جمعية التربية البيئية للأجيال القادمة

AEEFG

IPEN

for a toxics-free future

Tunisia:

National Report on the Situation of Highly Hazardous Pesticides (HHPs)

April, 2020

The traveller cannot fail to be impressed by the extent of the vestiges of the Roman occupation which is found everywhere as a filigree on Tunisian soil. Roman ruins have been resisting for 2000 years, while Tunisian soil is suffering from severe degradation: is it a question of climate change or bad human resources practices? Marc Cote, 1964 ; Conservation des eaux et des sols en Tunisie

ACKNOWLEDGEMENTS

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Contents

Appendices

Figures

Tables

1. Executive summary

In 2012 at the third meeting of the International Conference on Chemicals Management (ICCM3), a resolution on Highly Hazardous Pesticides (HHPs)[1] that included: "Supports the progressive ban of Highly Hazardous Pesticides and their substitution with safer alternatives" was proposed by Antigua & Barbuda, Armenia, Bhutan, Dominican Republic, Egypt, Guyana, International Trade Union Congress, IPEN, Iraq, Kenya, Kiribati, Kyrgyzstan, Libya, Mongolia, Nepal, Nigeria, Peru, Pesticide Action Network, Republic of Moldova, St Lucia, Tanzania, **Tunisia** and Zambia.

In 2015, the fourth International Conference on Chemicals Management (ICCM4) adopted a resolution that recognized Highly Hazardous Pesticides (HHPs) as an issue of concern and called for concerted action to address HHPs, with emphasis on promoting agro-ecologically based alternatives and strengthening national regulatory capacity to conduct risk assessment and risk management[2]. Stakeholders were encouraged to align efforts and, in order to ensure coherence, be guided by the definition of HHPs in the Code of Conduct and by these guidelines[3].

According to experts from the World Health Organization (WHO) and public health experts, the use of HHPs may partly explain the increase in cancer diseases observed in Tunisia (APIA, 2015).

Aligned to the IPEN strategy to phase out HHPs in Africa and all over the world, this report is a preliminary study in Tunisia to identify highly hazardous pesticides in use.

The identification of HHPs is based on the Pesticide Action Network's, Food & Agriculture Organization's (FAO's) and World Health Organization's (WHO's) criteria.

This report is an opportunity for reviewing the efficiency and risk-free management of pesticides in Tunisia. Indeed, a recent report[4] identified gaps in management of pesticides in Tunisia, which are mainly:

- Non-compliance with texts on several levels (marketing, storage, application, residues, protection, management of empty packaging);
- Lack of adequate and practical post-approval control procedures;
- Insufficient efforts to raise awareness and supervise small and medium-sized agricultural producers and users on the risks linked to pesticides and crop protection;
- Existence of parallel markets; and
- Absence so far of an ecological and rational management system for empty pesticides containers (EPC).

[1] SAICM/ICCM.3/CRP.16

[2] SAICM/ICCM.4/15 – Annex I - Resolution on highly hazardous pesticides (IV/3).

[3] International Code of Conduct on Pesticide Management Guidelines on Highly Hazardous Pesticides, 2016

[4] Project d'Identification de l'Agriculture Irriguée en Tunisie (Piait), version 2018

2. Definitions[5]:

Active ingredient: means the part of the product that provides the pesticidal action.
Banned pesticide: means a pesticide, all uses of which have been prohibited by final regulatory action, in order to protect human health or the environment. It includes a pesticide that has been refused approval for first-time use, or has been withdrawn by industry either from the domestic market or from further consideration in the domestic approval process, and where there is clear evidence that such action has been taken in order to protect human health or the environment.
Pesticide: means any substance, or mixture of substances, of chemical or biological ingredients intended for repelling, destroying or controlling any pest, or regulating plant growth.
Hazard: means the inherent property of a substance, agent or situation having the potential to cause undesirable consequences (e.g. properties that can cause adverse effects or damage to health, the environment or property).
HHPs: Highly Hazardous Pesticides means pesticides that are acknowledged to present particularly high levels of acute or chronic hazards to health or environment according to internationally accepted classification systems such as WHO or GHS or their listing in relevant binding international agreements or conventions. In addition, pesticides that appear to cause severe or irreversible harm to health or the environment under conditions of use in a country may be considered to be and treated as highly hazardous.
Risk: is the probability and severity of an adverse health or environmental effect occurring as a function of a hazard and the likelihood and the extent of exposure to a pesticide.

[5] International Code of Conduct on Pesticide Management, Guidelines on HHPs, FAO/WHO, Rome 2016

3. Introduction to the country

3.1 General overview of Tunisia and its agriculture activities

History of agriculture in Tunisia at a glance

Tunisia has a long and distinct history as a politically and culturally unified country despite subjection to a variety of rulers and the impulses of contrasting civilizations over a period of nearly 3,000 years. The modern state derives its name from Tunis, originally a Phoenician settlement and, since the thirteenth century, the country's capital and principal city. But to the Romans and later the Arabs, this relatively small region was known as Africa, whose name was eventually extended to the whole of the immense continent that lay beyond. [6] Tunisia was a "granary of the Roman empire" which aimed for self-sufficiency; its agricultural products include olives, grapes and grains. The Romans built thousands of miles of roads, bridges, dams, aqueducts, and irrigation systems. One of the aqueducts still partially visible near the town of Zaghouan (58km from the capital) carries 8.5 million gallons of water daily to Carthage, fifty-five miles to the north.

In modern-day Tunisia, heir to ancient Carthage, great importance is given to agriculture and "food security" is perceived as a national priority. Out of a total of 191 countries, Tunisia is ranked 13th in the world in terms of cultivable area compared to the total area of the country[7] and ranks top among world olive oil exporters with a market share of 6% of the world production. It is the leading producer and exporter of olive oil in the southern Mediterranean and the second worldwide, after the European Union[8].

Agriculture ranks high in the Tunisian economy; it occupies an important place in the national economic development strategy. The agricultural sector contributes significantly, with 11% of GDP and 25% employment of the active population. Agricultural products represent around 8% of the country's export earnings. The potential of land for agricultural use is estimated at 10.4 million ha, which corresponds to 63% of the national territory, with 4.9 million ha of arable land and 4 million hectares cultivated (2016) [9]. 75% of farms have an area of less than 10 ha and production systems are mainly based on rain-fed agriculture. Irrigated agriculture occupies around 8.4% of the cultivated area. Livestock and oasis cultures are also major components of the sector[10].

The sector, highly important, is evolving in a fragile natural environment, with a highly sensitive dependence on weather conditions.

Beyond self-sufficiency, Tunisians are working to meet the challenge of being able to trade in agricultural products without barriers, whether with the European Union, Tunisia's first trade partner, or other countries of the world.

In 2016 the government launched a five-year plan, "Tunisia 2020,"[11] in which it laid down its plans to increase the annual agricultural growth rate to over 4% by 2020.

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[6] https://www.marines.mil/Portals/1/Publications/Tunisia%20Study_1.pdf

[7] http://www.onagri.nat.tn/uploads/Etudes/securite%20alimentaire.pdf

[8] http://tunisia-oliveoil.com/Fr/actualites_7_11_D25

[9] Rapport de synthèse sur l'agriculture en Tunisie ; H.E. Chebbi, J.-P. Pellissier, W. Khechimi, J.-P. Rolland- 2016

[10] https://www.atlas-mag.net/en/article/tunisia-the-agricultural-sector-in-the-face-of-natural-disasters

[11] Rapport-final-economique-Tunisie-2025-28-aout-2017

The plan identified six objectives:

- Improve governance, strengthen and adapt the institutional framework;
- Improve Tunisian farmers' income and modernize farms;
- Increase agricultural contribution to Tunisia's GDP to 11%;
- Strengthen agricultural production;
- Create jobs in rural areas; and
- Improve national food security.

Growth in the agricultural sector will depend on the government's ability to tackle upcoming challenges such as the increase of droughts due to climate change, farmers' growing debt and land fragmentation. Tunisia is facing soil problems caused by desertification, salinisation, erosion, and others. Today, 46% of crops are grown on land with limited or very low fertility, and almost 1,100,000 ha are grown on land susceptible to erosion. Despite the existence of a network of 14 soil analysis laboratories, Tunisian farmers very rarely use the services of these structures to carry out soil analysis because, "in general, they are not aware of the interest, both economic and environmental, which may result from the exploitation of the results of this type of analysis" (AVFA, 2016). Additionally, greenhouse agriculture proves to be a major consumer of pesticides and chemical fertilizers. The consumption of protected crops alone accounts for 15% of the pesticides and fertilizers used in vegetable crops. These cultures consume 2-4 times more pesticides and fertilizers than field crops.[12]

Alternatives used in Tunisia vs conventional agriculture

Different approaches to pest management are used in the agriculture and agroforestry sector in Tunisia[13].

Tunisia is exploring different approaches to manage pests such as integrated pest management, physical management, biochemical management and biological pest control.

The biological pest management method began in the last century and involves living organisms or natural active substances to manage pests. It is used for citrus and dates. To reach a large population of agricultural producers, in 2006/2007 the GiFruit (Inter-Professional Fruit Grouping), in collaboration with CRDAs (Regional Commissary for Agriculture Development) and research, set up a participatory popularization approach in several regions of the country, notably in the Cap Bon zone. This approach consists of testing the two methods of chemical and biological control on "fields" and the farmers themselves compare the results. These farmer field schools (CEP) are tasked to facilitate the transfer of research results and their application to their fellow farmers.

