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Item 5 (c) (iii) of the provisional agenda*

Technical work: review of notifications of final regulatory action: carbosulfan

Carbosulfan: supporting documentation provided by Burkina Faso, Cabo Verde, Chad, the Gambia, Mauritania, the Niger, Senegal and Togo

Note by the Secretariat

As referred to in document UNEP/FAO/RC/CRC.11/7, the annex to the present note sets out documentation received from Burkina Faso, Cabo Verde, Chad, the Gambia, Mauritania, the Niger, Senegal and Togo to support its notification of final regulatory action for carbosulfan. The present note, including its annex, has not been formally edited.

* UNEP/FAO/RC/CRC.11/1.

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Annex

Carbosulfan: supporting documentation provided by Burkina Faso, Cabo Verde, Chad, the Gambia, Mauritania, the Niger, Senegal and Togo

List of documents:

1. Decision Nº007/MAE-MC/2015 – Portant interdiction de l'atrazine (French and English).
2. Annex to the decision to ban Carbosulfan (French and English).
3. Final report – Pilot Study on Agricultural Pesticide Poisoning in Burkina Faso.
4. Institut du Sahel Liste positive des pesticides autorisés à la 34ème session ordinaire du Comité Sahélien des Pesticides.
5. Carbosulfan Footprint PPDB, 2014.
6. Pesticide manual, 11th edition.
7. INERIS – Carbosulfan.
8. Wikipedia – Carbosulfan.

COMITE PERMANENT INTER-ETATS DE LUTTE CONTRE LA SECHERESSE DANS LE SAHEL
PERMANENT INTERSTATE COMMITTEE FOR DROUGHT CONTROL IN THE SAHEL

Bénin Burkina Faso Cap Vert Côte d'Ivoire Gambie Guinée Guinée Bissau Mali Mauritanie Niger Sénégal Tchad Togo

LE MINISTRE COORDONNATEUR

Décision N° 007/MAE-MC/2015
Portant interdiction du carbosulfan

Le Ministre Coordonnateur,

Vu la version révisée de la Réglementation Commune aux Etats membres du CILSS sur l'Homologation des Pesticides, issue de la Résolution n°08/34/CM/99 prise par le Conseil des Ministres du CILSS en 1999 à NDjaména, Tchad.

Soucieux de la protection de la santé humaine, animale et de l'environnement ;

Sur proposition du Comité Sahélien des Pesticides en sa séance de travail du 26 au 30 Mai 2014 à Bamako.

Décide

Article 1er / Le carbosulfan est interdit dans les Etats membres du CILSS pour les raisons énoncées dans le document joint en annexe, en tenant compte des spécificités agricoles et des délais d'utilisation des stocks existants.

Article 2/ La présente décision prend effet à compter de sa date de signature, sera communiquée partout où besoin sera.

Fait à N'Djamena, le 08 AVR 2015

Le Ministre de l'Agriculture et de l'Environnement
Ministre Coordonnateur du CILSS

Mme BAÏWONG DJIBERGUI AMANE ROSINE

AMPLIATIONS :

- Secrétariat Exécutif du CILSS (Original)
- Auditeur Interne
- Institut du Sahel (CSP)
- Etats membres du CILSS signataires de la réglementation commune (09)

The Coordinating Minister

Decision 007 MAE/MC2015

Banning Carbosulfan

Considering the revised version of the Regulation common to the CILSS states on pesticides registration from Resolution n° 08/34/CM/99 adopted by CILSS Council of Ministries in NDjamena, Chad in 1999

Concerned about the protection of human and animal health as well as the environment

On a proposal of the Sahelian Pesticide Committee during its working session from 26th to 30th May in Bamako

Decides

Article 1. Carbosulfan is banned in CILSS Member States for the reasons stated in the annex attached, taking into account the agricultural specificities and deadlines to use existing stocks

Article 2. This decision shall take effect from the date of its signature and shall be communicated wherever required.

NDjamna

Minister of Agriculture and the Environment

Coordinating Minister

COMITE PERMANENT INTER-ETATS DE LUTTE CONTRE LA SECHERESSE DANS LE SAHEL
PERMANENT INTERSTATE COMMITTEE FOR DROUGHT CONTROL IN THE SAHEL

Bénin | Burkina Faso | Cap Vert | Côte d'Ivoire | Gambie | Guinée | Guinée Bissau | Mali | Mauritanie | Niger | Sénégal | Tchad | Togo

Institut du Sahel

Comité Sahélien des Pesticides

Annexe à la décision d'interdiction du carbosulfan

Novembre 2014

1. Généralités sur le carbosulfan

Le carbosulfan ($C_{20}H_{32}N_2O_3S$) est un insecticide carbamate utilisé contre les locustes et plusieurs genres de sauterelles (CSP, 2011). Il a été introduit par la compagnie américaine FMC corp. (The pesticide manual, 1994).

2. Données toxicologiques

Le carbosulfan appartient à la classe II (modérément dangereux) de l'OMS (Footprint, 2011 ; WHO, 2008). C'est un inhibiteur des cholinestérases (FAO, 2003).

2.1. Intoxication aiguë

Le carbosulfan a une toxicité aiguë modérée pour les mammifères. La DL50 orale est de 101 mg / kg chez le rat (Footprint PPDB, 2014). La DL50 pour le carbosulfan était > 2000 mg / kg de poids corporel chez les lapins traités par voie cutanée et la CL50 était de 0,61 mg / l chez les rats traités par inhalation (FAO, 2003).

Les signes d'intoxication diffèrent selon la voie d'exposition :

En cas d'ingestion, on observe : une inhibition durable des cholinestérases de la plupart des tissus et notamment du S.N.C., des muscles et du sang avec accumulation d'acétylcholine ; des signes digestifs précoces et d'intoxications muscariniques : nausées, vomissements, douleurs digestives et diarrhée, myosis, hyper salivation, défécation, mictions involontaires, bradycardie, hypo TA, dyspnée asthmatiforme ; des signes d'intoxication nicotinique : fasciculations et crampes musculaires, mouvements involontaires et paralysie des muscles respiratoires puis tachycardie, HTA, confusion, ataxie, coma convulsif, risque de choc hémodynamique.

En cas d'inhalation, on observe le même mécanisme d'action qu'au niveau d'ingestion ; des signes digestifs moins marqués ; des symptômes respiratoires très précoces dyspnée asthmatiforme, hypersécrétion bronchique ; apparition rapide des signes d'intoxication muscarinique et nicotinique.

En cas d'intoxication aiguë locale, on observe une irritation et une bonne pénétration pour la peau et une irritation avec larmoiements et conjonctivite pour l'œil.

