Current status of HHPs use in Ethiopia and of alternatives being used to phase them out

Pesticide Action Nexus Association

January 2019, Addis Ababa

Contents

1. Introduction 1

2. Objectives 1

3. Methodology 2

4. Findings 2

4.1. Pesticide registration in Ethiopia 2

4.2. Pesticide formulation in Ethiopia 3

4.3. Identifying HHPs being used in Ethiopia 4

4.4. Risk assessment 5

4.5. Human health and environmental impacts 6

4.6. Limitations for phasing out HHPs in Ethiopia 7

5. Available alternatives to phase out HHPs in Ethiopia 7

6. Annex 10

1. Introduction

Agriculture in Ethiopia is the foundation of the country's economy. In an effort to increase production and productivity, the agriculture sector puts the use of inputs like pesticides and fertilizers as driving forces. Input use and distribution is, mainly, conducted through agriculture development agents who are working at the grassroots level with smallholder farmers.

In Ethiopia, the use of agricultural inputs, including pesticides, was introduced to the smallholder farmers in the 1960s through agricultural extension systems. Since then, the use of pesticides by smallholder farmers showed a steady growth. Currently, special emphasis given to agriculture investment and the development of the flower sector contributes a lot to the import and use of pesticides. This increasing trend in the use of pesticides as part of development poses threats to human health and the environment.

Moreover, highly hazardous pesticides (HHPs), including persistent organic pollutants (POPs), are being widely used by smallholder and commercial farmers in Ethiopia. A progressive ban of the use of HHPs has been recommended by the Food and Agriculture (FAO) since 2006 due to the confirmed adverse impacts HHPs can cause on people and the environment, and their threats to biodiversity.

However, concerted efforts to identify registered HHPs and ban their use have been minimal in Ethiopia. Despite this, NGOs and concerned environmentalists have been working towards pesticide use reduction and development of ecologically-based pest and production management techniques across the country.

This report, hence, has included pesticides use practices by smallholder farmers, registered pesticides and registration processes in Ethiopia and the list of HHPs which are being used in Ethiopia. It also includes best practices and successful experiences on the development and use of agro-ecological techniques accomplished by different civil society organisations in Ethiopia. Some of the agro-ecological farming methods have been taken up as pioneering methods by the government extension systems.

2. Objectives

The project objective is a direct reflection of IPEN's overall 2020 goals, which aim that:

- Agroecology and non-chemical alternatives have successfully replaced highly hazardous pesticides and HHPs are no longer a source of harm to human health and the environment in key crops and pests.
- NGOs and social movements identify those pesticides that are highly hazardous under their ordinary conditions of use in the country; and are able to influence

governments to establish and enforce legislation that prohibits their manufacture, import, sale and use of HHP.

The project, based on IPEN's Africa HHPs phase-out strategy, therefore, aims to: produce National HHPs country situation reports which focus on identifying HHPs registered and being used in Ethiopia and banned in other countries, using Pesticide Action Network's (PAN's) HHPs criteria and PAN's consolidated list of bans; identify major pesticide exporters & producers; document pesticide registration processes and their limitations for phase-out or banning HHPs or applying the precautionary principle; and highlight cases of health and environmental impacts by HHPs (if such cases exist) and look for opportunities to phase-out or ban HHPs and promote agroecology.

3. Methodology

Pesticide proclamations on pesticides legislation and registration processes, documents produced by the Ministry of Agriculture and Livestock Resources, peer-reviewed journal articles, and reports from government offices and NGOs were used to collect information regarding the case. Personal communications with experts from the agricultural sector, smallholder farmers, field officers of civil society organizations working at the grassroots level and field visits to areas where there is high pesticides use and in areas where agroecology is successfully being implemented were conducted through the process.

4. Findings

4.1. Pesticide registration in Ethiopia

Ethiopia imports different pesticides mainly for agriculture purposes, while some amounts of pesticides are also imported for health care. The Ethiopian government has a proclamation on pesticide registration and control in the country. As per the proclamation, there are four main requirements that should be fulfilled for pesticides to be registered and imported into the country.

1. No pesticide shall be registered unless the efficacy, safety and quality is tested under field or laboratory conditions and approved by the Ministry of Agriculture. No person may formulate, manufacture, import, pack, re-pack, label, sell, distribute, store or use a pesticide not registered by the Ministry or contrary to the conditions of its registration.
2. Apart from requirement 1 above, the Ministry of Agriculture may authorize importation of unregistered pesticides in prescribed quantities for research or experimental purposes only and not for distribution.

3. Notwithstanding the provisions in 1 above, the Ministry may allow the importation and use of pesticides which has not been registered due to compelling reasons. This is one of the windows which allows unregistered pesticides to be imported into the country. In this case; importers need to submit their reasons of importation for the ministry.
4. The compelling reasons referred in number 3 above shall be determined in the directive to be issued for the implementation of this proclamation (Federal Negarit Gazeta proclamation No.674/2010)[1].

As per the proclamation, a decision on the use/import or not will be made after going through the information about the pesticide- the information should be complete and accurate; and show that the pesticide will be used for the purpose intended. Information about the chemical's profile, human and animal health hazards, and its effect on the environment and non-target organisms will be checked. Its effect should be insignificant compared to its benefits and its residues should not be persistent. It also states that applicants cannot request use or import of pesticides that are banned or restricted by international conventions to which Ethiopia is a Party.