IPM (Integrated Pest Management) and IVM (Integrated Vector Management): There is a lack of overall strategy in IPM in Tunisia due to different difficulties, such as lack of: regulation, national policies, guidelines, technical implementation, government and institutional support and engagement of farmers. However, several works and programs have been carried out by research institutes for agriculture (Centre Regional des Recherches en Hoticulture et Agriculture Biologique, Centre Technique d'Agriculture Biologique and Direction Generale de l'Agriculture Biologique affiliated to the Ministry of Agriculture), which are set working on olive trees, date palm, citrus, potato and conventional greenhouses and geothermal energy cultures. For the case of olive plants, an IPM program has been set since 2004.

Moreover, the agroecology approach is not yet integrated within the national policies. However, many initiatives are implemented by NGOs working on implementation and

[12] https://newmedit.iamb.it/2018/12/15/farmers-risk-perceptions-of-pesticides-used-for-greenhouses-vegetables-production-in-tunisian-center-east/

[13] Plan de Gestion des Pestes et Pesticides (PGPP) (PICAGL),2018

awareness of permaculture, and with FAO support Tunisia is engaged in adopting a 'white paper' on the adoption of a new approach to agro-ecology in the Middle East and North African region (MENA).[14]Additionally, many researchers are promoting agro-ecology benefits, of which some details can be referred to from "Agro-ecological land use for diversified and quality food and a localized food system" in Tunisia in 2050[15].

Organic agriculture development

The organic agriculture strategy in Tunisia, launched in 2015, aimed to build a Tunisian model of organic farming supported by active government policies in the promotion of the sector. Tunisia ranks 23rd worldwide in the organic agriculture sector and occupies the first place in the world in terms of areas devoted to the organic olive farming. It is in the lead at the African and global levels in terms of areas dedicated to the organic olive growing. The organic farming areas increased to 336,000 hectares in 2018. The number of stakeholders in the organic agriculture sector has reached 8,000, while exports have increased by 28 %[16]. Almost 99% of the products from organic farming today come from olive oil and dates[17]. Other organic crops produced include jojoba, almonds, fruits and vegetables, honey and aromatic plants. The quantities of organic products exported are estimated at 60000 tons (2018). These exports hold 60 products and 38 destinations[18].

3.2 Main crops produced in Tunisia

The division of cultivated Tunisian agricultural land by major crops shows the importance of grains (wheat and barley) and tree crops, which together cover around 87% of the total: grains with 43% and tree crops with 44% (mainly olives). The remaining 17% is allocated between forage crops (7%), vegetable crops (3%), legumes (2.5%) and others (0.5%)[4]. Tunisia is one of the world's largest producers and exporters of olive oil; Tunisia will become the 2nd largest producer of olive oil after Spain, with a production reaching 350 thousand tonnes, during the 2019-2020 season[19].

It has a wide range of agriculture productions:

- Fruits: citrus, apricots, dates, prickly pear, strawberry, pomegranate, melon, watermelon, peach, pear, apple, plum, grapes, almonds, and others
- Vegetables: tomatoes, peppers, cucumber, potatoes, carrots, onions, garlic, green vegetables, artichokes, fennel, beets, radish, turnips, salads, cauliflower, cabbage, and others
- Cereal crops: barley, wheat, oats and others
- Legumes: faba beans, peas, chickpeas, lentils

As a result of agricultural intensification in plant production practices, pest pressure is increased, and then there is an increasing use of pesticides as a means of control.

[14] https://www.webmanagercenter.com/2017/11/21/412766/la-zone-mena-aura-bientot-son-livre-blanc-sur-lagro-ecologie/

[15] https://www.ocl-journal.org/articles/ocl/full_html/2017/03/ocl170025s/ocl170025s.html

[16] https://www.flehetna.com/fr/agriculture-bio-un-record-de-430-millions-de-dinars-dexportations-en-2017

[17] http://www.onagri.nat.tn/uploads/images/filieres/bio/mai2019/Fiche-indicateur-BIO-MAi2019.pdf

[18] Fiche-indicateur-Bio-Mai 2019

[19] https://www.tap.info.tn/en/Portal-Economy/11851465-tunisia-soon-to-be

3.3 National pesticide registration and control policy framework

Pesticides are regulated by Law # 92-72[20], completed by Law # 99-5[21]. The authority in charge of coordinating pesticide management in the country is the Ministry of Agriculture. This coordinating authority is responsible to facilitate coordination among all different national institutions. They must be imported by an approved importer in accordance with the Book of Specifications (Cahier des Charges) established by the Ministry of Agriculture's Order, dated May 5, 2003. The pesticide must also be registered and officially authorized by the Ministry of Agriculture's official laboratory, Laboratoire de Contrôle et d'Analyse des Pesticides. The registration procedure takes two years, including two years of experimentation[22]. Pesticide registration involves a process with many steps and actions, both by the applicant for registration as by the registration authority. The procedure to apply for pesticide registration is as below[23]:

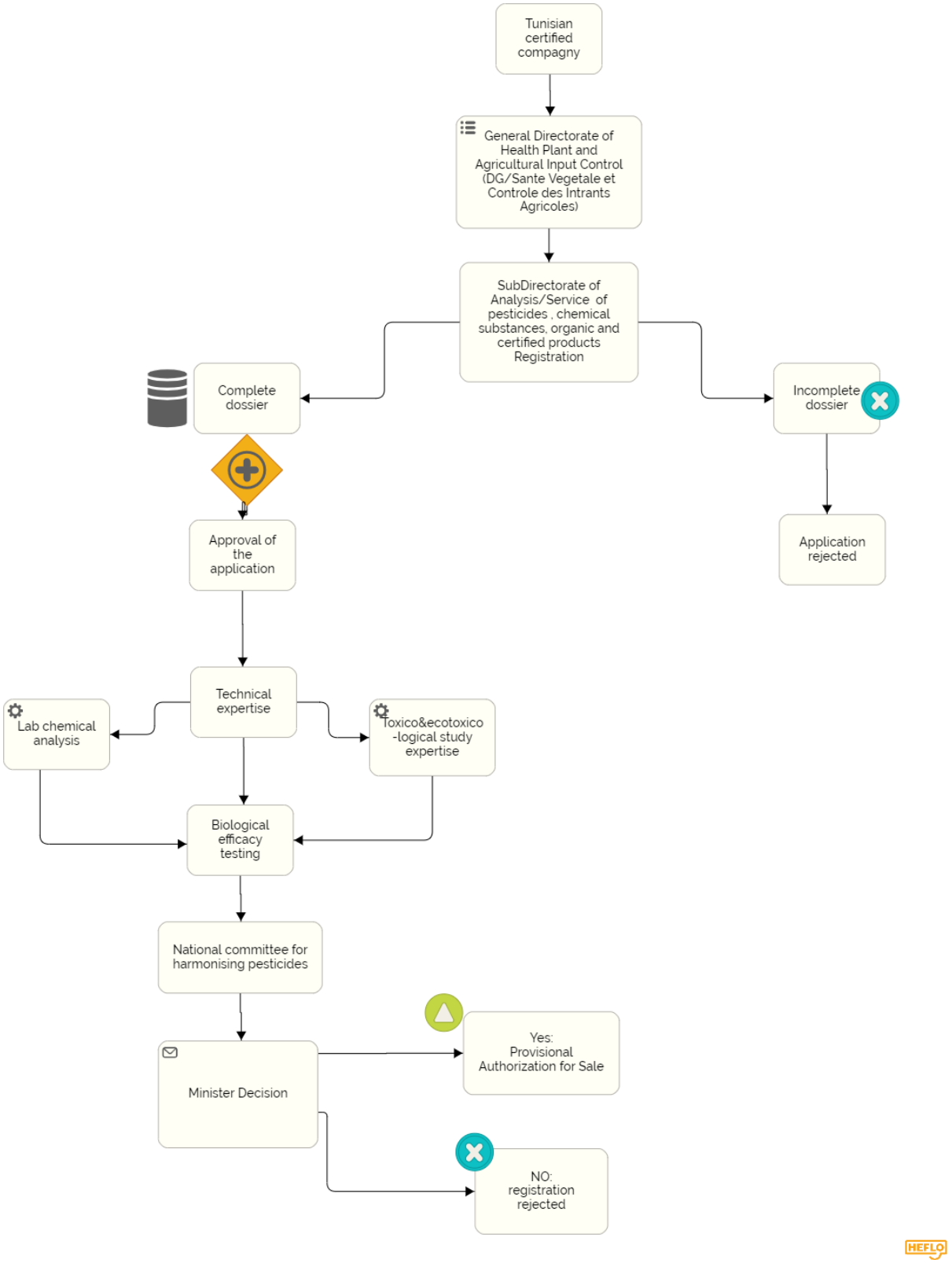
[20] http://www.legislation.tn/sites/default/files/journal-officiel/1992/1992F/Jo05192.pdf

[21] http://www.legislation.tn/sites/default/files/fraction-journal-officiel/1999/1999F/005/TF199951.pdf

[22] https://agriexchange.apeda.gov.in/IR_Standards/Import_Regulation/FoodandAgriculturalImportRegulationsandStandardsReportTunisTunisia752019.pdf

[23] UNEP-FAO-RC-Workshop-Tunisia-20161220.French.pdf

Fig1: Tunisian pesticide registration process



The decree no 2010-2973[24] is also trying to manage pesticide manufacturing, importation, formulation, conditioning, storage, sale, distribution and the condition of use of the pesticides of extreme danger for agricultural use. Additionally, the decree of the Ministry of Agriculture dated June 4, 2008[25] listed six active ingredients of pesticides as extremely dangerous for agricultural use. These are: aldicarb, sodium arsenite, Brodifacoum, Bromadiolone, Bromethalin and Chlorophacione.
The assessment of the pesticide before regulation, according to the law of pesticide registration, should include:

- a scientific evaluation which will serve to determine the risk that they may present for human health and the environment (not applicable yet)
- an evaluation of their biological effectiveness
- an appraisal of whether the pesticides are prohibited from being imported, marketed and used.