2.2. Intoxication chronique

✓ ***Effets cancérigènes***

Compte tenu de l'absence de génotoxicité et l'absence de cancérogénicité chez les rats et les souris, il a été conclu que le carbosulfan est peu susceptible de présenter un risque cancérogène pour l'homme (FAO, 2003). Selon Footprint PPDB (2014), le carbosulfan n'est pas cancérogène.

✓ ***Effets sur la reproduction et le développement***

Dans une étude sur trois générations de toxicité pour la reproduction, le carbosulfan a été administré à des doses de 10, 20 et 250 ppm. Aucun effet sur l'indice d'accouplement, l'indice de gestation et le nombre de fœtus viables n'a été observés. A la dose de 250 ppm, le poids des petits, la taille des portées et la survie des nouveau-nés ont diminué, de même que les poids corporels des parents mâles et les femelles à cette dose. Chez les parents, la NOAEL était de 20 ppm, ce qui équivaut à 1,3 mg / kg de poids corporel par jour, sur la base de la diminution du poids corporel. La NOAEL pour la toxicité chiot était de 20 ppm sur la base des réductions de la taille des portées, le poids corporel des petits et le gain de poids corporel chiot. La NOAEL pour la toxicité de la reproduction était de 250 ppm, soit 17 mg / kg de poids corporel par jour, la dose la plus élevée (FAO, 2003).

3. Données environnementales

✓ ***Comportement et devenir du pesticide dans l'environnement :***

Le carbosulfan est non mobile (Koc = 9489 mL/g) (Footprint, 2011). Il ne présente donc pas de risque de contamination des eaux superficielles par ruissellement. Il n'est pas persistant dans le sol (DT_{50} = 21 jours). Le carbosulfan présente un risque faible de contamination des eaux souterraines au regard de l'indice GUS qui est de 0,89 (Footprint, 2014).

Dans les expériences d'adsorption / désorption, le carbosulfan, le carbofuran et le dibutylamine ont été comparés au DDT et au 2,4-D dans quatre sols allant de sable fin à argilo-sableux limoneux avec des valeurs de pH entre 5 et 7. Le carbosulfan était plus étroitement lié à chaque type de sol que le 2,4-D et le carbofuran, mais pas aussi bien que le DDT. Par ailleurs, le carbosulfan a été dégradé en carbofuran sur le limon et l'argile (FAO, 1985).

Cette même étude confirme les résultats montrant le faible potentiel de lessivage du carbosulfan mais une dégradation substantielle et élution de ses métabolites, principalement le carbofuran. Le principal métabolite du carbosulfan est le carbofuran (FAO, 1985).
Il a un coefficient de partage octanol/eau élevé (Log P = 7,42) et un facteur de bioaccumulation préoccupant (BCF = 990) (Footprint PPDB, 2014).

- ✓ ***Effets sur les organismes non cibles:***

Le carbosulfan a une toxicité élevée pour les oiseaux (DL_{50} *Anas platyrhynchos* = 10 mg/kg), les poissons (CL_{50} 96h *Lepomis macrochirus* = 0,015 mg/L), les invertébrés aquatiques (EC_{50} 48h *Daphnia magna* = 0,0032 mg/L) et les abeilles (DL_{50} 48h = 0,18 µg/abeille) (Footprint PPDB, 2014).

4. Homologation et utilisation du carbosulfan

Au niveau de l'Union Européenne, le carbosulfan est exclu de l'annexe I de la directive 91/414/CEE par la décision n°2007/4/5/CE du 13 juin 2007. Mais, il a fait l'objet d'une ressoumission (Footprint, 2011 ; JO, 2007). De nos jours, il n'est homologué dans aucun pays de l'UE (Footprint PPDB, 2014).
En France, il a été interdit à partir du 13/12/2008 (JO, 2007). En Australie par contre, il est autorisé (APVMA, 2011 ; Footprint PPDB, 2014).
Au niveau des pays du CILSS, quatre formulations à base de carbosulfan avaient reçu l'autorisation provisoire de vente (APV) et ce, depuis 1996 pour la première APV. Deux autres formulations étaient maintenues en étude depuis 2005. Mais à partir de 2006, aucune formulations à base de carbosulfan n'a été homologuée par le Comité Sahélien des Pesticides (CSP) (CSP, 2011 ; Toe, 2007).

5. Le cas du Burkina Faso

Au cours d'une étude pilote réalisée au Burkina Faso en juin 2010 au moyen d'enquêtes rétrospectives et prospectives, 296 cas d'intoxication survenus au cours de l'application des pesticides ont été recensés s. Seule une formulation à base de carbosulfan a fait ainsi l'objet d'un cas d'intoxication. Il s'agit du PROCOT 40 WS, une formulation ternaire contenant du carbosulfan (250 g/kg), du carbendazim (100 g/kg) et du metalaxyl-M (50 g/kg).

Il est aussi ressorti de cette étude qu'aucun producteur n'a de suivi médical ou de prise en charge sanitaire par rapport à l'utilisation des pesticides. Les soins et examens médicaux sont laissés à l'initiative et à la charge du producteur. De plus, le personnel de santé dispose de très peu d'informations en rapport avec les pesticides. Sur 42 responsables de centres de santé questionnés, 20 ont répondu qu'ils n'avaient pas de connaissance sur les pesticides. Le faible niveau de connaissance des pesticides se révèle être un grand handicap pour la prise en charge des cas d'intoxication (diagnostic ne faisant pas ressortir le pesticide responsable de l'accident, schéma thérapeutique proposé inadapté au type de pesticide etc.) (Toe, 2010). De ce fait, l'absence de formation spécialisée du corps médical entraine une prise en charge inadéquate des cas d'intoxication.

Dans l'ensemble, cette enquête a révélé que les producteurs ne respectaient pas les Bonnes Pratiques Agricoles notamment le port d'équipements de protection individuels appropriés. Le matériel de protection (masques à poussière, bottes et gants principalement) est vendu aux producteurs par les distributeurs dans 20 % des cas. Ces équipements ne sont pas spécifiques pour effectuer des traitements.

Les producteurs portent principalement des masques à poussière (39,08 % des cas) suivis des bottes (28,8 %) tandis que les combinaisons sont les moins utilisées (4,5 %) lors de traitements phytosanitaires.

Plus de la moitié des producteurs (67,5 %) possédaient un point d'eau dans leur champ ou à proximité. La majorité des points d'eau est située à une distance inférieure à 100 m des champs. Cette proximité des points d'eau aux champs peut être à l'origine d'une contamination par différentes voies de l'eau par les pesticides. L'eau était consommée dans 50 % des cas, utilisée pour la préparation ou la dilution des pesticides dans 29,26 % et destinée à l'abreuvage des animaux 26,96 % (Toe, 2010).

En définitive, cette étude pilote a montré que les risques de pollution de l'environnement du aux pesticides chimiques tel que le carbosulfan sont importants.