Despite the presence of a regulation to import pesticides that also prohibits the import and formulation of pesticides that are banned or restricted in international conventions, banned pesticides are still being formulated and being used in Ethiopia. A study by Mengistie (2016)[2] on pesticide registration, distribution and use in Ethiopia reported that the existing law does not function in an adequate way due to inefficient implementation and missing legal instruments.

4.2. Pesticide formulation in Ethiopia

In Ethiopia there is only one local pesticide formulation plant called Adami Tulu Pesticides Processing Share Company located in the Central Rift Valley of Ethiopia. The main pesticides formulated in Adami Tulu include Malation, (Ethiolation 5% Dust and Ethiolathion 50% EC), Endosulfan (Ethiosulfan 25% ULV), Diazinon (Ethiozinone 60% EC), and Fenithrothion (Ethiothrothion 50% EC)). The plant

[1] Federal Negarit Gazeta Proclamation No.674/2010: A proclamation to provide for the registration and control of pesticides.

[2] Mengistie, B.T. (2016). Policy-Practice Nexus: Pesticide Registration, Distribution and use in Ethiopia. SM J Environ Toxicol, Vlolume 2, issue: 1006.

imports active ingredients and solvents. It is evident that the plant formulates pesticides which are banned in international conventions (APPSCO, 2014)[3].

Ethiopia is Party to the Stockholm Convention, which prohibits the formulation, import/export/sell/use of a number of synthetic pesticides which are classified as persistent organic pollutants (POPs). Endosulfan and its related isomers are included in the POPs list in the Stockholm Convention. However, Ethiopia is still formulating Endosulfan at Adami Tulu pesticide formulation plant. It is then distributed to the big commercial farms and smallholder farmers throughout the country.

Despite the presence of regulations and Ethiopia being Party to a number of international conventions, banned pesticides are still being widely used by the agriculture sector. Hence, implementation of the laws needs to be one of the focus areas of the government, non-governmental organizations and interested groups. Mengistie (2016) indicated the need to find ways to envisage better implementation of the law designed to govern pesticide use by farmers, from registration to distribution and use and monitoring, including quality control.

4.3. Identifying HHPs being used in Ethiopia

Highly hazardous pesticides are often off-patent products that can be found for a cheap price in the market. Products that are out of the market in developed (high income) countries usually remain registered in developing (low income) countries. This is mainly because of weak registration schemes as a result of limited technical and financial resources; inadequate capacity for risk assessment; governments' non-stringent policies on pesticide regulation, allowing cheap and old pesticides to come into the country; farmers' perceptions that pesticides are the sole pest management options, and at the same time, their lack of experiences on alternative options (FAO and WHO, 2017)[4]. Formulation of Endosulfan in the Adami Tulu Pesticide Processing plant shows that processing and use of HHPs, including POPs, are still present in Ethiopia. Strong effort is needed to build the technical, regulatory and financial capacity of the Ministry of Agriculture, which is responsible for the registration, import and use of pesticides.

The Ministry of Agriculture and Livestock Resources, Plant and Animal Health Directorate registered 409 pesticides by 53 registrants (Annex 2) in 2016 for different

[3] APPSCO (2014). Profile of Adamit Tulu Pesticide Processing Share Company, Brochure, Adami Tulu.

[4] FAO and WHO (2017). International Code of Conducted on Pesticide Management: Guidelines on Highly Hazardous pesticides.

purposes, of which the majority were insecticides (121). The other types of pesticides included fungicides (49), herbicides (36), household (9), public health (7), rodenticides (5), miticides (4), avicides (2), adjuvants, stickers and plant growth regulators, defoliants (2) and nematicides (1) (MoANR, 2016).

The list of registered pesticides was examined against PAN's list of HHPs to identify pesticides that are included in the PAN HHPs list but are still being used in Ethiopia. Out of the total 409 pesticides registered, 236 pesticides were listed under the 2018 PAN HPPs list (Annex 1), which shows that pesticides in PAN's HHP list are being widely used in Ethiopia. As per the 2016 list of registered pesticides, more than 50% of the pesticides registered to be imported were HHPs.

4.4. Risk assessment

As can be seen in section 4.3 above, lots of pesticides listed under the PAN HHP list are still being used in Ethiopia. Absence of proper assessment of pesticide poisoning and pesticides' environmental impacts in the country made it difficult to estimate the hazard that the products are posing to human health and the environment. With HHPs being widely used in the country, and reduction of exposure poorly managed (with special emphasis on end users), pesticide-related hazards can be forecasted to be higher with the current trend of the increased magnitude HHPs use (Photo. 1).

