implemented as an approach to food safety and quality. GAPs guideline for main crops have been developed and introduced to farmers. In the extension system GAPs approach has been launched nationwide through the FFS. The implementation approach emphasized on the producing safe agricultural products using IPM concept. A number of bio-agents are introduced to replace and/or to alternate with chemical pesticide. In additional, before harvesting product especially vegetables are tested for the chemical residue to ensure the safety for consumers.

Besides GAPs of general agricultural products DOAE has a special project “Pest Control of Fruit Fly”. Fruit Fly, causing yield loss and degradation quality of fruit production in Thailand and leading to quarantine restriction from many importing countries. DOAE has beenconcerned two species of economic importance, Oriental fruit fly-OFF(*Bactrocera dorsalis,* Hendel) and Guava fruit –fly GFF (*Bactrocera correcta,* Bezal) the key pests of mango. They attack most fresh fruit, and is classified as a critical quarantine pest for many of Thailand’s trading partners. For one decade, an integrated pest management program based on sterile insect technique was applied in order to suppress fruit fly population with high technical population with high technical cooperation between the International Atomic Energy Agency (IAEA) of the United Nations and Thailand. The first pilot project using the sterile insect technique (SIT) was implemented by DOAE in Ratchburi Province. A small pilot facility produces up to 40 million sterile males per week in Pathumtani Province following standard operation produces which were weekly transported and released by stationary ground release. In the first pilot area, integrated approach has been effective in controlling fruit flies by reducing damage from over 80% before program implementation to an average of less than 3.6% in Ratchburi Province in the past five years (2000 to 2004) but after SIT release was stopped in year 2005 damage increased to 17%. Meanwhile, in Pichit Province where the control program has been carried out for 2 years (2003 to 2005), the infestation has been reduced from 43% to 17%. This has opened the possibility for exports of mango produced in these selected pilot areas to some of the most stringent and lucrative markers such as Japan. An economic feasibility study conducted in 2002 clearly shows that fruit fly control in Thailand using area-wide SIT could be expanded to other production areas with significant economic returns. The program is rather unique in Pichit Province that field operational costs are covered mainly by growers.

Historically, various factors have affected the degree of population suppression, including problems with the high variability in pupa production and with fallen fruit of host plant management in the release area especially lacking of funding. Anyway, inadequate funding has been solved in 2007 therefore fruit fly control program was expand to the rest area totally 19,680 hectares and long-term project has been planning such a national program.

5. Pesticides Management

Status of Regulatory Measures in Pesticide Management, list of regulations and legislation.

Registration of a pesticide shall be granted after the efficacy test result, label, toxicological data and analytical result are approved. Plant Protection Research and Development Office is responsible for efficacy test in the field. Division of Agricultural Regulatory Inspection, Office of Agricultural Regulation, monitors pesticide quality from the markets and at port of entry. The percentage of active ingredient must be conformed to the percentage proposed for registration.

DOA has issued a new regulation, every pesticides submitted for registration must conduct residue trial under supervision of Office of Agricultural Production Science Research and Development. Pre-harvest interval (PHI) and maximum residue limit (MRL) shall be determined by this trial.

Under the collaboration among DOA, DOAE, Thai Agri-Business Association and Thai Crop Protection Association have arranged the training courses on safe use of pesticides for farmers and also put a campaign to mind farmers to read the label thoroughly before applying a pesticide. Some companies attached simple protective device, e.g. rubber gloves and cloth pad etc. with pesticides for sale. One company arranged training courses for doctors, nurses, and public health officials on first aid treatment and remedy of poisoned people.

Pest and Pesticide Management

The Food Safety Program set by MOAC starting from B.E. 2547(2004). It has been implemented on fruit crops and vegetables. This project applied GAP and IPM approach in training courses for farmers in farmer field schools in northern, eastern and central regions of Thailand where pesticide is used intensively.

Implementation of Code of Conduct on the Distribution and Use of Pesticides in Thailand

Pesticides are regulated by the Hazardous Substances Act B.E. 2535(1992). Under this Act, the Hazardous Substances Committee (HSC) has been set up as the legal body to control pesticides. HSC has assigned

- Department of Agriculture (DOA) to be responsible for regulation of pesticide used in crop production
- Department of Livestock Development (DLD) to be responsible for regulation of pesticide used in livestock production
- Department of Fisheries (DOF) to be responsible for regulation of pesticide used in fish culture
- Food and Drug Administration (FDA), Ministry of Public Health to be responsible for pesticides used as household chemicals

Ministerial Regulations, Ministerial Notifications, Department Notifications and Department Rules were issued in order to facilitate implementation of the Act.