6. Alternatives au carbosulsan

- ✓ ***Alternatives chimiques :***

Des solutions de substitution à l'utilisation de formulations à base de carbosulfan existent. Comme alternative, les formulations d'insecticide/acaricide sont homologuées et autorisées à la vente dans les pays du CILSS. On retrouve ainsi au moins dix formulations d'insecticide/acaricide dans la liste globale des pesticides homologués par le CSP pour le maïs, la canne à sucre, les cultures maraichères (CSP, 2014). Ces formulations sont à base de chlorpyrifos-

éthyl, de profenofos, de cypermethrine, de ethoptophos, de abamectine, de deltamethrine, et de lambda-cyhalothrine.

✓ ***Gestion intégrée de la production et des déprédateurs (GIPD) :***

La gestion intégrée de la production et des déprédateurs, l'expérience GIPD initiée par la FAO en collaboration avec les ministères de l'agriculture de plusieurs pays du Sahel permet d'obtenir des résultats importants dans la production agricole et la gestion des déprédateurs. Cette initiative de bonnes pratiques agricoles (BPA) permet d'améliorer la productivité agricole et de former plusieurs producteurs qui sont de potentiels facilitateurs. La GIPD repose sur les principes suivants :

- Une utilisation raisonnée et judicieuse des pesticides ;
- L'acquisition de connaissances et pratiques nécessaires pour la gestion des déprédateurs ;
- Le renforcement de la capacité des producteurs à la prise de décision au niveau du champ ;
- La conception d'une meilleure productivité à faibles coûts qui protège l'environnement.

Conclusion

Le carbosulfan présente des risques pour la santé des populations et surtout pour les organismes non-cibles de l'environnement, le rendant très difficile à manier sans risque par les utilisateurs des pays du sahel. Ces risques ont justifié son interdiction dans de nombreux pays dans le monde dont tous les pays de l'Union Européenne.

Au niveau des pays du CILSS, le Comité Sahélien des Pesticides a arrêté l'homologation des pesticides à base de carbosulfan depuis 2006 compte tenu de :

- L'écologie fragile des pays du CILSS caractérisée déjà par un déséquilibre des écosystèmes et la disparition d'organismes utiles de l'environnement ;
- Non respect des mesures recommandées pour une utilisation sécurisée du carbosulfan par les utilisateurs dans le contexte des pays du CILSS ;
- Faible taux d'utilisation des équipements de protection par les producteurs ;
- L'existence d'alternatives à l'utilisation du carbosulfan.

Pour porter à la connaissance du public et ce de façon transparente cette décision d'interdiction des pesticides à base de carbosulfan aux fins d'améliorer la santé des populations et préserver l'environnement dans les pays du CILSS, son Ministre Coordonnateur publie la présente note d'interdiction.

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Institut du Sahel

Sahelian Pesticide Committee

Annex to the decision to ban Carbosulfan

November 2014

1. General information on Carbosulfan

Carbosulfan ($C_{20}H_{32}N_2O_3S$) is a carbamate insecticide used to control locusts and different types of grasshopper (SPC, 2011). It has been introduced by the American FMC corp. (The pesticide manual, 1994).

2. Toxicological data

Carbosulfan belongs to WHO class II (moderately hazardous) (Footprint, 2011 ; WHO, 2008). It is a cholinesterase inhibitor (FAO, 2003).

2.1. Acute toxicity

Carbosulfan is moderately acutely toxic to mammals. Oral LD50 is 101 mg / kg in rats (Footprint PPDB, 2014). LD50 for Carbosulfan was > 2000 mg / kg body weight in rabbits treated by dermal route and LC50 was 0,61 mg / l in rats treated by inhalation (FAO, 2003).
Poisoning signs vary according to the exposition route:
if swallowed, the following can be observed : a lasting cholinesterase inhibition of most tissues, in particular of the central nervous system, of muscles and blood with an acetylcholine accumulation; early onset of gastrointestinal signs and of muscarinc receptors poisoning : nausea, vomiting, digestive pains and diarrhoea, miosis, hyper salivation, defecation, urination, bradycardia, high blood pressure, asthmatic dyspnoea; signs of nicotinic receptors poisoning: fasciculation and muscle cramps, involuntary movements, paralysis of respiratory muscles and tachycardia, HBP, confusion, ataxia, convulsive coma, risk of hemodynamic shock;
if inhaled, the same mechanism of action can be observed as if swallowed ; less marked gastrointestinal signs; very early respiratory symptoms, asthmatic dyspnoea, bronchial hyper secretion; early signs of muscarinic and nicotinic receptors poisoning;
in case of local acute poisoning, skin irritation and good penetration as well as eye irritation with tearing and conjunctivitis.

2.2. Chronic toxicity

- ✓ ***Carcinogenic effects***

Considering the absence of genotoxicity and carcinogenicity in rats and mice, it has been concluded that Carbosulfan is not likely to represent a carcinogenic risk to humans. (FAO, 2003). According to Footprint PPDB (2014), Carbosulfan is not carcinogenic.

- ✓ ***Reproductive and development effects***

In a three-generation reproductive toxicity study, Carbosulfan was administered at doses of 10, 20 and 250 ppm. No effects on mating and gestation rate and on the number of viable foetuses have been observed. The weight of offspring, litter size and newborn survival decreased at doses of 250 ppm, as well as the body weight of male and female parents at the same doses. NOAEL in parents was 20 ppm, equivalent to 1,3 mg / kg of body weight per day, based on the reduction of body weight. NOAEL for puppy poisoning was 20 ppm based on the reduction of litter size, offspring body weight and puppies body weight gain. NOAEL for reproductive toxicity was 250 ppm, that is 17 mg / kg of body weight per day, the highest dose (FAO, 2003).

3. Environmental data

- ✓ ***Behaviour and fate of the pesticide in the environment :***

Carbosulfan is not mobile (Koc = 9489 mL/g) (Footprint, 2011). It therefore does not present a risk of surface water pollution by runoff. It is not persistent in the soil (DT_{50} = 21 days). Carbosulfan presents a low ground water pollution risk considering GUS which is of 0,89 (Footprint, 2014).

As far as adsorption/desorption are concerned, Carbofuran and Dibutylamine have been compared to DDT and 2,4-D in four soils ranging from fine sand to clay-sandy loamy soils with pH values ranging between 5 and 7. Carbosulfan was more closely linked to each soil type than 2,4-D and Carbofuran, but not as much as DDT. Furthermore, Carbosulfan was degraded into Carbofuran on silt and clay (FAO, 1985).

The same study confirms the results indicating the low Carbosulfan leaching potential. The main metabolite of Carbosulfan is Carbofuran (FAO, 1985).

It has a high octanol/water partition coefficient (Log P = 7,42) and a bioaccumulation factor of concern (BCF = 990) (Footprint PPDB, 2014).