HHPs exposure in Ethiopia is aggravated, mainly because of:

- Less emphasis given to pesticide users' stewardship, considering the illiteracy level of end users
- Lack of internationally agreed and government-adopted list of HHPs
- The limitation of legal frameworks to make pesticide producers verify that their products are being used for intended purposes and according to the instructions
- Lack of compliance to ban POPs pesticides and limit HHPs
- Focusing only on training rather than working on learning and behavioural changes of smallholder farmers
- Inappropriate promotion of HHPs without mentioning their hazards

Figure 1. Pesticide application by farm workers in Central Rift Valley of Ethiopia

4.5. Human health and environmental impacts

Different studies (Amera T. & Abate A., 2008;[5] Ejigu D & Mekonnen Y, 2004;[6] Emana B. et. Al. 2010;[7]) revealed that pesticide exposure and poisoning is happening widely in Ethiopia, either directly or indirectly. Pesticide hazard assessment and records of pesticide poisoning is overlooked when promoting their use in the agriculture sector. In Ethiopia. There have been studies and anecdotal information from farmers and farm workers that reported pesticide exposure and poisoning.

It has been also reported that poor application techniques, lack of awareness of the adverse impacts of pesticides on human health (short and long term), perception of smallholder farmers considering pesticides as medicines not as poisons and poor extension services were some of the reasons for the ongoing pesticide impacts on human health and the environment.

Surveys conducted by PAN-Ethiopia in 2008, 2015 and 2017 in the Central Rift Valley of Ethiopia, one of the areas where there is high pesticides use, revealed poor management of pesticides during storage, application and handling of empty containers. During the surveys, farmers and farm workers mentioned symptoms of acute poisoning like headache, nausea and vomiting after pesticide application, and using empty containers for food and beverage storage.

[5] Amera T. And Abate A. 2008. An assessment of the pesticide use, practice and hazards in the Ethiopian Rift Valley, Institute for Sustainable Development, Ethiopia.
[6] Ejigu D. & Mekonnen Y. 2004. Pesticide use on agriculture fields and health problems in various activities. East African medical Journal 82, 427.
[7] Emana B., Gebremedhin B. & Regassa N. 2010. Impacts of improved seeds and agrochemicals on food security and environment in the Rift Valley of Ethiopia. Implications for the application of an African green Revolution. Dry Land Coordination Group, Addis Ababa.

4.6. Limitations for phasing out HHPs in Ethiopia

As described above, more than 50% of the pesticides registered in Ethiopia are HHPs according to the 2018 version of PAN's HHP list. It shows that strong and concerted efforts are needed to phase-out the use of HHPs in Ethiopia.

Lack of proper follow up and records on the adverse impacts of registered pesticides, and little or no attention given to risks and limitations to include alternative pest management options to the government extension systems are among the gaps that limit phasing-out HHPs use in Ethiopia. The process of phasing-out the use of HHPs in Ethiopia needs to start at the policy level with a legislation that promotes working alternatives and prohibits the manufacturing, import, distribution, sale and use of HHPs.

5. Available alternatives to phase out HHPs in Ethiopia

The use of agricultural inputs, pesticides and fertilisers is seen as the driving force to increase production and productivity. Most farmers and agriculture professionals (including the agricultural extension agents) consider pesticides as silver bullets for pest management. With that perception in mind, HHPs are being highly used in Ethiopia and this testifies that hazards that can be caused by HHPs are overlooked. Extensive use of HHPs with the aim of increasing production and productivity can cause severe and irreversible damage to human and environmental health.

Because of misconceptions and limited knowledge, there may often be a suggestion for HHPs to continue being used, despite the fact that there are alternatives that pose less or no risk to users and their environment. Bio-pesticides, plant extracts, ecologically based non-synthetic chemical pest management approaches, organic agriculture, the use of less hazardous chemicals and the use of integrated pest management (IPM) and integrated vector management (IVM) are among the viable alternatives that can be used to phase-out HHPs in Ethiopia.

With the objective of cutting and /or reducing the use of HHPs, different efforts have been made by different civil society organisations. There are best practices and experiences of success on the use of IPM, implementing organic agriculture, and use of ecologically-based production techniques. Below are a few of the best practices on agroecology and organic agriculture in Ethiopia.

Production of organic cotton in Southern Rift Valley or Ethiopia: The Southern Rift Valley of Ethiopia is one of the areas where there is high pesticides use by smallholder and large farms. They have been producing cotton with the use of pesticides, mainly HHPs, as their sole pest management options.

Since 2006, cotton IPM projects have been implemented as a means to reduce and/or totally cut the use of pesticides. The cotton IPM project was started by FAO in collaboration with the Ministry of Agriculture in Southern Rift Valley areas with

smallholder cotton farmers in 2006 and taken over by PAN-Ethiopia since 2007. Smallholder cotton farmers have been involved in practical trainings via the farmer field schools approach. The cotton IPM went on with new innovative pest management techniques included to help boost the use of natural enemies, biological control agents. Since, 2013, nearly 3000 smallholder and two big commercial farms have been involved in the cotton IPM with the use of food spray techniques, an innovative and ecologically sound pest management technique.

Cotton grower smallholder farmers totally cut the use of pesticides since the introduction of IPM and the food spray method. Farmers established a cotton grower cooperative to have access to better market links and are strongly involved in the cotton value chain. The cooperative started processing for organic certification once the farmers stopped using pesticides by using organic production techniques. Cooperative member farmers were certified organic in 2017 as the first organic cotton growers in Ethiopia. Certified farmers got a premium price for their organic cotton. This was an outstanding experience for other farmers to get involved into the organic certification scheme.