HSC also appointed Sub-Committees for registration of pesticide under each responsible agency. These Sub-Committees also appointed Working Groups (WG) to be responsible for operation of pesticide registration and regulation. Sub-Committees for Registration of Pesticide under Responsible of DOA appointed WG for:

- Consideration of Pesticide Labels
- Consideration of Toxicological Data of Pesticides
- Consideration of Experimental Designs and Efficacy Results
- Consideration of Biochemical Pesticides Registration
- Consideration of Microbial Pesticides Registration
- Pesticide Surveillance and Evaluation

In addition, Division of Agricultural Regulatory Inspection has been assigned to monitor pesticide quality used in agriculture through out the country.

Monitoring and management of pesticide residues

Environmental Information

Impact of Pesticide Use Sub-Division, Office of Agricultural Production Science Research and Development is responsible for monitoring pesticide contamination in the environment. Samples were collected for analysis of pesticide residues. In the year 2003, number of samples taken from water, soil and sediment were 1964, 560 and 1304, respectively. It was found that the most severe case is in orange orchards in Fang and Chaiprakarn districts of Chiangmai province.

Trends in Pesticide Manufacture, Use and Trade.

Pesticides are not manufactured in Thailand. Almost all of pesticides were imported in both technical grade materials and formulated products. The only one pesticide, which is paraquat dichloride, is imported as methyl chloride to be manufactured.

Thailand also exports pesticides to neighboring countries. In 2004, the export volume was 3,941 tons of active ingredients comprise of insecticides 1,160 tons, fungicides 1,203 tons, herbicides 1,333 tons, plant growth regulators 57 tons and others 188 tons. The quantity of pesticide for use in the country in 2006 was 55,538.87 tons (ai). This year (2007), DOA requires that industries should report their production volumes and the channel of pesticide traffic starting from import, production and sale.

The illegal trade of pesticides had been reported in 4 cases. All cases were formulating pesticides and sale without license.

Selected Standards

DOA decided that pesticides with high acute toxicity (LD 50 $\leq$ 30 mg/kg) have to be put under surveillance scheme. At present, aldicarb, blasticidin-S, carbofuran, dicrotophos, ethoprophos, formetanate, methidathion, methomyl, oxamyl, EPN and endosulfan (CS formulation) are under surveillance scheme. If there is a report on its impact on health and environment, DOA will take action to ban or severely restrict these pesticides.

Pesticide disposal

On the label, it is recommended to rinse the container with water 3 times before destroying and then followed by burying. It is neither recommended to burn the paper or plastic container nor pour the left-over pesticides into natural water resources. Glass bottles are bought and reused by some pesticide formulators. For obsolete pesticides, DOA in collaboration with FAO, had conducted a survey to find out the quantity and sites where the obsolete pesticides are kept. The budget has been requested to be disposal cost of the obsolete pesticides kept in various sites under responsibility of DOA.

National Legislation and Enforcement

Pesticides are classified as type II and III hazardous substances. For type II hazardous substances, it is required to register but not to get license. The industry is required to notify officials on kind of business to be done such as import, production or possession (for sale or service). For type III hazardous substances, the industry is required to register and get license for import, production or possession.

Thailand has voluntarily practiced the Code for many years. The main problem is misuse of pesticide. Farmer doesn't strictly follow the label. For example, pesticide is used on crop or pest which is not recommended, the pre-harvest interval doesn't been met, the protective equipment is not applied, etc. The residues found on crop commodities are the main problems. MOAC promoted organic farming and started the chemical pesticide reduction scheme. It is targeted to reduce use of pesticide about 25 %. To respond to this scheme, DOA decided to promote "the Safe and efficient use of pesticides" scheme and promote use of bio-pesticides which is a safer mean for pest control. There are some local bio-pesticides proposed for registration. DOA has set up a working group for bio-pesticide registration. It is hoped that there will be more bio-pesticides registered for use and closer collaboration with Department of Agricultural Extension and the two pesticide associations for training on safe use of pesticides.

Development and application status of Bio-pesticides including botanical pesticides.

In Thailand, many species of plants exhibit bio-active compounds which have potential application in public health and agriculture. The promising botanical pesticides being used are found out from local wisdom eg. Neem, derris, marigold, pyrethrum, stemona, tobacco citronella, etc. Currently, the most being used botanical pesticides are neem products.

Apart from neem, two other plants, *Derris elliptica*, *Stemona* spp. and saponin from teaseed cake are being studied in order to produce new environmental friendly plant extracts as well as development of forms and formulations so that they can be stored for longer shelf-life.

List of banned/prohibited pesticides See Annex 1

6. Conclusion

Presently, the Plant Quarantine Act B.E. 2507 (1964) amended the Plant Quarantine Act (No. 2) B.E. 2542 (1999) is being enforced. In order to prevent the invasion of plant pests and diseases for outside the country, a number of regulations, notifications and orders are applied to imported plants and plant products.