✓ ***Effects on non-target organisms:***

Carbosulfan is highly toxic to birds (LD_{50} *Anas platyrhynchos* = 10 mg/kg), fish (LC_{50} 96h *Lepomis macrochirus* = 0,015 mg/L), aquatic invertebrates (EC_{50} 48h *Daphnia magna* = 0,0032 mg/L) and bees (LD_{50} 48h = 0,18 µg/bee) (Footprint PPDB, 2014).

4. Registration and use of Carbosulfan

As far the European Union is concerned, Carbosulfan has been excluded from Annex I of Directive 91/414/EEC by decision n° 2007/4/5/EC of 13th June 2007, but it has been resubmitted (Footprint, 2011 ; JO, 2007). It is currently not registered in any of the EU countries (Footprint PPDB, 2014).

It has been banned in France since 13/12/2008 (JO, 2007). It is on the contrary authorized in Australia (APVMA, 2011 ; Footprint PPDB, 2014).

As far as CILSS countries are concerned, four Carbosulfan based formulations had been granted temporary sales authorization (TSA) in 1996 for the first TSA. Two other formulations have been under review since 2005. However, no Carbosulfan based formulation has been registered by the Sahelian Pesticide Committee since 2006 (SPC) (SPC, 2011 ; Toe, 2007).

5. The Burkina Faso case

During a pilot study carried out in Burkina Faso in June 2010, through both retrospective and prospective surveys, 296 poisoning cases during the application of pesticides have been reported; only one Carbosulfan based formulation was involved in one poisoning case: PROCOT 40 WS, a tertiary formulation containing Carbosulfan (250 g/kg), Carbendazim (100 g/kg) and Metalaxyl-M (50 g/kg).

It also came out from that study that no grower is granted medical check-up or healthcare related to the use of pesticides. Medical treatment and exams are left to the initiative of and at the expense of the growers.

Furthermore, healthcare personnel has very little information on pesticides. 20 out of 42 persons in charge of heath care centres who had been interviewed had answered that they had no information on pesticides The low level of knowledge on pesticides is a significant handicap when dealing with poisoning cases.(the diagnosis not identifying the pesticide responsible for the accident, inadequate proposed therapy etc.) (Toe, 2010). Therefore, the absence of specialised training of medical staff leads to inadequate care in case of poisoning.

In the whole, this survey showed that growers did not follow Good Agricultural Practices, in particular the use of appropriate personal protective equipment. Protective equipment (dust masks, boots and gloves in particular) is sold to the growers by distributors in 20% of cases. That equipment is not specific for field treatments. Growers mainly wear dust masks (39,08 % of cases) followed by boots (28,8 %) whereas overalls are the least used (4,5 %) during plant treatment.

More than half of the growers (67,5 %) had a water source in their fields or nearby. The majority of water points were less than 100m from the fields and this proximity may be at the origin of water pollution by pesticides. Water was being drunk in 50% of cases, it was used for the preparation or dilution of pesticides in 29,26 % and used for animal drinking in 26,96 % (Toe, 2010).

To conclude, this pilot study showed that environment pollution risk by chemical pesticides such as Carbosulfan is high.

- ✓ ***Chemical alternatives:***

Alternatives to the use of Carbosulfan based formulations do exist. As an alternative, there are insecticide/acaricide formulations which are registered and authorized for sale in CILSS countries. There are at least ten insecticide/acaricide formulations in the general list of pesticides registered by SPC for corn, sugar cane, vegetables (SPC, 2014). These are ethylchlorpyrifos, profenofos, cypermethrine, ethoptophos, abamectine, deltamethrine and lambda-cyhalothrine based formulations.

- ✓ ***Integrated pest and production management (IPPM)***

The experience in IPPM launched by FAO in collaboration with the Ministries of Agriculture in several countries of the Sahel yielded important results in agricultural production and pest management. This initiative of Good Agricultural Practices (GAP) will improve the agricultural productivity and train several growers who are potential facilitators. IPPM is based on the following principles:

- A sound and judicious use of pesticides ;
- The acquisition of knowledge and practical skills critical to pest control ;
- The reinforcement of decision-making capacity of growers at a field level;

- The development of a better low-cost productivity which protects the environment

Conclusion

Carbosulfan presents risks to human health and especially to non-target organisms in the environment, making it very difficult to handle it without risks for users in Sahel countries. These risks have justified its ban in many countries of the world among which all the European Union countries.

The Sahelian Pesticides Committee has stopped the registration of Carbosulfan based pesticides in CILSS countries in 2006 taking into account:

- The fragile ecology of CILSS countries already characterized by an imbalance of ecosystems and the disappearance of organisms useful to the environment;
- Non compliance with recommended measures for a safe use of Carbosulfan by users in the context of CILSS countries;
- The low utilization rate of protective equipment by growers ;
- The existence of alternatives to the use of Carbosulfan.

The Coordinating Ministry of CILSS Countries issues this ban to make public the decision to ban Carbosulfan based pesticides, and this in a transparent way, in order to improve human health and to preserve the environment in these countries.

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Secrétariat de la Convention de Rotterdam

sur la procédure de consentement préalable en connaissance
de cause applicable à certains produits chimiques et pesticides dangereux
qui font l'objet d'un commerce international

Secretariat of the Rotterdam Convention

On the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

FINAL REPORT

Pilot Study on Agricultural Pesticide Poisoning in Burkina Faso

With the collaboration of the Designated National Authorities (DNA) of the Rotterdam Convention in Burkina Faso

Coordinated by Prof. Adama M. TOE from IRSS/DRO

September 2010

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ABBREVIATIONS AND ACRONYMS

CILSS	:	Permanent Interstate Committee for Drought control in the Sahel
CMA	:	Medical centre with surgery facilities
CNCP	:	National Commission on the Control of Pesticides
CSPS	:	Healthcare and Social Advancement Centre
DF	:	Dry flowable
DGPV	:	o Directorate-General of Plant Production
DNA	:	Designated National Authority
DP	:	Dustable powder
DPV	:	Plant Protection Directorate
DS	:	Powder for Dry Seed Treatment
DTE	:	Datong Entreprises
E.U.	:	European Union
EBCVM	:	National Survey on Household Living Conditions
EC	:	Emulsifiable concentrate
FAO		Food and Agriculture Organization of the United Nations
FCFA	:	CFA Franc
GAP	:	Good Agricultural Practices
GDP	:	Gross Domestic Product
GR	:	Granules
ha	:	Hectare
INSD	:	National Institute of Statistics and Demography
KAP	:	Knowledge, Attitude and Practices
L	:	Litre
M	:	Metre
MAHRH	:	Ministry of Agriculture, Water and Water Resources
MECV	:	Ministry of Environment and Living Conditions
MED	:	Ministry of Economy and Development
PAN-UK	:	Pesticide Action Network – United Kingdom
PIC	:	Prior Informed Consent Procedure
PPE	:	Personal Protective Equipment
SAPHYTO	:	African Pesticide Formulation Company

SC	:	Suspension concentrate
SCAB	:	Burkina Faso Agro-Chemicals Company
SG	:	Soluble granules
SHPF	:	Severely Hazardous Pesticide Formulation
SL	:	Soluble concentrate
SOFITEX	:	Fibres and Textiles Company
SPCP	:	Sahelian Pesticide Committee
UAT	:	Technical Support Unit
ULV	:	Ultra Low Volume
UNPCB	:	National Union of Burkina Faso Cotton producers
WG	:	Water dispersible granules
WHO	:	World Health Organization
WP	:	Wettable powder
WS	:	Water soluble powder

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We hope that the results obtained meet FAO/PIC expectations and help to reach the expected objectives!