The financial pesticide assessment is carried out by the importers and the biological effectiveness analyses on pests and productivity is carried by agriculture institutions.

3.2 Authorities responsible for the registration of pesticides, role of different ministries in the country

The Ministry of Agriculture sets up and coordinates an inter-ministerial technical committee to assume the role of pesticide registration board. The assigned body is directly responsible for issuing all licenses and permits related to pesticides management. The members of assigned technical commissions are as follows:

- The president of the committee represented by the executive chair for Protection and the Control of Agricultural Products Quality (DGPCQPA), presently GD/Plant Health and Agricultural Input Control (DG/SVCIA) under the Ministry of Agriculture
- Members are from: Department of Crop Insurance; National Agricultural Research Institute of Tunisia; Ministries of Health (ANCSEP), Trade and Industry
- Observers: NGOS (2 NGOS: AEEFG and ATPP); Tunisian Union for Industry, Trade and Handicrafts (UTICA)

Additional to the national technical committee for harmonizing pesticides, other ministries deal with the management of pesticides as described in the Table 1 below:

[24] http://www.nasraouibouzid.tn/Presentations/PesticideReformNasraoui2016.pdf

http://www.nasraouibouzid.tn/Livres/LivreB.pdf

[25] http://www.agriculture.tn/images/PIAIT3.pdf

Table 1. Authorities responsible for pesticide related decisions

Authorities		Role
Ministry of Agriculture	GD/Plant Health and Agricultural Input Control (DG/SVCIA)	i) control the marketing of pesticides and agricultural inputs, ii) control the quality of products locally, approve them and prepare a specific guide and approve pesticides for agricultural use and prepare a specific guide, iii) assess the biological efficiency of pesticides for agricultural use, iv) control biological control agents, v) ensuring liaison and coordination with national and international establishments specializing in health control, the quality of inputs and plant products, vi) monitor the development of quarantine pests, set up programs to control their spread, vii) carry out national campaigns to combat pests, monitor their execution and evaluate the achievements and give, if necessary, the necessary alerts for the fight against plagues, and viii) control and analyze residues of agricultural products.
	Laboratory for pesticides control and analysis	i) phytosanitary conformity control of products ii) analysis of pesticide residues
	The Agency for Agricultural Extension and Training	i) training ii) information awareness with farmers
	Regional Commissaries for Agriculture Development	advise and assist farmers in phytosanitary treatment and pesticide management
Ministry of Environment	General Directorate of Environment and Life Quality (DGEQV)	i) assess general environmental situation ii) prepare guidelines on national policy for environment protection and enhancement of quality of life iii) elaboration of action plans for natural resources protection iv) reduction and, if feasible, elimination of domestic and industrial waste
	National Agency for Management of Waste (ANGeD)	i) development of a national strategy and program for the integrated and sustainable management of waste, including pesticides and dangerous chemicals ii) establishment and coordination for management of recycling and collecting waste
	National Agency for Environment Protection (ANPE)	control all sources of pollution
Ministry of Health	National Agency for Sanitary and Environment Products Control (AN CSEP)	i) provide advice to facilitate the use of pesticides for sanitary use and locally formulated pesticides ii) member of the national committee for pesticide registration
	Center of Medical Emergency Assistance (CAMU)	i) emergency care of poisoned patients, and identification /evaluation of sources of intoxications ii) conduct studies and research regarding the use of pesticides, causes of the poisoning and others
Ministry of Social Affairs	Occupational Health and Safety Institute (ISST)	i) training, information and awareness-raising related to risks caused by pesticides abuse and the non-conformity to sanitary standards ii) establishment of study and surveys with target people using pesticides for evaluation of the level of sanitary and safety, best practices, and level of risks and hazards perception caused by pesticides
	Occupational Examination and Safety Department	i) contribute to the development of legislation and regulations in occupational health and safety ii) perform the medical ability test for workers and for victims of accidents at work and occupational diseases

3.3 International chemical conventions related to the country ratified

Table 2. International chemical conventions Tunisia ratified

International chemical conventions related to pesticides	Status	Designated National Authority for each convention	Focal person
Stockholm	Ratification (13 April 2004)	Ministry of Environment	Mr. Youssef Zidi
Basel	Ratification (11 October 1995)	Ministry of Environment	Mr. Abderazek Marzouki
Montreal Protocol	Accession (25 Sep 1989)	Ministry of Environment	Mr. Youssef Hammami
Rotterdam	Ratification (9 Feb 2016)	Ministry of Agriculture	Mr. Chaabane Moussa
International Plant Protection Convention	Accession (22 July 1971)[26]	Ministry of Agriculture	Mr. Mohamed Lahbib Ben Jamaa

Furthermore, and related to pesticides management, Tunisia has adopted the following codes and agreements:

- The International Code of Conduct on the Distribution and Use of Pesticides
- Agreement on the Application of Sanitary and Phytosanitary Measures (the SPS Agreement)
- Strategic Approach to International Chemicals Management (SAICM)
- Globally Harmonized System (GHS) of classification and labeling of chemicals

4. Status of pesticide use in Tunisia

4.1 The list of nationally registered pesticides

Tunisia registered 215 active ingredients of pesticides and distributed them on the national market under 493 commercial brand names.
The number of pesticide active ingredients according to the type of pests they supposed to control are indicated in Table 3 & 4 below[27]:

Table 3. Number of active ingredients/commercial brands registered in Tunisia by type of pest

Type of pest control	Active substances	Commercial brands
Insecticides	**64**	**174**
Fungicides	**69**	**205**
Herbicides	**48**	**92**
Nematicides	**06**	**07**
Rodenticides	**03**	**06**
Others	**18**	**32**

[26] https://www.senat.fr/rap/l04-044/l04-044_mono.html

[27] Projet d'Identification de l'Agriculture Irriguée en Tunisie (Piait), Mars 2018

Table 4. List of active ingredients of pesticides registered in Tunisia[28]:

2,4 - D	**Bacillus (C 100 B + B 99)**	**Clodinafop-propargyl**	**Difenoconazole**	**Fenpropimorphe**	**Glufosinate**	**Mancozeb**	**Myclobutanil**	**Protein hydrolysate Borax**	**Sulfosulfuron**	**Trimethylamine HCl**
2,4 –D EHE	**Bacillus subtilis de souche Y 1336**	**Clofentezine**	**Diflubenzuron**	**Fenpyrazamine**	**Glyphosate**	**Mandipropamide**	**Nerolidol**	**Protein hydrolyzate**	**Sulfoxaflor**	**Triticonazole**
2,4 D -Ester butylglycol	**Bacillus thuringiensis**	**Clomazone**	**Diflufenican**	**Fenpyroximate**	**Haloxyfop-R**	**Manebe**	**Non-ionic oil**	**Prothioconazole**	**Sulfur**	**Zeta-cypermethrin**
2,4-D Acide (2Ethylhexyl ester)	**Benalaxyl**	**Clopyralid**	**Diméthoate**	**Ferag 1D TM**	**Helicoverpa armigera nucleopolyhedrovirus**	**MCPA**	**OXAMYL**	**Pymetrozine**	**Sulfuric esters**	**ZIRAM**
2,4-D Sel d'amine	**Bentazone**	**Cloquintocet-2-Mexyl**	**Dimethomorph**	**Florasulam**	**Hexythiazox**	**Mefenoxam**	**Oxyfluorfene**	**Pyrachlostrobin**	**Tau-fluvalinate**	**Zoxamide**
2,4-D Sel de Dimethylamine	**BHT**	**Copper**	**Dimoxystrobine**	**Fluazifop-P-Butyl**	**Huile parafinique**	**Méfenpyr**	**Penconazole**	**Pyraclostrobin**	**Tebuconazole**	
2.4 D EHE	**Bifenazate**	**Copper hydroxide**	**Dinocap Meptyl**	**Fluazinam**	**hydrochloride**	**Mefenpyr Diethyl**	**Pencycuron**	**Pyrethrins**	**Tebufenpyrad**	
3,8Tetradecatrien1 - y acetate	**Borax**	**copper metal**	**Diquat**	**Flubendiamide**	**Hydrogen cyanamide**	**Meptyldinocap**	**Pendimethaline**	**Pyridalyl**	**Teflubenzuron**	
90,5% of neem oil	**Boscalid**	**Copper Oxychloride**	**Diquat dibromide**	**Flucarbazone-sodium**	**Hydrolyzed protein**	**Mesosulfuron**	**Phenamiphos**	**Pyrimethanil**	**Tefluthrine**	
Abamectin	**Brodifacoum**	**Copper sulfate**	**Dithianon**	**Fludioxonil**	**Hymexazole**	**Mésosulfuron-Méthyl (Mesomax)**	**Phenmediphame**	**Pyrimicarbe**	**Tepraloxydim**	
Acetameprid	**Bromuconazole**	**Cyantraniliprole**	**Dodine**	**Flufenacet**	**Imazamox**	**Metaflumizone**	**Phosmet**	**Pyriproxyfen**	**Terbuthylazine**	
Acibenzolar-Smethyl	**Bupirimate**	**Cycloxidime**	**DSM 14940 + DSM 14941**	**Flufenoxuron**	**Imidaclopride**	**Metalaxyl -M**	**Phosphide of Hy.**	**Pyroxsulam**	**Thiabendazole**	
Aclonifen	**Capsaicine**	**Cyflufenamid**	**E3Z8Z11-14Ac**	**Flumetsulame**	**Indolbutiric beta acid**	**Métaldéhyde**	**Phosphure d'Al.**	**Pythium oligandrum**	**Thiacloprid**	
Acrinathrin	**Captan**	**Cymoxanil**	**Emamectin benzoate**	**Fluopicolide**	**Indoxacarbe**	**Metam potassium**	**Phosphure de Magnésium**	**Quizalofop p-tefuryl**	**Thiamethoxam**	