Weedy rice was the most serious weed in paddy field in the Western region (Kanjanaburi province) and in the Eastern region (Nakornnayok and Prajinburi province). The infested area was 800,000 acres covering 21 provinces. The recommended control treatment is the use of chemical application with 2 separate treatments , firstly : before planting using butachlor(60%EC) or oxyfluorfen(23.5%EC) and secondly : after planting using oxyfluorfen/2,4-D (2.7%G) or butachlor /2,4-D (7%G).

During in 2006-2007, IPM technology has been emphasized on okra, asparagus and orchid. IPM technology provided effectively control and safe to consumers and environment. The Good Agricultural Practice (GAP) booklets of 9 crops were rewritten the manuals for serving the extension workers.

Pesticides consumption in 2006 was gradually decreased compare to those in 2004 and 2005 due to the national policy on “Reduction Use of Pesticides”. DOA and DOAE have promoted to use Botanical pesticides and Natural enemies to suppress the pests through the IPM and GAP schemes. Both DOA and DOAE have collaboratively organized the training course on “Safe and Efficient Use of Pesticide” for farmers and private sectors. It is emphasized for the reduction of pesticides usages.

Annex 1

List of banned/prohibited pesticides

1. aldrin
2. aminocarb
3. 4-aminodiphenyl
4. amitrole
5. aramite
6. asbestos - amosite
7. azinphos - ethyl
8. azinphos - methyl
9. benzidine
10. beta - HCH (1,3,5/2,4,6 - hexachloro-cyclohexane)
11. BHC or HCH (1,2,3,4,5,6 - hexachloro-cyclohexane)
12. binapacryl
13. bis (chloromethyl) ether
14. bromophos
15. bromophos-ethyl
16. cadmium and cadmium compounds
17. calcium arsenate
18. captafol
19. carbon tetrachloride
20. chlordane
21. chlordecone
22. chlordimeform
23. chlorobenzilate
24. chlorophenols
25. chlorthiophos
26. copper arsenate hydroxide
51. heptachlor
52. hexachlorobenzene
53. lead arsenate
54. leptophos
55. lindane (>99% gamma-HCH or gamma- BHC)
56. MCPB [4-(4-chhloro-o-tolyloxy) butyric acid]
57. mecoprop
58. mephosfolan
59. mercury compounds
60. mevinphos
61. MGK repellent - 11
62. mirex
63. monocrotophos
64. napthylamine
65. 4-nitrodiphenyl
66. nitrofen
67. parathion
68. Paris green
69. pentachlorophenate sodium or pentachlorophenoxide sodium
70 pentachlorophenol
71. phenothiol
72. phorate
73. phosphamidon
74. phosphorus
75. polybrominated biphenyls, PBBs
76. polychlorinated triphenyls, PCTs
77. prothoate

27. cycloheximide
28. cyhexatin
29. daminozide
30. DBCP (1,2-dibromo-3-chloropropane)
31. DDT (1,1,1-trichloro-2,2-bis (4-chlorophenyl ethane)
32. demephion
33. demeton
34. o-dichlorobenzene
35 dieldrin
36. dimefox
37. dinoseb
38. dinoterb
39. disulfoton
40 DNOC (4,6-dinitro-o-cresol)
41. EDB (1,2-dibromoethane)
42. endrin
43. ethyl hexyleneglycol (ethyl hexane diool))
44. ethylene dichloride
45. ethylene oxide (1,2-epoxyethane)
46. fensulfothion
47. fentin
48. fluoroacetamide
49. fluoroacetate sodium
50. fonofos
78. pyrinuron (piriminil)
79 safrole
80. schradan
81. sodium arsenite
82. sodium chlorate
83. Strobane (polychloroterpenes)
84. sulfotep
85. 2,4,5-T ([2,4,5-trichlorophenoxyl] acetic acid)
86. 2,4,5-TCP (2,4,5-trichlorophenol)
87. TDE or DDD [1,1-dichloro-2,2-bis (4-chlorophenyl) ethanel)
88. TEPP (tetraethyl pyrophosphate)
89. 2,4,5-TP ((+)-2-[2,4,5-trichlorophenoxy] propionic acid)
90. thallium sulfate
91. toxaphene or camphechlor)
92. tri (2,3-dibromopropyl) phosphate)
93. vinyl chloridemonomer (monochloroethene)
94. methamidophos
95. parathion methyl
96. endosulfan (except CS formulation)

Annex 2

List of pesticides under surveillance schemes.

1. aldicarb
2. blasticidin –S
3. carbofuran
4. dicrotophos
5. EPN
6. ethoprofos
7. formethanate
8. methidathion
9. methomyl
10. oxamyl
11. endosulfan
12. 2,3 – dibromopropan – 3 – ol or 2,3 – dibrpmo – 1 - propanol
13. *N* - methylformamide
14. Propylene oxide or 1-2-epoxypropane or methyloxirane