SUMMARY

In order to improve human health and contribute to the protection of the environment, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade supported the conduct of a pilot study on agricultural pesticides poisonings in Burkina Faso which took place in June-July 2010. The study was carried out using retrospective and prospective surveys conducted among different relevant stakeholders, i.e., agricultural producers, pesticide distributors and retailers, as well as health officers, and has provided the following information:

Ninety-seven (97) pesticide distributors and retailers have been identified on 14 survey sites. A total of 153 different pesticide formulations have been identified among the surveyed distributors and retailers. Distributors have various sources of supply;

Six hundred and fifty agricultural producers were surveyed. Among these farmers, 296 poisoning cases resulting from pesticide application operations were recorded. Pesticide formulations containing paraquat (Gramoxone, Calloxone, Gramoquat super, Benaxone) have alone caused 59 incidents, accounting for 20% of the incidents, and those containing cypermethrine + endosulfan have caused 35 poisoning incidents. Overall, the study has shown that farmers did not follow good agricultural practices and especially that they did not wear appropriate personal protective equipment (only 0.31% of farmers use the personal protective equipment recommended);

Forty-two (42) health care centres were visited and a total of 922 poisoining incidents recorded on the basis of symptoms only have been reported. The pesticide formulation implicated in the poisonings and the circumstances under which they occurred have been identified in only 22 cases. Five (5) out of the 22 cases occurred during pesticide applications and the chemicals incriminated were Gramoxone (2 cases), Capt 88 EC (1 case), Conquest 88 (1 case), Procost 40 WS (1 case).

Generally speaking, farmers do not follow good agricultural practices when using pesticides (only about 0.31% of farmworkers use the recommended personal protective equipments) which explains the high incidence of pesticide poisoning and of acute ones as well in a context where the medical care system is precarious and not easily accessible. Appropriate recommendations

intended to foster the safe management of agro-chemicals by the various stakeholders involved have been developped with a view to improving human health and protecting the environment.
Key words: Severely hazardous pesticide formulations, poisoning, safe management.

INTRODUCTION

The agricultural sector is of major importance in the national economy of Burkina Faso. As a matter of fact, it employs 86% of the total population and generates about 40% of the gross domestic product (GDP) (agriculture 25%, livestock 12% and 3% forestries and fisheries) (MAHRH, 2007).

Cultivated land areas, which account for about 3.6 millions hectares, are dominated by cereal crops (about 82%) followed by cash crops (15% - 14% of which are mainly cotton and groundnuts). Vegetable crops including green beans are cultivated on a land area of 700 hectares and account for less than 1% of the cultivated land area.

Disease and animal pests cause major damage in agriculture and can be responsible in some cases for up to 30 % of yield losses. Thus plant protection products are used to eradicate pests affecting crops particularly in the case of intensive cultures such as cash crops, sugarcane, vegetable crops and, to a lesser extent, fruit trees.

In 1997, 2,533 tons of pesticide formulations with a market value of 12,665 billions CFA Francs were estimated to be used in Burkina Faso and that only for the treatment of cotton, vegetables and the consumption of plant protection services (Van Der Valk, Diarra, 2000). The annual growth rate of pesticide consumption has reached 11 %. About 185 commercial brands (more than a hundred active ingredients) are marketed in Burkina Faso, 75 % of which are active ingredients used as insecticides, acaricides or nematicides. Organophosphates and phyretroids account for about 65% of the active ingredients of the various brands which are offered for sale. Pesticides are considered as one of the main factors of rural development at a time when demographic and economic constraints increase the pressure for productivity growth. They help to reduce the damage caused to crops by pests and even to prevent them. However, pesticides constitute a real threat at the following three (3) levels:

- ☞ The effects of pesticides toxicity on agricultural users and professionals in the pest control industry (Toe *et al.*, 2000 ; Toe *et al.*, 2002);
- ☞ The effects of toxicity on consumers related to the presence of toxic residues (Fournier et Bonderef, 1983);
- ☞ The pollution and contamination of the environment (Ramade, 1992; Toe *et al.*, 2004).

Consequently the sound management of pesticides is of critical importance. The sound management of pesticides which aims at ensuring on the one hand, the protection of users and consumers' health and, on the other hand, that of the environment is a major task which requires the involvement and the contribution of all the stakeholders involved in the production,

distribution and use of pesticides. The principle of the safe management of pesticides with a view to improving human heath and protecting the environment underlies the work of the present «***Pilot Study on Agricultural Pesticide Poisoning in Burkina Faso*** ».

I- BACKGROUND AND STUDY RATIONALE

The use of pesticide should be done in accordance with the recommended good agricultural practices (GAP) in order to improve, on the one hand, users' health and that of consumers of agricultural produce which have undergone pest treatment, and on the other hand, to protect the environment.

Several studies and works carried out in Burkina Faso have shown that agricultural producers did not follow good agricultural practices. (Lendres, 1992, Domo, 1996; Toe *et al.*, 1996; Toe *et al.*, 2000; Toe, 2002). As a matter of fact, an analysis of farmers' agricultural practices revealed that recommended pesticide doses, adequate time of treatments and treatment calendars were not taken into account, inappropriate mixture of products was still very common and that precautionary hygienic measures were not being observed during treatments. Careless disposal of left-over pesticides and of empty containers was also found to be very common among workers.

These sad facts clearly indicate that the sound management of pesticide products is far from being implemented and highlight the major risks incurred by users, consumers and those posed to the environment.

To face the problem, the Rotterdam Convention has supported the conduct of a pilot study on pesticide poisoning in Burkina Faso which took place in June-July 2010.

The Rotterdam Convention is an international agreement on environment which promotes shared responsibilities and cooperative efforts among Parties in the international trade in certain hazardous chemicals in order to protect human health and the environment. Under Article 6 of the Convention, any Party that is a developing country or a country with an economy in transition that is experiencing problems caused by a severely hazardous pesticide formulation (SHPF) under the conditions of use in its territory may propose to the Secretariat the inclusion of the formulation in Annex III (List of chemicals subject to the Prior Informed Consent Procedure).