[28] Liste pesticides Avril 2017

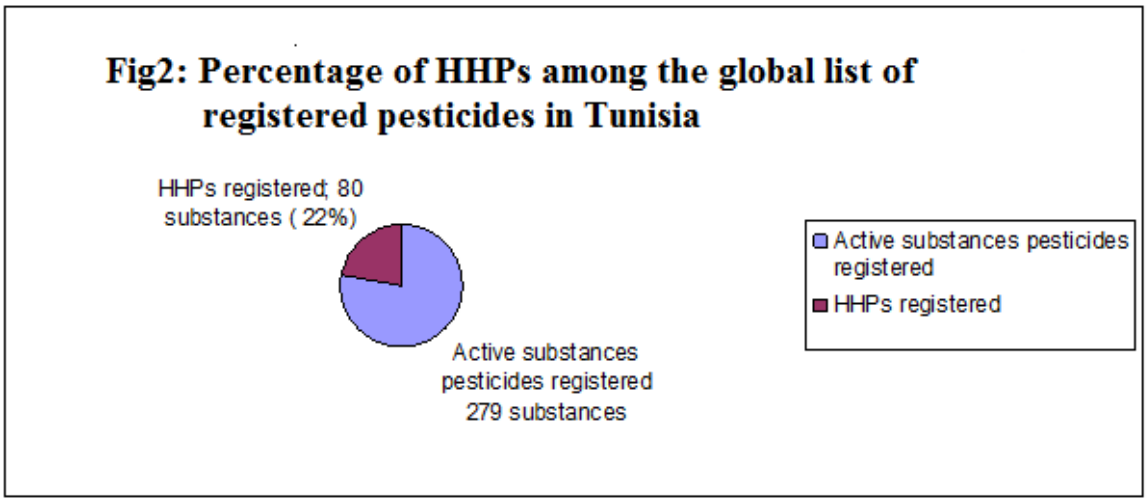
AlkylphenolexyEthylène	**Carbandazime**	**Cypermethrin**	**Epoxiconazole**	**Fluopyram**	**Iodosulfuron**	**Metam sodium**	**Picoxystrobine**	**Reynoutria sachalinensis**	**Thifensulfuron-methyl**	
Ally Isothiocyanate	**Carfentrazone-ethyl**	**Cyproconazole**	**Esfenvalerate**	**Fluoxastrobine**	**Iodosulfuron-Methyl**	**Metazachlor**	**Pinoxaden**	**Saflufenacil**	**Thiocyclam hydrogen oxalate**	
Alphamethrin	**Chinozole**	**Cyprodinil**	**Ethofumesate**	**Flupyradifurone**	**Iodosulfuron-Méthyl Sodium**	**Metconazole**	**Pirimiphos-methyl**	**Sedexane**	**Thiophanate-methyl**	
Ametoctradin	**Chlorantranili-prole**	**Cyromazine**	**Ethoprophos**	**Fluroxypyr**	**Iprodione**	**Methiocarb**	**Polyoxyethylene amine**	**Simazine**	**Triadimenol**	
Amidosulfuron	**Chlormequat-chlorure**	**DDVP**	**Etoxazole**	**Flurtamone**	**Iprovalicarb**	**Methomyl**	**Prochloraze**	**S-metolachlor**	**Triasulfuron**	
Aminopyralid	**Chloro 4 phenoxyacetic acid**	**Deltamethrin**	**Famoxadone**	**Flutriafol**	**Isoxabene**	**Methoxyfenozide**	**Prohexadione-Calcium**	**Sodium lauryl ether sulfate (SLES)**	**Tribasic copper sulfate**	
Aminotriazole	**Chloroprophame**	**Desmedipham**	**Farnesol**	**Fluxapyroxad**	**Kresoxim methyl**	**Metirame of zinc**	**Propamocarbe**	**Spinetoram**	**Tribunuron-methyl**	
Amisulbrom	**Chlorothalonil**	**Diafenthiuron**	**Fenamidone**	**Folpel**	**Kresoxim-methyl**	**Metosulame**	**PROPICONAZOLE**	**Spinosad**	**Trichoderma harzianum T-22**	
Ammonium acetate	**Chlorpyriphos Ethyl**	**Diaminoalcane**	**Fenazaquin**	**Formate d'Ethyl**	**lambda-Cyhalothrin**	**Metrafenone**	**Propinebe**	**Spirodiclofen**	**Trifloxystrobine**	
Ammonium thiocyanate	**Chlorpyriphos-Méthyl**	**Dicamba**	**Fenhexamide**	**Fosetyl –Al**	**Linuron**	**Metribuzine**	**Propoxycarbazon Sodium**	**Spiromesifen**	**Triflumuron**	
Aurebasidium pillulan (2 souches)	**Chlortoluron**	**Dichloroprop-p**	**Fénoxaprop-p-Ethyl**	**Gamma-cyhalothrine**	**Lufenuron**	**Metsulfuron-méthyl**	**Propyzamide**	**Spirotetramat**	**Trifluralin**	
Azadirachtin	**Chromafénozide**	**Diethofencarb**	**Fenoxycarb**	**Geraniol**	**Magnesium phosphide**	**Milbemectin**	**Proquinazid**	**Spiroxamine**	**Trimethylamine**	
Azoxystrobin	**Cléthodime**	**Difenacoum**	**Fenpropidine**	**Gibberellic acid**	**Malathion**	**Mineral oil**	**Prosulfocarb**	**Spores de lecanicillum muscarium souche 1979**	**Trimethylamine hydrochloride**	

4.2 The list of HHPs amongst list of nationally registered pesticides

4.2.1 Active ingredients

Table 5. List of HHPs active ingredients among the national registered pesticides in Tunisia

Abamectin	Deltamethrin	Fenpyroximate	Kresoxim-methyl	Methomyl	Propinebe	Trifluralin
Acrinathrin	Diafenthiuron	Fluazifop-P-Butyl	lambda-Cyhalothrin	Metirame of zinc	Pymetrozine	Zeta-cypermethrin
Amisulbrom	Difenacoum	Flufenoxuron	Linuron	Metribuzine	Pyridalyl	ZIRAM
Borax	Diméthoate	Folpel	Lufenuron	Milbemectin	Spinetoram	
Brodifacoum	Dimoxystrobine	Gamma-cyhalothrine	Magnesium phosphide	Mineral oil	Spinosad	
Chlorantraniliprole	Dinocap Meptyl	Glufosinate	Malathion	OXAMYL	Spirodiclofen	
Chlorothalonil	Diquat	Glyphosate	Mancozeb	Oxamyl	Sulfoxaflor	
Chlorpyrifos-Methyl	Emamectin benzoate	Haloxyfop-R	Manebe	Oxyfluorfene	Tefluthrine	
Copper hydroxide	Epoxiconazole	Hexythiazox	Metaflumizone	Paraffin oils	Tepraloxydim	
Copper hydroxide	Esfenvalerate	Imidaclopride	Metam potassium	Pendimethaline	Thiacloprid	
Cypermethrin	Ethoprophos	Indoxacarbe	Metam sodium	Phosmet	Thiamethoxam	
Cypermethrin	Fenazaquin	Iprodione	Metam sodium	Pirimiphos-methyl	Thiophanate-methyl	
DDVP	Fenoxycarb	Iprovalicarb	Methiocarb	Propiconazole	Triadimenol	