The organic cotton production in the Southern Rift Valley area is one of the best experiences of agro-ecological farming. It was found to be economically profitable with a higher yield and lower production costs compared to conventionally grown cotton in the area (Amera et al., 2017)[8]. In collaboration with the local bureau of agriculture, the food spray-based cotton IPM is being expanded to new areas.

With the aim of expanding the IPM and food spray methods to food crops in addition to cotton, since 2018 trials have been made on vegetables in the Central Rift Valley, where there is also high pesticides use. The first season result was promising, and it indicates that it is possible to dramatically cut the HHPs.

This is another best practice that can be used as an alternative for HHPs in vegetable production in the Central Rift Valley of Ethiopia and beyond, given that trials are done in the different agro-ecological zones across the country.

Ecological organic agriculture for vegetable production: Ecological organic agriculture in Ethiopia is one of the promising options to be used as an alternative for conventional production that relies on the use of HHPs. The Ministry of Agriculture and Livestock Resources is acting as a lead and coordinating entity, and ecologically-based organic agriculture is being implemented in different parts of the country. Central to the ecological organic agriculture in Ethiopia are the use of biological control agents, using indigenous knowledge for pest management. This knowledge includes the use of extracts from medicinal plants, adjustment of planting dates, and implementing cultural control measures, which avoid the use of pesticides.

[8] Amera T., Mensah K.R., and Belay, A. (2017): Integrated pest management in a cotton-growing area in the Southern Rift Valley region of Ethiopia: development and application of a supplementary food spray product to manage pests and beneficial insects, International Journal of Pest Management, DOI: 10.1080/09670874.2016.1278084.

This is one promising move by the Ministry to motivate famers and organisations that are striving to reduce the use of hazardous pesticides.

Push-Pull technology: Stem borers and striga weeds are the major challenges for maize and sorghum production. Control of stem borer insects with the use of pesticides was too difficult, as the insects bore into the stems of the crop. An ecologically sound and innovative stem borers' pest management technique called Push-Pull was developed by the International Centre for Insect Physiology and Ecology (ICIPE). Central to this technique is the use of Desmodium (Desmodium uncinatum); a flowering plant of the Fabaceae family, and Brachiaria, a grass family native to the tropics. Desmodium, which plays the push role, is planted in between the rows of maize or sorghum crop, while Brachiaria, which plays the pull role, is planted around, sandwiching the crop from every side of the farm.

Odour released from Desmodium repels the stem borer moths away; preventing them from laying their eggs on the maize/sorghum crop. At the same time the odour released from Brachiaria is an odour cue, which invites the moths to lay their eggs on. Once they lay their eggs on the Brachiaria, the tiny white spines of the grass kill the eggs, stopping the life cycle of the stem borer moth.

The push-pull technology was first trialled in Northern Ethiopia in 2010. It was found to be effective and has been expanded to different sorghum and maize producing areas of the country. It played a great role in reducing the use of pesticides for the control of stem borer insects.

Information dissemination: Dissemination of information about best practices, experiences and success stories on innovative, ecologically sound and economically viable alternatives has been one important aspect for scaling out available alternatives.

The main information dissemination tools used include print and electronic media (radio, television, magazines, newspapers, published journals), websites, brochures, newsletters and posters. Manuals, toolkits and training curriculums were prepared and used during extension efforts to new areas and farmers. Proper documentation and dissemination of agroecological practices was, hence, vital to reach out to more HHPs users and provide available information for them to re-consider their choices.

6. Annex

Annex 1. List of HHPs registered and being used in Ethiopia

No	Trade Name	Common Name	Level of Toxicity	Remark
01	ACE 750 SP	acephate	Group 3	Insecticide
02	Actara 25 WG	thiamethoxam 250g/kg	Group 3	Insecticide
03	Actellic 2% dust	pirimiphos-methyl	-	Insecticide
04	Actellic 50% EC	pirimiphos – methyl	-	Insecticide
05	Adonis 12.5 UL	fipronil 12.5% ULV	Group 3	Insecticide
06	Agro-Lambacin Super 315 EC	profenfos 30% + lambda-cyhalothrin 1.5%	Group 1, 2 & 3	Insecticide
07	Agro-Thoate 40% EC	dimethoate 40%	Group 3	Insecticide
08	Aim 10% EC	alpha-cypermethrin	Group 1 & 3	Insecticide
09	Akito 2.5% EC	beta cypermethrin	Group 1 & 3	Insecticide
10	Alpha-cyproid 10% EC	alpha-cypermethrin	Group 1 & 3	Insecticide
11	Alphahock 7.5% ULV	alpha-cypermethrin 7.5%	Group 1 & 3	Insecticide
12	Ampligo 150 ZC	chlorantrniliprole + lambda-cyhalothrin	Group 1, 2 & 3	Insecticide
13	Apron Star 42 WS	thiamethoxam 20% + metalaxyl - 20% + difenoconazole 2%	Group 3	Insecticide
14	Avaunt 150 SC	indoxacarb	Group 3	Insecticide
15	Bandit 20 SL	imidacloprid	Group 3	Insecticide
16	Basudin 600 EW	diazinon	Group 2 & 3	Insecticide
17	Baythroid 050 EC	cyfluthrin	Group 1 & 3	Insecticide
18	Carba 85% WP	carbaryl	Group 2 & 3	Insecticide
19	Closer 240 SC	Sulfoxaflor	Group 3	Insecticide
20	Confidor SL 200	imidacloprid	Group 3	Insecticide
21	Con-fidence 350 SC	Imidacloprid	Group 3	Insecticide
22	Coragen 200 SC	Chlorantraniliprole	-	Insecticide
23	Cruiser 350 FS	thiamethoxam 35% FS	Group 3	Insecticide
24	Cruiser 70 WS	thiamethoxam 70% WS	Group 3	Insecticide
25	Cybolt 2.5 ULV	flucythrinate 2.5% ULV	Group 1 & 3	Insecticide
26	Curacron 250 EC/ULV	Profenofos	Group 3	Insecticide
27	Cymbush 1% Granule	Cypermethrin	Group 1 & 3	Insecticide