The objective of the present study is to collect data on pesticide poisoning incidents particularly from severely hazardous pesticide formulations in order to help to protect human health and the environment.

II- OBJECTIVES OF THE STUDY

II-1. Overall Objective

The overall objective of the study is to achieve health and environmental improvements.

II-2. Specific Objectives

- ✓ Identify pesticide formulations found in the studied zone and those used by farmers;
- ✓ Identify health and environmental risk factors associated with the use of pesticides in general and specifically on severely hazardous pesticide formulations;
- ✓ Identify health problems caused by the use of pesticides;
- ✓ Generate additional data to support decision-making processes related to the possible ban of certain pesticide formulations in the CILSS countries and the proposal for their inclusion in Annex III of the Rotterdam Convention;
- ✓ Study technical itineraries;
- ✓ Develop and implement good agricultural practices (GAP).

III- MATERIAL AND METHODOLOGY OF THE STUDY

III-1. Study Material

- ✓ Socio-economic data;
- ✓ Cotton, maize (corn), rain-fed lowland rice farms;
- ✓ Agricultural inputs (pesticides);
- ✓ Equipment/machinery used for pesticide application;
- ✓ Personal protective equipment (PPE) used during pesticide applications;
- ✓ Data collection tools.

Support used to collect data consisted in survey and interview factsheets. The factsheets were developped on the basis of the forms established by the Rotterdam Convention Secretariat. We also took into account the format of questionnaires which had been developed and used to conduct similar studies at the national level in Burkina Faso. (Toé *et al*, 2000; Toé *et al*, 2002; Toé *et al*, 2010).

III-2. Context of the study

Field work (surveys and interviews) took place in the agricultural areas of the Hauts-Bassins, the Cascades and the Boucle du Mouhoun. This is the biggest agricultural and cotton producing zone of Burkina Faso and the major user of agricultural pesticides. The Hauts-Bassins cotton production of the 2006/2007 agricultural season reached 329,787 tons and accounted for 43.4% of national production while the Boucle du Mouhoun area had a production of 257,430 tons (i.e. 33.9% of national production), which made of those two regions the major cotton producing zone of Burkina Faso with 77.3% of national production (MED, 2007a, c). Consequently, cotton is the main cash crop of those two regions. According to the results of the National Survey on Household Living Conditions (EBCVM) which was carried out in 2003, cotton was the second source of income for the farmers of the Boucle du Mouhoun. It alone accounted for 67.1% of income of that region (INSD, 2003).

The Hauts-Bassins had a population of 1,389,258 inhabitants in 2006, i.e. 10.6% of the national population with a cereal production of 628,907 tons (i.e. 17.1% of the national production) including 379,769 tons of maize which constituted 43.8% of the national production (MED, 2007c). As with the Boucle du Mouhoun, it had a population of 1,478,392 inhabitants in 2006, or 11.3% of the national population with a cereal production of 693,506 tons (i.e. 18.7% of the national production) including 169,755 tons of maize accounting for 19.6% of the national production (MED, 2007a).

The Cascades area had a population of 430,677 inhabitants in 2006 with a cereal production of 151,434 tons and a cotton production of 71,767 tons in its 2006/2007 agricultural season (MED, 2007b).

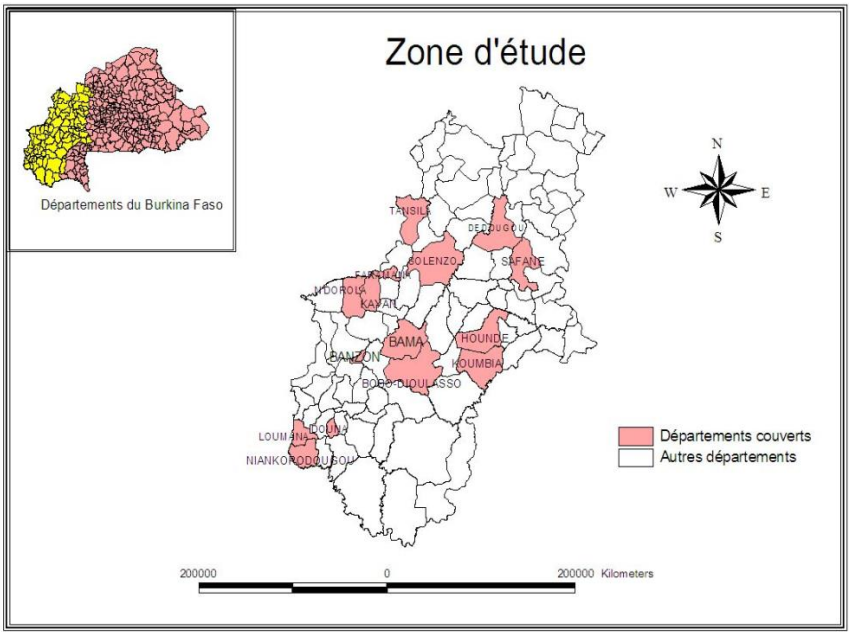
Suvey sites have been selected on the basis on their agro-climatic characteristics, their geographic situation, the extent of cultivated crops such as cotton, maize and rice on which pesticides are highly used. On the basis of the above-mentioned criteria, the following sites were selected:

Table I: Distribution of survey sites per region

Regions	Provinces	Survey sites	Farming Systems
Hauts-Bassins	Kénédougou	Banzon	Rice, cotton, maize,
		Kayan*	Maize, cotton,
		N'Dorola*	Maize, cotton,….
	Houet	Bama	Rice, cotton, maize,…
		Bobo-Dioulasso	Maize, cotton,….
		Faramana*	Maize, cotton,….

		Missidougou	Maize, cotton,….
	Tuy	Houndé	Maize, cotton,….
		Koumbia	Maize cotton,….
Boucle du Mouhoun	Mouhoun	Dédougou	Maize cotton,….
		Safané	Maize cotton,….
	Banwa	Solenzo	Maize cotton,….
		Tansila*	Maize cotton,….
Cascades	Léraba	Douna	Riz, cotton, maize,…
		Loumana*	Maize, cotton,….
		Niankorodougou*	Maize, cotton,….

* bordering departments (Ivory Coast, Mali)



Map 1: Departments hosting survey sites

(Text in the table Study Zone, Departments covered/Other departments)

III-3. Population of interest for the study

It includes:

- Cotton, maize, (rain-fed or lowland) rice producers;
- Agricultural producers (male and female);
- Health personnel in charge of health care centres in the surveyed zones;
- Regional officers from the Ministry of Agriculture, Water and Water Resources and from the Ministry of Health;
- Pesticide retailers and distributors.