4.2.2 Crops using HHPs

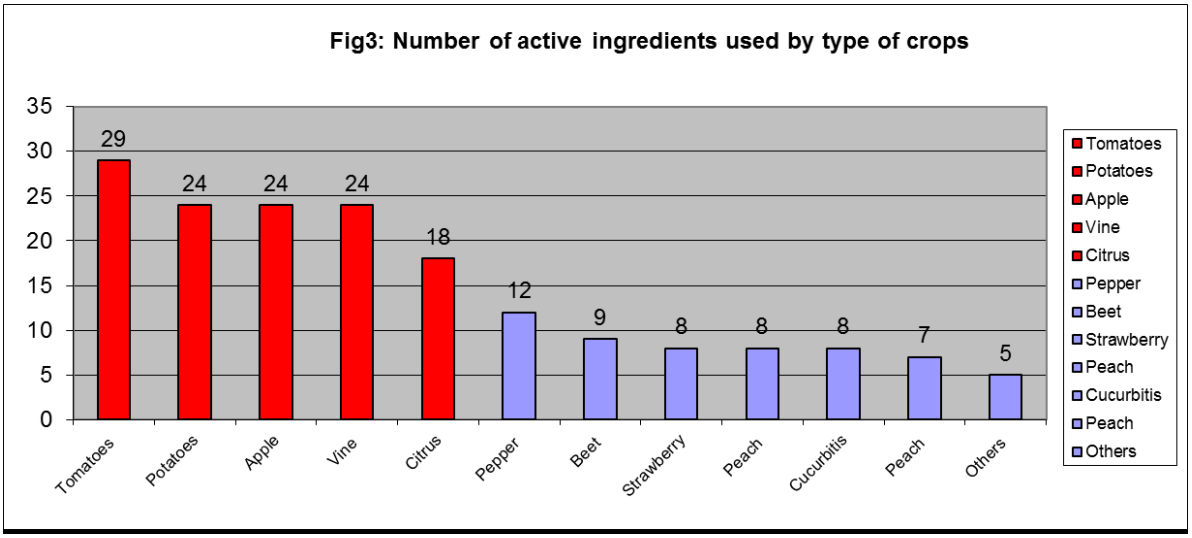
Table 6. Crops that use HHPs in Tunisia

ACTIVE INGREDIENT	Crops using HHPs
Insecticides	
Acrinathrin	Tomatoes-Olive tree- Apple tree- Peach
Borax	Tomatoes-Grapes-Strawberry
Chlorantraniliprole	Tomatoes- Apple-Chili-Pear
Lambda-Cyhalothrin	Tomatoes- Sugar beet- Faba bean- Chili piment- Cucurbits-Grapes- Apple-Pear-Grapes- - Olive tree- Vegetable crops- Fruit trees-All crops
Deltamethrin	Tomatoes- Peppers- Cucurbits- Beet- Cereals- Faba bean-Vegetable crops -Olive tree - Potatoes- Pear – Apple- Peach- Corn-Legumes-Pomegranate tree- Citrus fruits- Forest
Emamectin benzoate	Tomatoes
Fenazaquin	Tomatoes- Olive tree- Apple tree
Fenoxycarb	Tomatoes- Apple-Pear- Grapes
Lufenuron	Tomatoes- Apple- Grapes-Citrus- Eggplant
Fenpyroximate	Tomatoes- Apple
Gamma-cyhalothrin	Apple
Hexythiazox	Tomatoes- Chili- Citrus
Imidaclopride	Tomatoes – Chili- Citrus- Apple- Peach- Grapes-Greenhouse crops
Indoxacarbe	Tomatoes
Metaflumizone	Tomatoes
Milbemectin	Vegetable crops, Fruit trees
Phosmet	Fruits trees- Pear -Peach- Citrus
Pyridalyl	Tomatoes
Spinetoram	Tomato - Chilli –Pear-Market gardening crops in greenhouses
Spinosad	Tomatoes-Greenhouse tomatoes and crops – Grapes- Strawberry- Storage potato-Citrus- Olive trees
Spirodiclofen	Tomatoes- Apple- Pear- grapes-Citrus
Sulfoxaflor	Tomatoes- Citrus
Thiacloprid	Tomatoes -Chili – Cucurbits- Strawberries- Apple –Pear- Peach
Thiamethoxam	Tomatoes- Chili- Cucurbits –Citrus- Sugar beet - Cereal seeds – treatment of Wheat seeds
Mineral oil	Apple- Citrus fruits- Vin

Abamectin	Tomato- Strawberry- Pear- Apple -
Pirimiphos-methyl	All crops
Zeta-cypermethrin	Tomatoes- Potatoes
Borax	Tomatoes-Grapess- Strawberries
Chlorpyrifos-methyl	Tomatoes –Peppers- Apple- Peach
Cypermethrin	Tomatoes – Potatoes- Beet-Olive trees- Crops market gardeners- Field crops – Cereals- Corn- Fruit trees- Pear- ground crops
Diafenthiuron	Tomatoes- Cucurbits –Apple-Citrus
Diméthoate	Olive tree- Fruit trees (except Citrus)- All crops
Flufenoxuron	Tomatoes- Apple -Citrus
Malathion	All crops- Olive tree- Arbo- Grapes- Citrus-
Metam sodium	Tomatoes- Tobacco
Methiocarb	Tomato- Chili- Grapes- Nectarine
Methomyl	Crops Market gardeners -Pepper - Corn
OXAMYL	Tomatoes
Aluminium-phosphide	Disinfection stored products: almond, pistachio, hazelnut, pine nut, cocoa, cereals, legumes, dates
Magnesium-phosphide	Dates- Storage tobacco
Pymetrozine	Tomatoes -Potato- Apple-Peach-
Tefluthrin	Beet- Potato- Chili
Fungicides	
Amisulbrom	Tomatoes- Potato -Grapes
Kresoxim-methyl	Grapes- Apple
Copper hydroxide	Potato –Grapes-Apple
Metirame of zinc	Tomatoes- Potato- Grapes- Lettuce-
Folpel	Tomato - Potato -Grapes- Downy mildew
Dinocap Meptyl	Grapes
Dimoxystrobine	Wheat
IPROVALICARB	Tomatoes- Grapes- Downy mildew
Thiophanate-Méthyl	Cucurbits- Wheat- Grapes- Apple- Melon
Triadimenol	Chili –Grapes-Apple- Strawberry- Cereals- Wheat
Chlorothalonil	Tomatoes-Potatoes- Cucurbits - Legumes -Wheat- Bean - Melon - Faba bean- Strawberry- garlic- onion -Durum wheat

Epoxiconazole	Wheat- Barley- Septoria leaf spot
Propiconazole	Wheat -Durum wheat- Barley- Oats
Mancozeb	Tomatoes- Potatoes- Cucurbits -Cucumber- Vegetable crops- Strawberry- Melon- Grapes- Apple- pear -greenhouse crops- Beet –Wheat- Arbo- Ornamental crops- Tobacco
Copper hydroxide	Tomatoes- Grapes- Strawberry -Arbo
Iprodione	Tomatoes- Strawberry –Apricot- Grapes- Apple - Tomato,
Maneb	Vegetable crops –Potato- Grapes- Wheat- tobacco
Propineb	Tomatoes- Potato- Grapes- Fruit Trees -Tobacco
ZIRAM	Pear -Fruit trees
Herbicides	
Diquat (bromide)	Potato
Glyphosate	Citrus - Fruitculture
Metribuzin	Tomatoes – Potato- Tobacco
Fluazifop-P-Butyl	Beetroot - Faba bean- Legumes -Chickpeas
Oxyfluorfen	Onions- Citrus- Fruitculture-
Glufosinate	Arbo- Desiccation of the potato
Haloxyfop-R (Haloxyfop-methyl)	Potatoes- Beet- Rapeseed - Sunflower
Linuron	Potato- Onion –Carrot- Cumin- Caraway - Grasses, broadleaf weeds
Pendimethalin	Tomatoes- Potato- Onion - Garlic
Tepraloxydim	Potato- Peas
Trifluralin	Sunflower, Legumes
Nematicides	
Ethoprophos	Extra crop- greenhouse cultivation- Seasonal cultivation
Metam potassium	Tomatoes
Metam sodium	Tomato- Tobacco
Oxamyl	Potatoes
Rodenticides	
Brodifacoum	Rat, field mouse and house mouse
Others	
Cyanamide-hydrogen	Grapes–Apple-Peach

Difenacoum	All cultures
Cypermethrin	Potatoes
DDVP	Mass trapping in integrated pest management
Paraffin oils	Potatoes- Beet- Fruitculture
Esfenvalerate	Citrus fruits



Among the populations producing this fruit, Tunisia is the largest consumer of canned tomatoes in the world, with an individual annual consumption estimated at 60 kg of industrial tomatoes (equivalent to 10 kg of double concentrate of tomatoes). The diagram above shows that tomato culture is highly treated with HHPs. In the same way, Tunisia largely produces potatoes that are highly consumed[29].

Some research[30] on pesticides residues on table grapes mentioned that 'Sixty-four table grape samples from different regions of Tunisia were collected during three consecutive years (2015–2017). The presence of 96 pesticides, including dithiocarbamates, was assessed. Pesticides identification and quantification were performed by liquid or gas chromatography, coupled to tandem mass spectrometry. All samples contained multiple residues (4 to 24 residues), with an average of 11.6 residues per sample. Individual concentrations of pesticides in grapes ranged from 0.01 to 5.86 mg kg^{-1}'.