28	Cymbush 25% EC	Cypermethrin	Group 1 & 3	Insecticide
29	Danadim 40% EC	dimethoate 400 gm/lt	Group 3	Insecticide
30	Decis 0.5 EC/ULV	Deltamethrin	Group 2 & 3	Insecticide
31	Decis 0.6 ULV	Deltamethrin	Group 2 & 3	Insecticide
32	Decis 2.5 EC	Deltamethrin	Group 2 & 3	Insecticide
33	Decis EC 025	deltamethrin 25 gm/lt	Group 2 & 3	Insecticide
34	Degesch Plates/Strips	magnesium Phosphide 56%	Group 1	Insecticide
35	Delros 2.5 EC	Deltamethrin	Group 2 & 3	Insecticide
36	Deltacal 0.2DP	deltamethrin 0.2%DP	Group 2 & 3	Insecticide
37	Deltahock 0.6% ULV	deltamethrin 0.6% ULV	Group 2 & 3	Insecticide
38	Deltanet 200 EC	Furathiocarb	Group 1	Insecticide
39	Deltarin 25 EC	Deltamethrin	Group 2 & 3	Insecticide
40	Diamog 40% EC	Dimethoate	Group 3	Insecticide
41	Diazinon 10% G	Diazinon	Group 2 & 3	Insecticide
42	Diazinon 60% EC	Diazinon	Group 2 & 3	Insecticide
43	Diazol 10G	Diazinon	Group 2 & 3	Insecticide
44	Diazol 60 EC	diazinon 60% EC	Group 2 & 3	Insecticide
45	Dimeto 40% EC	dimethoate	Group 3	Insecticide
46	Dursban 240 ULV	chlorpyrifos-ethyl	Group 3	Insecticide
47	Dursban 48% EC	chlorpyrifos-ethyl	Group 3	Insecticide
48	Dynamec 1.8 EC	abamectin 18 gm/lt	Group 2 & 3	Insecticide
49	Dynamic 400 FS	thiram + Carbofuran	Group 2 & 4	Insecticide
50	Ethiodemethrin 2.5% EC	deltamethrin 25 gm/lt	Group 2 & 3	Insecticide
51	Ethiodemethrin 2.5% WDP	deltamethrin 25 gm/lt	Group 2 & 3	Insecticide
52	Ethiolathion 5% Dust	malathion	Group 2 & 3	Insecticide
53	Ethiolathion 50% EC	malathion	Group 2 & 3	Insecticide
54	Ethiopyrifos 48% EC	chlorpyrifos	Group 3	Insecticide
55	Ethiosulfan 25% ULV	endosulfan	Group 1 & 4	Insecticide
56	Ethiothoate 40% E.C	dimethoate	Group 3	Insecticide
57	Ethiotrothion 50% EC	fenitrothion	Group 2 & 3	Insecticide
58	Ethiozinon 60% EC	diazinon	Group 2 & 3	Insecticide
59	Ethiozinon 60% EC	diazinon	Group 2 & 3	Insecticide