III-4- Study methodology

III-4-1. Types of surveys

Part of the study consisted in undertaking restrospective surveys intended to collect epidemiologic data related to pesticide intoxication cases in rural areas. The relatively short time required for that work, the availabily of human and financial resources and the opportunity it gave us to record and identify a large number of poisoning cases led us to opt for this type of investigation method. Previous studies conducted on the subject had confirmed the prevalence of intoxication incidents. (Toé *et al*, 2000, Toé *et al*, 2002).

Prospective studies were conducted to monitor agricultural producers during pesticide application operations and to identify weaknesses and strengths of producers' pesticide management (pesticide acquisition, pesticide doses, precautionary measures, safety measures, management of agro-chemical stocks, left-over pesticides and of empty containers).

III-4-2. Sampling method

Fifty (50) farms were selected in each department. In order to take into consideration the different categories of agricultural producers, a stratified sampling based on the size of the farms was created.

Stratified sampling

Based on the size of farms, the following four groups were taken into account:

Group I. Less than 1,000 m^2

Group II Between 1,000 and 2,500 m^2

Group III Between 2,500 and 5,000 m^2

Group IV More than 2,500 m^2

The total number of farms per department and the number of farms of each group was assessed in order to do the sampling. The representativeness of each group in the department was calculated on the basis of the total number of farms per group as per the following:

$$\frac{\textbf{Number of farms in the group}}{\textbf{Total number of farms in the department}}$$

To determine the number of farms from each group that should be part of the 50 farms selected for the sampling, we have multiplied 50 by the group coefficient.

All pesticide distributors and retailers located in rural towns were taken into account. With respect to more populated areas (urban zones/towns) retailers were selected according to their geographical situation (market place, city centre).

As for health care service centres they have all been systematically included in the sampling.

III-4-3. Investigation techniques used among interviewees

III-4-3-1. Investigation techniques used among pesticide distributors and retailers

They consisted in carring out interviews among the persons who were in charge of the trade and distribution of pesticides in wholesale and retail establishments and in having them filling out the questionnaire attached in Annex 1.

III-4-3-2. Investigation techniques used among farmers

They consisted in collecting data on experienced or observed intoxication cases, the identity of incriminated chemicals, the accounts of accidents and on the evaluation of knowledge, attitudes and practices, (KAP) among agricultural producers through the conduct of retrospective surveys with the help of Questionnaire 2.

They also included a prospective study aiming at monitoring farmers during pesticide applications in the fields.

III-4-3-3. Investigation techniques used among health care centres

Surveys aimed at recording poisoning incidents together with their description were carried out at health centres' level. The investigations were designed to collet reliable and well-documented data along with biological tests results, when available.

III-4-4. Information research

The first step was to identify the political, institutional and legal frame related to the use and trade of pesticides. The second step consisted in determining the number of farms and farmers per site, in drawing a list of the existing health care centers and finding about their

vicinity to community groups and finally in compiling data on recorded pesticide formulations and their active ingredients (toxicologic and ecotoxicologic data, registration status, regulations).

III-4-5. Field work

III-4-5-1.Field work preparation

Semi-structured and strutured interviews were conducted among resource persons at the Bobo-Dioulasso Cotton Progamme and among the Agriculture technical and administrative regional officers. The interviews were designed to collect information to be used to identify survey target sites. (Table I). Sites have been selected taking into account:

- The importance and the nature of commercial crops, (cotton, maize (corn) or rice) which, because of the extent of cultivated areas and permanent threats from pests, require the excessive use of pesticides;

- The geographic situation of the sites to take into consideration uncontrolled and illegal entries of pesticides through land boundaries (Mali, Ivory Coast).

To finalize the questionnaires, a few producers and pesticide retail dealers were interviewed in order to rewrite questions which did not seem to be clear enough at the time of the preliminary surveys.

Once the final version of questionnaires was adopted, a training session aimed at interviewers was organized in order to optimize their survey technique tools and knowledge (sampling, interview techniques, and to give them a better understanding of the objectives of the study (See Training Workshop Report, May, 2010).

III-4-5-2. Field study progress

Each survey interviewer had contacted the relevant administrative and technical services at her/his town/village level (Headquarters (prefectures), townhalls, Technical Support Units (TAU), to collect preliminary data on the number of farms and their different categories.

On the basis of the data obtained, a random sampling was done to identify persons to be surveyed and the latter were subsequently asked to answer the questionnaire attached in Annex 2. As most of the farmers were busy during the day, surveys were conducted early in the morning, in the evening or in the fields during the day.

Interviews were carried out among the persons in charge of pest control products in the distribution, storage and retail premises to obtain information on pesticide management with the help of the questionnaire in Annex 2.

Following the questionnaire presented in Annex 3, interviews were conducted among health agents to record and describe poisoning incidents caused by pesticides, with special focus on incidents which occurred in the fields during pesticide treatment operations.

III-4-6.Data processing and analysis

After the perusal of survey sheets, data was codified, entered and analysed using the data management software Epi Info 3.3.2 and Excel 2007 software. Results were summarized into descriptive statistics and depicted in graphs summarizing the frequency distribution and average and standard deviation distribution.

The identification of active ingredients together with their concentration, chemical family and hazard class under WHO classification of the recorded pesticide formulations was made with the help of the CPS list of registered pesticides, the PIP Toolkit, the Footprint PPDB database and the ACTA Phytopathologica Journals.

III-4-7. Final report

The final report was written, printed and forwarded to DNA/CNGP and to FAO/PIC for clearance.

III-5. Expected results

- ✓ Technical itineraries will be analysed;
- ✓ Agricultural pesticide formulations used in Burkina Faso will be identified and listed;
- ✓ Health and environmenal risk factors related to the use of pesticide and specifically to severely hazardous pesticide formulations will be identified;
- ✓ Health problems associated with the use of pesticides in general and specifically to severely hazardous pesticide formulations will be recorded;
- ✓ Proposals for the inclusion of severely hazardous pesticide formulations listed in Annex III of the Rotterdam Convention will be forwarded;
- ✓ Additional data to support decision-making processes related to the possible ban of certain pesticide formulations in CILSS countries will be collected.

IV- OUTCOME OF THE STUDY AND DISCUSSIONS

IV-1. The use and trade of pesticides and the political, institutional and legal framework

In order to support sustainable development and food security, Burkina Faso has introduced, among others, new legislation and national regulations to strengthen the implementation of sound pesticide management. In doing so, Burkina Faso reiterates its commitment to the international and regional agreements signed under the Basel Convention, the Rotterdam Convention, the Stockholm Convention, the International Code of Conduct on the Distribution of Pesticides, and the Common Regulations for Pesticide Resgistration scheme in CILSS countries.