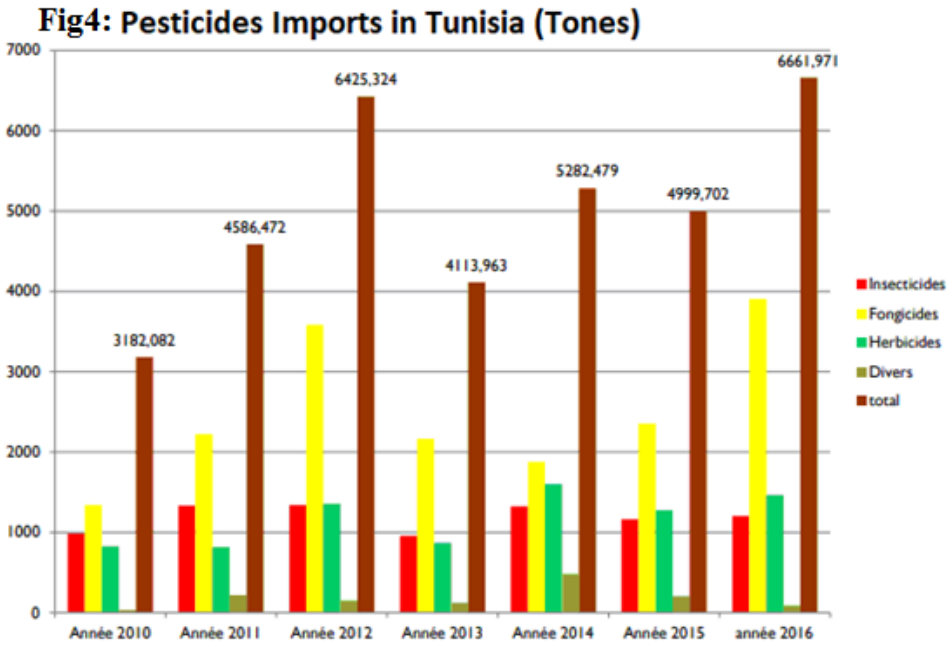
4.3 General data on the volume of use of HHPs for agriculture

There is a big gap of an inventory for volume by type of pesticides used. It is a global volume not a specific one, as shown in the diagram below[31]:

[29] http://inc.nat.tn/sites/default/files/document-files/Article%204%20Contexte%20%C3%A9conomique.pdf

[30] https://www.ncbi.nlm.nih.gov/pubmed/30764749

[31] http://inc.nat.tn/sites/default/files/document-files/Pesticides-Tunisie-%20Tarak%20ZARAI.pdf



4.4 General data on the volume of use of HHPs for non-agriculture (household and public health) purposes

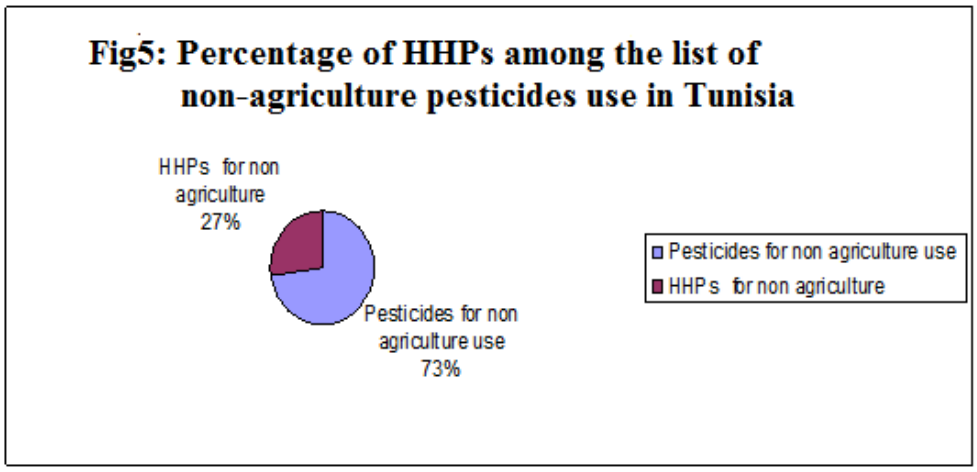
The active ingredients of pesticides for non-agricultural use are controlled by the Ministry of Health. The Table 7 below represents the active ingredients[32] compared to the HHPs:

Table 7. Active ingredients of pesticides used for household and public health in Tunisia

Pesticides for non-agricultural use	HHPs for non-agricultural use
(Z),9Tricozène	Bifenthrin
Acide Borique Sodium	Boric acid
Alphacypermèthrine	Brodifacoum
Bacillussphaericus	Bromadiolone
Bacillusthuringiensis	Bromethalin
Bifenthrine	Carbamate
Biopybuthrine	Chlorophacinone
Bioresmesthrine	Chlorpyrifos
Brodifacoum	Coumatetralyl
Bromadiolone	Cyfluthrin
Bromethaline	Deltamethrin
Carbamate	Difenacoum
Chlorpyrifos	Difethialone
ChlorpyrifosEthyl	Fenitrothion
Ciphenothrine	Fipronil
Coumachlore - Cyfluthrin	Imidacloprid
Coumatetralyl	Imiprothrin
Cyphénothrine	Lambda-cyhalothrin
D,phénothrin - D,Trans pralletrine	Permethrin
D,phenothrine	Prallethrin
D,Tetraméthrine	Propoxur

[32] http://www.agriculture.tn/images/PIAIT3.pdf p53, version Mars 2018

Deltaméthrine	Pure temephos
Denatonium Benzoate	Spinosad
Difethialone	Tetramethrin
ETOC	Tetraméthrine
Fipronyl	
Geraniol	
Huile de citronnelle - Hydramethylnon	
Huile essentielle de lavande	
Icaridine	
Imiprothrine	
Isopropoxy Phényl Méthyl	
Lambda cyhalothrine	
Lthomyl	
Meperfluthrine	
N,NDiéthyltoluamide	
Piperonyl Butoxide	
Pirimiphosmethyl	
Prallethrine	
Propoxur	
Pyrèthre	
Pyrethrine	
S.bioallethrine	
Spinosad	
Sumithrine	
Sumithrine Neopynamine	
Tetraborate	
Tetraméthrine d	
Acide borique	
Allethrin	
Alphachloralose	
Bioallethrine	
Chlorophacinone	
Coumafene	
Dazinon	
Difenacoum	
Diflubenzuron	
Epis de mais	
Esbiothrine	
Fenitrothion	
Imidacloprid	
Permethrine	
Pynamin forte	
Pyriproxyfen	
Temephos	
Tetramethrine	



As mentioned in the previous paragraph, there is a lack of specific inventory for pesticides.

4.5 List of HHPs banned in other countries but in use in Tunisia (Table 8)

Table 8. List of HHPs banned in other countries but used in Tunisia

List of HHPs banned in other countries but in use in Tunisia					
Insecticides	**Fongicides**	**Herbicides**	**Nematicides**	**Rodenticides**	**Others**
Aluminium phosphide Chlorpyrifos-methyl Cyhalothrin Cypermethrin DiafenthiuronDimethoate Flufenoxuron Magnesium phosphide Malathion Metam sodium Methiocarb Methomyl Oxamyl Pymetrozine Tefluthrin	Chlorothalonil Copper hydroxide Epoxiconazole Folpet Iprodione Mancozeb Maneb Propiconazole Propineb	Diquat (bromide) Fluazifop-P-Butyl Glufosinate Haloxyfop-R (Haloxyfop-methyl) Linuron Oxyfluorfen Pendimethalin Tepraloxydim Trifluralin	Ethoprophos Metam sodium Oxamyl	Brodifacoum	Cyanamide, hydrogen Difenacoum Cypermethrin DDVP Paraffin oils

4.6 Human health, environmental impacts or human rights issues related with HHPs in Tunisia

Few references in Tunisia highlight HHPs, as mentioned below. A recent study elaborated in 2018, 'Pest and pesticides management plan'[33], listed, among the registered pesticides, the

[33] http://www.agriculture.tn/images/PIAIT3.pdf, Version Mars 2018, p; 97-102

pesticides that have at least one health impact. The HHPs references used are the ones created by the World Health Organization, Pesticide Action Network, U.S. Environmental Protection Agency, and International Agency for Research on Cancer. A Tunisian study (published in January 2018) on the effects in pre-pubertal mice of exposure to malathion, demonstrates significant distortion of liver and kidney biochemistry and function in the animals[34]. A relevant study, *Farmers' Risk Perceptions of Pesticides Used for Greenhouses Vegetables Production in Tunisian Center-East*[35], was published in 2018. Additionally, some recent press releases (2019) denounced the use of pesticides banned in Europe and still used in Tunisia, such as imidaclopride. Another title (2020), 'Pesticides in Tunisia, The Poisoned Gift,[36]' revealed that nationally, pesticides are the second leading cause of poisoning after medicines. It also indicates the bad conditions of pesticides use and that farmers are conscious about pesticides' impacts on their health, as they live with health problems.

The National Agency for Sanitary and Environmental Control of Products (ANCSEP), under the Ministry of Health, created a 'National Vigilance System for the Control of Pesticide Risks in Tunisia (SNVP)', but it isn't yet implemented. ANCSEP declared[37] that there is a lack of information, training and awareness in the field of pesticides. ANCSEP carried out two studies; one on pesticides residues in the food chain [38] and the other on total diet study, in order to assess the dietary exposure to pesticide residues. Unfortunately, it is not yet published, although it was completed in 2009.

The emergency department of the medical assistance center (CAMU) in Tunis treats people poisoned with pesticides.

The Occupational Health and Safety Institute has the obligation to train users of pesticides on best available techniques (BAT).

The Professional Pathology and Environment Association declared that in Tunisia, the medical follow-up of exposed workers, particularly in agricultural areas, remains insufficient and statistical data on the professional risks resulting from these exposures are very rare. In 2019 this NGO carried out a study on the impact of pesticides on pregnant farmers[39].