60	Fyfanon 50% EC	malathion	Group 2 & 3	Insecticide
61	Gain 20 SL	imidacloprid	Group 3	Insecticide
62	Gaucho 70 WS	imidacloprid	Group 3	Insecticide
63	Girgit-Plus	profenofos 72% EC	Group 3	Insecticide
64	Hanclopa 48% EC	chlorpyrifos	Group 3	Insecticide
65	Helmathion 50 Ec	malathion 50% EC	Group 2 & 3	Insecticide
66	Highway 50 EC	lambda-cyhalothrin	Group 1,2 & 3	Insecticide
67	Hondize 60% EC	Diazinon	Group 2 & 3	Insecticide
68	Karate 0.8 ULV	lambda-cyhalothrin	Group 1,2 & 3	Insecticide
69	Karate 5% EC	lambda-cyhalotrin	Group 1,2 & 3	Insecticide
70	Lambdahock 5% EC	lambda-cyhalotrin	Group 1,2 & 3	Insecticide
71	Lamdex 5% EC	lambda-cyhalothrin 5% EC	Group 1,2 & 3	Insecticide
72	Lifothoate 40 EC	dimethoat	Group 3	Insecticide
73	Lipron 50 SC	Fipronil	Group 3	Insecticide
74	Locslay 5% EC	lambda-cyhalothrin	Group 1,2 & 3	Insecticide
75	Malathion 50% EC	malathion	Group 2 & 3	Insecticide
76	Malmog	malathion	Group 2 & 3	Insecticide
77	Malt 50% EC	malathion 500 gm/lt	Group 2 & 3	Insecticide
78	Marshal 20 UL	Carbosulfan	Group 4	Insecticide
79	Marshal 25% EC	Carbosulfan	Group 4	Insecticide
80	Marshal 25% ULV	Carbosulfan	Group 4	Insecticide
81	Marshal/Suscon	Carbosulfan	Group 4	Insecticide
82	Modan 5% EC	lambda –cyhalothrin 5% EC	Group 1,2 & 3	Insecticide
83	Netpyrifos 48 EC	Chlorpyrifos	Group 3	Insecticide
84	Perfecto 175 SC	imidacloprid + lambda-cyhalothrin	Group 1,2 & 3	Insecticide
85	Phonix 5% EC	lambda-cyhalothrin	Group 1,2 & 3	Insecticide
86	Polo 500 SC	diafenthiuron 500 gm/lt	-	Insecticide
87	Polytrin C 220 ULV	profenofos + cypermethrin	-	Insecticide
88	Profit 72% EC	profenofos	-	Insecticide
89	Proven 44 EC	Profenofos + cypermethrin	Group 3	Insecticide
90	Pyriban 48% EC	chlorpyrifos	Group 3	Insecticide
91	Pyrinex 24 ULV	chlorphyrifos-ethyl	Group 3	Insecticide

92	Pyrinex 48% EC	chlorpyrifos-ethyl	Group 3	Insecticide
93	Pyrinex	chlorpyrifos 48% w/v	Group 3	Insecticide
94	Radiant 120 SC	Spinetoram	Group 3	Insecticide
95	Rimon Star ULV	novaluron + bifenthrin	Group 2 & 3	Insecticide
96	Ripcord 5% ULV	cypermethrin	Group 3	Insecticide
97	Rufast 75% EW	Acrinathrin	Group 3	Insecticide
98	Sarikas	dimethoate 40% w/v	Group 3	Insecticide
99	Secure 24% SC	Chlorfenapyr	Group 3	Insecticide
101	Secure 36% SC	Chlorfenapyr	Group 3	Insecticide
102	Selecron 720 EC	profenofos "Q" 720g/l	Group 3	Insecticide
103	Sevin 85% WP	Carbaryl	Group 2 & 3	Insecticide
104	Success Bait	Spinosad	Group 3	Insecticide
105	Sumithion 50% EC	Fenitrothion	Group 2 & 3	Insecticide
106	Sumithion 96% ULV	Fenitrothion	Group 2 & 3	Insecticide
107	Sumithion 95% ULV	Fenitrothion	Group 2 & 3	Insecticide
108	Suprathion 40 EC	methidathion 400 g/l	Group 1 & 3	Insecticide
109	Talic 2% Dust	pirimiphos-methyl	Group 3	Insecticide
110	Talstar 20 ULV	Bifenthrin	Group 2 & 3	Insecticide
111	Thiodan 25% ULV	Endosulfan	Group 1 & 4	Insecticide
112	Thiodan 35% EC	Endosulfan	Group 1 & 4	Insecticide
113	Thionex 25% EC/ULV	endosulfan	Group 1 & 4	Insecticide
114	Thionex 25% ULV	Endosulfan	Group 1 & 4	Insecticide
115	Thionex 35% EC	Endosulfan	Group 1 & 4	Insecticide
116	Torque 550 SC	Fenbutatin	Group 1 & 3	Insecticide
117	Tracer 480 SC	spinosad (a mixture of spinosyn A & spinosyn B) 480 gm/lt	Group 3	Insecticide
118	Tricel 48% EC	Chlorpyrifos	Group 3	Insecticide
119	Ultracide 40 EC	Methidathion	Group 1 & 3	Insecticide
120	Winner 0.8 ULV	lambda cyhalothrin	Group 1,2 & 3	Insecticide
121	Zerofly storage Bag	Deltamethrin	Group 2 & 3	Insecticide
122	Agro-sate 48 SC	glyphosate 360 g/l A.E	Group 2	Herbicide