Another study, on the impact of pesticides on health and the environment, was carried out between November 2018 and June 2019 and concerns three governorates (Monastir, Ben Arous and Nabeul). It was the first time that Tunisia carried out such a study under the Ministry of Agriculture, in collaboration with the Food and Agriculture Organization of the United Nations (FAO), UNEP and Rotterdam Convention. The final report is not yet published[40].

The study addresses pesticides with high toxicity and their impacts on human health, whether user (farmer, seller) or consumer.

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[34] https://beyondpesticides.org/dailynewsblog/2018/11/liver-and-kidney-damage-tied-to-exposure-to-the-organophosate-insecticide-malathion/

[35] https://newmedit.iamb.it/bup/wp-content/uploads/2018/12/nm1804d_Jeder.pdf

[36] https://inkyfada.com/en/2020/01/22/pesticides-in-tunisia-a-poisoned-gift/

[37] (https://inkyfada.com/fr/2020/01/22/pesticides-tunisie-agriculture/

[38] Rapport Annuel 2016

[39] Influence du Travail en Milieu Agricole sur le Deroulement de la Grossesse, Revue N 6, Semestre 2019

[40]Rapport de l'atelier de lancement de l'étude sur les effets des pesticides agricoles sur la santé humaine et l'environnement en Tunisie, Tunis du 26-27 septembre 2018 Rome/Genève, Septembre 2018,

A study on professional exposure was conducted to identify the exposure of workers to pesticide's acute toxicity [41].

4.7 The precautionary principle and provisions to phase out HHPs, ban pesticides and deregister the already-registered pesticides

Within the framework of gradually eliminating HHPs, in 2005 Tunisia implemented the African Stockpiles Program to eliminate obsolete pesticides. The program reached the elimination of 1,280 tons of POPs obsolete pesticides (HCH, Lindane, DDT, Dieldrin and Toxaphene).

During all the sessions of national commission for pesticide registration meetings that occur when a new list of pesticides needs approval from the committee, AEEFG studies the new proposed pesticides for registration and compares them to the list of HHPs in order to highlight them at the commission. With the support of representatives from the Ministry of Health, and from CAMU and ANCSEP, some pesticides weren't allowed for registration, Nowadays, ANCSEP and the Ministry of Environment have more awareness about working on HHPs.

4.8 Companies/associations representing the pesticide industry in Tunisia

There are 33 companies representing pesticides companies in Tunisia:

Table 9. Companies representing the pesticide industry in Tunisia

Bioprotection Tunisia	SANABEL AGRO Tunisia
TASMID	Tunisian Chemical Fertilizer Company (STEC)
COTUGRAIN IMPEX Tunisia	AGRIPROTEC Tunisia
El Moussem agricole Tunisia	JADWA AGROTEC Tunisia
SEPCM Tunisia	SOCOOPEC Tunisia
ATLAS AGRICOLE Tunisia	ETS MEZGHANI Tunisia
AGRIMATCO Tunisia	RAYEN PHYTAGRI Tunisia
SOLAGRI Tunisia	INNOVA
AGRONOMIC Land	EL KHADRA
FERTIPLANT	AGRO SYSTEMES
ALOHA Agriculture/PROMOCHIMIE	AMINCO
STIMA	NUTRIPLANT
DELTA AGRICOLE PLUS	SLDA
HALAB TUNISIE	AGRIPLUS
NEGANOR FFT	N B T A
HORTIMED	Linde Gas Tunisie

5. National endeavors to phasing out HHPs

5.1 Projects/programs and campaigns to phase out HHPs

In Tunisia, there isn't a specific plan to phase out HHPs by the government nor by other stakeholders. However, the national implementation plan (NIP) related to the Stockholm Convention on Persistent Organic Pollutants (POPs) includes pesticides classified as POPs and can be considered as a first step to phase out HHPs. We can adopt the same plan as for POPs to phase out HHPs as described in Table 10 below:

[41] Aspects Epidemiocliniques des Accidents de Travail par Intoxication Aiguë aux Pesticides : Étude au Centre d 'Assistance Médicale Urgente de Tunis (2007 – 2015), Revue N 4, Semestre 2016

Table 10. Procedures used to ban POPs in Tunisia

Theme	**Projects / actions**
Governance	-Drafting decree related to the implementation of the Stockholm Convention -Good governance in charge of managing POPs in Tunisia, by setting up an inter-ministerial coordination mechanism -Establish national profiles in charge of health and environment safety -Strengthen the information exchange system -Strengthen national information, awareness and education systems for workers and other people in contact with POPs by developing a program on Information and Awareness on the impacts of POPs on health and the environment
Contaminated sites	-Urgent intervention: transfer of POPs stocks - Detailed studies of health and environmental risks linked to contaminated sites - Removal of stocks and decontamination and remediation of contaminated sites
Assessment	-Monitoring use and fate of POPs pesticides already present and in use in the country

5.2 Main challenges in the process of campaigning the phasing out of HHPs

Tunisia has carried out only a few projects in the field of pesticides related specifically to health and the environment. Some sporadic research has been carried out by different institutions, but the information isn't assembled on a unique platform. The field of pesticides in Tunisia, though well-structured through institutions and law, suffers from many gaps that concern:

- Lack of data on volume of pesticides used by substance ingredient
- Lack of pesticide data base from the government institutions
- Lack of studies on impacts on health and environment
- Lack of analyses related to toxicity, residues on food and others
- Lack of training farmers on BAT regarding pesticides
- Lack of information and awareness

All the gaps mentioned above need efforts from different stakeholders, with financial support, to be properly addressed.

5.3 Recommendations and project ideas that support the national HHPs phase out

The agricultural Tunisian sector suffers some constraints, among which are:

- Limited natural resources: hardly arable lands, severe erosion,
- Poor average rainfall: irregular rain in space and time,
- Increasing frequency and severity of extreme phenomena such as droughts and floods: hail and torrential rain are the most dreaded phenomena by farmers,
- Rising temperatures by 2.1 C° and decrease in rain by -10 to -30% by 2050, and
- Increasing severity of extreme phenomena with gradual decrease of arable lands.

This report is a very good opportunity to provide information about HHPs in Tunisia. It is considered as a first step to phase out HHPs and should be followed by other projects.

The most urgent project needed to support national HHPs phase out is analysis of different variables and the development of an assessment of the results in a matrix. According to the information revealed by this report, the assessment should cover:

- Implementation of SAICM resolution on HHPs
- Analysis of drinking water samples to evaluate the level of HHPs
- Advocating the results of analysis with ANCSEP - the institution in charge for sanitary and environment control
- Identification and support of a national strategy- according to the resolution on HHPs- in order to prepare a draft work plan on banning HHPs

APPENDIX I: Remarks on pesticides banned in EU[42]

Pesticides banned in EU	Remarks
Ammonium acetate	Substance fulfilling criteria Annex VI Reg. 2229/2004
Chlorpyrifos-methyl	Withdrawal of authorisations by 16 February 2020.Max. period of grace: 16 April 2020.
Desmedipham	Withdrawal of authorisations: 1 January 2020 Max. Grace period: 1 July 2020
Dimethoate	CORRIGENDA Grace period for plant protection products used on cherries: 30 September 2019Grace period for plant protection products used on other crops: 30 June 2020Withdrawal of
Diquat	Withdrawal authorisations by 4 May 2019. Max period of grace: 4 February 2020.
Fenamidone	Withdrawal authorisations by 14 February 2019. Max period of grace: 14 November 2019.
Flucarbazone-sodium	Never notified and authorised in the EU
Flurtamone	The original RMS was France. Non-renewal of approval voted in October 2018. Withdrawal authorisations by 27 June 2019. Max period of grace:27 March 2020.
Malathion	Ban as plant protection product (AnnexI of Directive91/414: 1376/07)[43]
Simazine	Severe restriction (775/2004)
Thiocyclam	Ban (777//2006)

[42] https://ec.europa.eu/food/plant/pesticides/eu-pesticides-Database/public/?event=activesubstance.selection&language=EN

[43] https://www.pan-europe.info/old/Resources/Links/Banned_in_the_EU.pdf

APPENDIX II: The impacts of HHPs used in agriculture according to the PAN criteria - March 2019