123	Alanex 48% EC	alachlor 480 g/l	Group 2 & 4	Herbicide
124	Alazine 350/200 SE	alachlor 350 + alazine 200	Group 2 & 4	Herbicide
125	Ametrazine 500 SC	atrazine 250 gm/lt + ametryne 250 gm/lt	Group 2	Herbicide
126	Atramet combi 50 SC	atrazine 25% + ametryne 25%	Group 2	Herbicide
127	Brittox 52.5 EC	bromoxynil + ioxynil + mecoprop	Group 1	Herbicide
128	Butrazine 48 SC	butachlor + Atrazine	Group 2	Herbicide
129	Gesapax combi 500 FW	ametryne + atrazine	Group 2	Herbicide
130	Gesaprim 500 FW	atrazine 500g/l	Group 2	Herbicide
131	Glycel 41% SL	glyphosate 360 G/L	Group 2	Herbicide
132	Gly Kill	Glyphosate	Group 2	Herbicide
133	Glyphos 48% SL	glyphosate 480G/L	Group 2	Herbicide
134	Glyphos 360 SL	glyphosate 36%	Group 2	Herbicide
135	Glyphogan	glyphosate 480 G/L	Group 2	Herbicide
136	Glyphogan T	glyphosate + terbuthylazine	Group 2	Herbicide
137	Glyweed 48% SL	Glyphosate	Group 2	Herbicide
138	Helosate 48 SL	glyphosate 48%	Group 2	Herbicide
139	Illoxan 28% EC	diclofop-methyl	Group 2	Herbicide
140	Kalach 360 SL	Glyphosate 36% SL	Group 2	Herbicide
141	Lasso 480 EC	alachlor 480 G/L	Group 2 &4	Herbicide
142	Lasso/Atrazine 55% SC	alachlor 35% + atrazine 20%	Group 2 &4	Herbicide
143	Linkosate 75.7 SG	glyphosate ammonium	Group 2	Herbicide
144	Linkosate 48 SL	glyphosate-isopropyl ammonium	Group 2	Herbicide
145	Mamba 360 SL	Glyphosate	Group 2	Herbicide
146	Mamba Super 480 SL	Glyphosate	Group 2	Herbicide
147	Mog-Sate 480 SL	Glyphosate	Group 2	Herbicide
148	Pendico® 33 EC	Pendimethalin	Group 3	Herbicide
149	Piranha 360 SL	glyphosate 360 Gr/Lt	Group 2	Herbicide
150	Primagram 500 FW	metolachlor + atrazine	Group 2	Herbicide
151	Primagram Gold 660 SC	s-metolachlor 290 g/l + atrazine 370 g/l	Group 2	Herbicide
152	Roundup 36 SL*	Glyphosate 360 g/l	Group 2	Herbicide
153	Roundup Turbo 450 SL	Glyphosate	Group 2	Herbicide
154	Sugar cane Hoe 500 SC	Ametryn 250 gm/lt + Atrazine 250 gm/lt	Group 2	Herbicide

155	Terminator 480 G/L SL	Glyphosate	Group 2	Herbicide
156	Trust-Sate 360SL	Glyphosate	Group 2	Herbicide
157	Weedall 480 SL	Glyphosate	Group 2	Herbicide
158	Acrobat WG	dimethomorph + mancozeb	Group 2	Fungicide
159	Agro-Laxyl MZ 63.5 WP	mancozeb + metalaxyl	Group 2	Fungicide
160	Ardent 50 SC	kresoxim-methyl	Group 2	Fungicide
161	Benlate 50 WP	benomyl 50% WP	Group 2 &4	Fungicide
162	Boss 72% WP	metalaxyl + mancozeb	Group 2	Fungicide
163	Chob Manzeb 80 WP	Mancozeb	Group 2	Fungicide
164	Curzate M 68 WP	cymoxanil 45 gm/kg + mancozeb 680 gm/kg	Group 2	Fungicide
165	Daconil 2787 W 75	chlorothalonil 75% WP	Group 1&2	Fungicide
166	Datozeb 80 WP	metalaxyl + mancozeb	Group 2	Fungicide
167	Delan 500 SC	dithianon 500 gm/lt	-	Fungicide
168	Electis 75% WG	zoxamide 8.3% + mancozeb 66.7%	Group 2	Fungicide
169	Ethiozeb 80% WP	mancozeb	Group 2	Fungicide
170	Flowsan FS	Thiram	Group 2 &4	Fungicide
171	Folio Gold 537.5 SC	metalaxyl-M 37.5 gm/l +500 gm/l chlorothalonil	Group 1&2	Fungicide
172	Folpan 80 WDG	Folpet	Group 2	Fungicide
173	Goldazim 500 SC	carbendazim	Group 2	Fungicide
174	Helcozeb 80 WP*	mancozeb 80% W/W	Group 2	Fungicide
175	Horizon 680 WG	Mancozeb + metalaxyl-M	Group 2	Fungicide
176	Imidalm T 450 WS	midaclopride 250 gm/kg + thiram 200 gm/kg	Group 2 & 4	Fungicide
177	Indofil M-45	mancozeb 80% WP	Group 2	Fungicide
178	Indom	mancozeb	Group 2	Fungicide
179	Ippon 500 SC	iprodione 500 gm/lt SC	Group 2	Fungicide
180	Iprodione 500 SC	iprodione 500 gm/lt	Group 2	Fungicide
181	Karilaxyl-72	metalaxyl + Mancozeb	Group 2	Fungicide
182	Mancolaxyl 72 % WP	mancozeb + metalaxyl WP	Group 2	Fungicide
183	Mancotan 80 WP	mancozeb	Group 2	Fungicide
184	Mancozeb 80 WP	mancozeb	Group 2	Fungicide

185	Manoxyl 72% WP	mancozeb 64%+ metalaxyl 8%	Group 2	Fungicide
186	Matco	metalaxyl 8% + mancozeb 64%WP	Group 2	Fungicide
187	Maxitan 72% WP	mancozeb 64% + metalaxyl 8%	Group 2	Fungicide
188	Metalaxyl 8% + Mancozeb 64% WP	metalaxyl 8% + mancozeb 64% WP	Group 2	Fungicide
189	Odeon 82.5 WDG*	Chlorothalonil	Group 1 & 2	Fungicide
190	Penncozeb 80 WP*	mancozeb 80% WP	Group 2	Fungicide
191	Polyram DF	Metiram	Group 2	Fungicide
192	Proseed Plus 63 WS	Carboxin + Thiram + Imidacloprid	Group 2 & 4	Fungicide
193	Rex® Duo	Epoxiconazole + Thiophanate-methyl	Group 2	Fungicide
194	Ridom 80% WP	Mancozeb	Group 2	Fungicide
195	Ridomil MZ 63.5 WP ****	metalaxyl/mancozeb	Group 2	Fungicide
196	Ridomil Gold MZ 68 WP ****	metalaxyl – M 4% + mancozeb 64%	Group 2	Fungicide
197	Rova 500 FW*	chlorothalonil 50% FW	Group 1&2	Fungicide
198	Rova 75 WP*	chlorothalonil 50% FW	Group 1&2	Fungicide
199	Rovral Aquaflo 500 SC	Iprodione	Group 2	Fungicide
200	Saboxyl 72% WP	Metalaxyl + Mancozeb	Group 2	Fungicide
201	Sabozeb 80%WP	mancozeb	Group 2	Fungicide
202	Sancozeb 80% WP*	mancozeb 800 g/kg WP	Group 2	Fungicide
203	Thiram Granuflo 80 WP*	thiram 80% WP	Group 2 &4	Fungicide
204	Topmil 72 WP	Metalaxyl 8% + Mancozeb 64% WP	Group 2	Fungicide
205	Unizeb 80 % WP	Mancozeb	Group 2	Fungicide
206	Victory 72 WP	Metalaxyl 80 gm/kg + Mancozeb 640 gm/kg	Group 2	Fungicide
207	Klerat pellets	brodifacoum	Group 2 & 3	Rodenticides
208	Lanirat Bait 0.005%****	bromadiolone	Group 1 &2	Rodenticides
209	Storm*	flocoumafen 0.005% pellet	Group 1 &2	Rodenticides
210	Zinc phosphide	Zinc phosphide 80% Technical	Group 1	Rodenticides
211	Ratol*	Zinc phosphide 80% Techical	Group 1	Rodenticides
212	Queletox UL 600****	fenthion	-	Avicides
213	Bathion 640 ULV	fenthion	-	Avicides

214	Mocap GR 10	ethoprophos	Group 1 &2	Nematicides
215	Abalone 18 EC	Abamectin	Group 1 &3	Miticides
216	Akrimactin 1.8 EC	Abamectin 18 gm/lt	Group 1 &3	Miticides
217	Calypso SC 480	Thiacloprid	Group 2	Miticides
218	Cascade 10 DC	Flufenoxuron	-	Miticides
219	Pix® 50 EC*	mepiquat chloride 50 g/l or 5%	-	Adjuvants, stickers and plant growth regulators, Defoliants
220	Trust-Difol 180 SC	Diuron + Thidiazuron	Group 2	Adjuvants, stickers and plant growth regulators, Defoliants
221	Baygon****	Propoxur 1% + Cyfluthrin 0.04% + Dichlorvos 0.5%) Aerosol	Group 2 &3	House hold
222	Hardy****	Cypermethrin 0.03% + Dichlorvos 0.99%	Group 1 & 3	House hold
223	Kilit****	dichlorvos 0.7% + tetramethrin 0.14%	Group 1 & 3	House hold
224	Knoxout 2 FM	Diazinon 23% W/W	Group 2 & 3	House hold
225	Mobile	Tetramethrin, Rich-D-T-Prallethrin & Deltamethrin	Group 2 & 3	House hold
226	Mobil insecticide****	tetramethrin = neopnamin 0.20%+ pynamin forte = d –allethrin 0.250% + Sumithrin = d-phenothrin 0.120%	Group 2 & 3	House hold
227	Roach killer*	fenithrothion + cypermethrin+bioallethrin 2.3%	Group 3	House hold
228	Super shelltox C.I.K****	cypermethrin 0.25% + teramethrin 0.15%	Group 3	House hold
229	Zera Insecticide	Fipronil	Group 3	House hold
230	Dawa® plus 2.0	deltamethrin	Group 2 & 3	Public health
231	Ficam VC 80% WP	bendiocarb	Group 3	Public health
232	ICONET (Icon 2.5 EC)	lambda-cyhalothrin 2.5 CS	Group 1, 2 & 3	Public health
233	ICON 10 WP	lambda – cyhalothrin	Group 1, 2 & 3	Public health
234	K-O Tab.*	deltamethrin 25% m/m	Group 2 & 3	Public health
235	K-Othrine Moustiquare* SC 1%	deltamethrin 1%	Group 2 & 3	Public health

236	Lifenet	deltamethrin	Group 2 & 3	Public health

Note: *Group 1: Acute Toxicity, Group 2: Long term Effect, Group 3: Environmental Toxicity, and Group 4: Conventions*