					Group 1: Acute Toxicity				Group 2: Long term effects									Group 3: Environmental toxicity				
	CAS number	**Pesticide**	**Grouped (see page 21)**	**Sum of max=1 in Groups 1-4**	WHO Ia	WHO Ib	H330	**max = 1**	EPA carc	IARC carc	EU GHS carc (1A, 1B)	IARC prob carc	EPA prob likel carc	EU GHS muta (1A, 1B)	EU GHS repro (1A, 1B)	EU EDC (1) or C2 & R2 GHS	**max = 1**	very bio acc	very pers water, soil or sediment	very toxic to aq. organism	highly toxic bees	**max = 1**
1	71751-41-2	Abamectin		**2**			1	**1**									**0**				1	**1**
2	101007-06-1	Acrinathrin		**1**				**0**									**0**				1	**1**
3	348635-87-0	Amisulbrom		**1**				**0**									**0**		1	1		**1**
4	1303-96-4	Borax; Borate salts	**1**				**0**							1		**1**					**0**	
5	56073-10-0	Brodifacoum		**2**	1		1	**1**							1		**1**					**0**
6	500008-45-7	Chlorantraniliprole		**1**				**0**									**0**		1	1		**1**
7	1897-45-6	Chlorothalonil		**2**			1	**1**					1				**1**					**0**
8	5598-13-0	Chlorpyrifos-methyl		**1**				**0**									**0**				1	**1**
9	20427-59-2	Copper (II) hydroxide		**2**			1	**1**									**0**		1	1		**1**
10	52315-07-8	Cypermethrin		**1**				**0**									**0**				1	**1**
11	62-73-7	Dichlorvos; DDVP		**2**		1	1	**1**									**0**				1	**1**
12	52918-63-5	Deltamethrin		**2**				**0**								1	**1**				1	**1**
13	80060-09-9	Diafenthiuron		**1**				**0**									**0**				1	**1**
14	56073-07-5	Difenacoum		**2**	1			**1**									**0**	1				**1**
15	60-51-5	Dimethoate		**1**				**0**									**0**				1	**1**
16	149961-52-4	Dimoxystrobin		**2**				**0**								1	**1**		1	1		**1**
17	39300-45-3	Dinocap		**1**				**0**							1		**1**					**0**
18	85-00-7	Diquat dibromide		**1**			1	**1**									**0**					**0**
19	155569-91-8	Emamectin benzoate		**1**				**0**									**0**		1	1	1	**1**
20	133855-98-8	Epoxiconazole		**1**				**0**					1		1	1	**1**					**0**
21	66230-04-4	Esfenvalerate		**1**				**0**									**0**				1	**1**
22	120928-09-8	Fenazaquin		**1**				**0**									**0**				1	**1**
23	72490-01-8	Fenoxycarb		**2**				**0**					1				**1**				1	**1**
24	134098-61-6	Fenpyroximate		**1**			1	**1**									**0**					**0**
25	69806-50-4	Fluazifop-butyl		**1**				**0**							1		**1**					**0**
26	101463-69-8	Flufenoxuron		**1**				**0**									**0**	1		1		**1**
27	133-07-3	Folpet		**1**				**0**					1				**1**					**0**
28	76703-62-3	Cyhalothrin, gamma		**1**				**0**									**0**				1	**1**
29	77182-82-2	Glufosinate-ammonium		**1**				**0**							1		**1**					**0**
30	for CAS number see list of grouped pesticides	Glyphosate	x	**1**				**0**				1					**1**					**0**
31	69806-40-2	Haloxyfop-methyl (unstated stereochemistry)		**1**				**0**					1				**1**					**0**
32	78587-05-0	Hexythiazox		**1**				**0**					1				**1**					**0**

33	138261-41-3	Imidacloprid		**1**				**0**									**0**				1	**1**
34	173584-44-6	Indoxacarb		**1**				**0**									**0**				1	**1**
35	36734-19-7	Iprodione		**1**				**0**					1				**1**					**0**
36	140923-17-7	Iprovalicarb		**1**				**0**					1				**1**					**0**
37	143390-89-0	Kresoxim-methyl		**1**				**0**					1				**1**					**0**
38	91465-08-6	Lambda-cyhalothrin		**3**			1	**1**								1	**1**				1	**1**
39	330-55-2	Linuron		**1**				**0**							1	1	**1**					**0**
40	103055-07-8	Lufenuron		**1**				**0**									**0**	1		1		**1**
41	12057-74-8	Magnesium phosphide		**1**			1	**1**									**0**					**0**
42	121-75-5	Malathion		**2**				**0**				1					**1**				1	**1**
43	8018-01-7	Mancozeb		**1**				**0**					1			1	**1**					**0**
44	12427-38-2	Maneb		**1**				**0**					1			1	**1**					**0**
45	139968-49-3	Metaflumizone		**1**				**0**									**0**	1	1		1	**1**
46	137-41-7	Metam-potassium		**1**				**0**					1				**1**					**0**
47	137-42-8	Metam-sodium		**1**				**0**					1			1	**1**					**0**
48	2032-65-7	Methiocarb		**2**		1		**1**									**0**				1	**1**
49	16752-77-5	Methomyl		**2**		1		**1**									**0**				1	**1**
50	9006-42-2	Metiram		**1**				**0**					1			1	**1**					**0**
51	21087-64-9	Metribuzin		**1**				**0**								1	**1**					**0**
52	51596-10-2	Milbemectin		**1**				**0**									**0**				1	**1**
53	64741-88-4	Paraffin oils; mineral oils	x	**1**				**0**			1						**1**					**0**
54	23135-22-0	Oxamyl		**2**		1	1	**1**									**0**				1	**1**
55	42874-03-3	Oxyfluorfen		**1**				**0**					1				**1**					**0**
56	40487-42-1	Pendimethalin		**1**				**0**									**0**	1	1			**1**
57	732-11-6	Phosmet		**1**				**0**									**0**				1	**1**
58	29232-93-7	Pirimiphos-methyl		**1**				**0**									**0**				1	**1**
59	60207-90-1	Propiconazole		**1**				**0**							1		**1**					**0**
60	12071-83-9	Propineb		**1**				**0**					1				**1**					**0**
61	123312-89-0	Pymetrozine		**1**				**0**					1				**1**					**0**
62	179101-81-6	Pyridalyl		**1**				**0**									**0**	1	1	1		**1**
63	187166-15-0	Spinetoram		**1**				**0**									**0**				1	**1**
64	168316-95-8	Spinosad		**1**				**0**									**0**				1	**1**
65	148477-71-8	Spirodiclofen		**1**				**0**			1		1				**1**					**0**
66	946578-00-3	Sulfoxaflor		**1**				**0**									**0**				1	**1**
67	79538-32-2	Tefluthrin		**2**		1	1	**1**									**0**				1	**1**
68	149979-41-9	Tepraloxydim		**1**				**0**								1	**1**					**0**
69	111988-49-9	Thiacloprid		**1**				**0**					1		1		**1**					**0**
70	153719-23-4	Thiamethoxam		**1**				**0**									**0**				1	**1**
71	23564-05-8	Thiophanate-methyl		**1**				**0**					1				**1**					**0**
72	55219-65-3	Triadimenol		**1**				**0**							1		**1**					**0**
73	1582-09-8	Trifluralin		**2**				**0**								1	**1**	1				**1**
74	52315-07-8z	zeta-Cypermethrin		**2**		1		**1**									**0**				1	**1**
75	137-30-4	Ziram		**1**			1	**1**									**0**					**0**

APPENDIX III: The impacts of HHPs used in non-agriculture according to the PAN criteria - March 2019

					Group 1: Acute Toxicity				Group 2: Long term effects									Group 3: Environmental toxicity				
	CAS number	**Pesticide**	**Grouped (see page 21)**	**Sum of max=1 in Groups 1-4**	WHO Ia	WHO Ib	H330	**max = 1**	EPA carc	IARC carc	EU GHS carc (1A, 1B)	IARC prob carc	EPA prob likel carc	EU GHS muta (1A, 1B)	EU GHS repro (1A ,1B)	EU EDC (1) or C2 & R2 GHS	**max = 1**	very bio acc	very pers water, soil or sediment	very toxic to aq. organism	highly toxic bees	**max = 1**
1	82657-04-3	Bifenthrin		**2**				**0**								1	**1**				1	**1**
2	10043-35-3	Boric acid		**1**				**0**							1	1	**1**					**0**
3	56073-10-0	Brodifacoum		**2**	1		1	**1**							1		**1**					**0**
4	28772-56-7	Bromadiolone		**2**	1		1	**1**							1		**1**					**0**
5	63333-35-7	Bromethalin		**2**	1			**1**									**0**	1		1		**1**
6	3691-35-8	Chlorophacinone		**1**	1			**1**									**0**					**0**
7	2921-88-2	Chlorpyrifos		**1**				**0**									**0**				1	**1**
8	5836-29-3	Coumatetralyl		**2**		1	1	**1**							1		**1**					**0**
9	68359-37-5	Beta-cyfluthrin; Cyfluthrin		**2**		1	1	**1**									**0**				1	**1**
10	52918-63-5	Deltamethrin		**2**				**0**								1	**1**				1	**1**
11	56073-07-5	Difenacoum		**2**	1			**1**									**0**	1				**1**
12	104653-34-1	Difethialone		**2**	1		1	**1**							1		**1**					**0**
13	122-14-5	Fenitrothion		**2**				**0**								1	**1**				1	**1**
14	120068-37-3	Fipronil		**1**				**0**									**0**				1	**1**
15	138261-41-3	Imidacloprid		**1**				**0**									**0**				1	**1**
16	72963-72-5	Imiprothrin		**1**				**0**									**0**				1	**1**
17	91465-08-6	Lambda-cyhalothrin		**3**			1	**1**								1	**1**				1	**1**
18	52645-53-1	Permethrin		**2**				**0**					1				**1**				1	**1**
19	23031-36-9	Prallethrin		**1**				**0**									**0**				1	**1**
20	114-26-1	Propoxur		**2**				**0**					1				**1**				1	**1**
21	3383-96-8	Temephos		**1**				**0**									**0**				1	**1**
22	168316-95-8	Spinosad		**1**				**0**									**0**				1	**1**
23	7696-12-0	Tetramethrin		**1**				**0**									**0**				1	**1**

List of references:

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http://chm.pops.int/Implementation/NationalImplementationPlans/NIPTransmission/tabid/253/ctl/Download/mid/13657/Default.aspx?id=178&ObjID=6444
http://files.panap.net/resources/PAN-Consolidated-List-of-Bans.xlsx