The Government has promulated a series of laws to address the sound management of pesticides and has made provisions for their effective enforcement. They provide for the control and safe storage of pesticides and involve the following three (3) ministerial departments:

- **Ministry of Agriculture, Water and Water Resources (MAHRH)**

Under the Common Regulations for Pesticide Registration in CILSS Countries, Burkina Faso is not entitled to have its own independent pesticide registration body. Pesticide registrations are carried out by the Sahelian Pesticide Committee (SPC). The common regulation applies to pesticides and bio-pesticides. Burkina Faso entered CILSS Common Regulations for Pesticide Registration scheme in 1992. A National Commission on the Control of Pesticides (CNCP) was subsequently created in August 2000 to implement regulatory actions taken by the Sahelian Pesticide Committee.

Unde Article 23 of the regulation, the following two Acts together with provisions for their enforcement have been enacted:

- Law N°041/96/ADP, of 8 November 1996 on Pesticide Control in Burkina Faso;
- Law N°006-98/AN, of 26 March 1998 – amendment to Law N°041/96/ADP of 8 November 1996 on Pesticide Control in Burkina Faso;
- Decree N°98-472/PRES/PM/AGRI, of 20 December 1998 on the establishment of the National Commission on the Control of Pesticides (CNCP), its composition and operational procedures;
- Decree N° 2005- 051 /PRES/PM/ MAHRH of 7 February 2005 - amendment to the decree N°98-472/PRES/PM/AGRI of 20 December 1998 on the establishment of the National Commission on the Control of Pesticides (CNCP), its composition and operational procedures;

- Decree N° 2008- 679 /PRES/PM/MAHRH/MCPEA of 27 October 2008 establishes conditions for issuance of licenses to pesticide formulators, repackagers, distributors, retailers and pesticide application service providers.

Ministry of Environment and living conditions (MECV)

The relevant legal instruments are:

- Law N°005/97/ADP of 30 January on the Environmental Code of Burkina Faso;
- Decree N°2001-185/PRES/PM/MEE of 7 May 2001 sets pollutant emission limits in the air, water and soil.
- Decree N°98 322/PRESS/PM/MEE/MCIA/MEM/MS/MATS/METSS/MEF of 28 July 1998 on the regulation related to dangerous, inconvenient and insalubrious establishments/buildings;
- Decree N°2001-342/PRES/PM/MEE of 17 July 2001 sets out the scope, content, procedure of the environment impact study and statement.

Ministry of Health

The relevant legal instruments within the Ministry of Health are:

- Decree N°99-377 PRES/PM/MS on the establishment of the National Public Health Laboratory (LNSP);
- Ordinance N°2002/MS/MHAR/MECV/MECV/MFB/MCPEA establishes laboratory control procedures on pesticides and assimilated products before commercialization.
- Law N°022-2005/AN of 24 May 2005 on the Public Hygiene Code of Burkina Faso.

IV-2. Results of the survey carried out among pesticide distributors

IV-2-1 Pesticide distributors characteristics

Ninety-seven (97) pesticide suppliers distributed in 14 different sites were identified during the study. Figure 1 shows the distribution of pesticide suppliers in the different sites of the study.

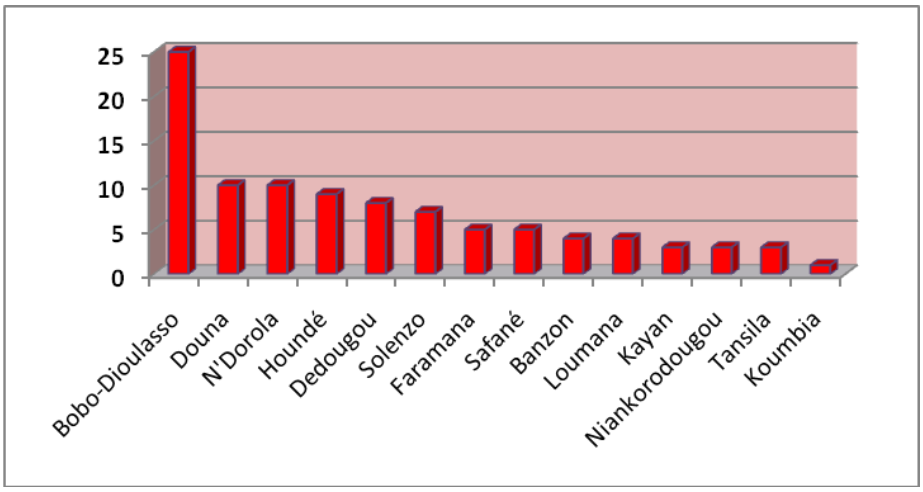


Figure 1: Distribution of pesticide suppliers in the surveyed sites

As shown in Figure 1, twenty-five (25) out of 97 pesticide distributors are found to be located in the town of Bobo-Dioulasso, i.e. 25.77% them which is explained by the fact that Bobo-Dioulasso is the second most important town of the country and its main economic centre. Among the surveyed pesticide distributors, companies such as SAPHYTO and SCAB stand out as the major and more organized pesticide distribution establishments.

IV-2-2. Main pesticides recorded

One hundred and fifty-three (153) pest control products out of which 49 (i.e. 32 %) have been authorized for sale by the Sahelian Pesticide Committee, were recorded during the survey and 56 active ingredients were identified among the 97 distributors of the 14 survey sites. The main categories of pesticides found are herbicides, insecticides and fungicides. The complete list of recorded chemicals is provided in Annex 6 and the list of active ingredients is given in Annex 4.

Out of the 56 active ingredients which were recorded, thirty (30) are included in the Annex 1 of the European Union and hence are authorized in the European Union countries, eight (8) of them have been resubmitted for consideration and three (3) are banned. The other 15 active ingredients which are not listed in Annex 1, include, among others, paraquat, carbofuran, endosulfan, lindane and profenofos and are found in some of the pesticide formulations under Class Ib and II of the WHO hazard classification.

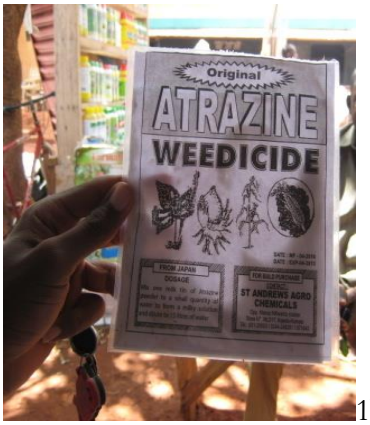
IV-2-3. Main sources of supply

National wholesale companies such as SCAB, DTE, SAPHYTO (the only pesticide manufacturer), SOFITEX Company, cooperatives, the National Union of Burkina Faso Cotton

Producers (UNPCB), constitute the main sources of supply of pesticides to agricultural producers.

Eighty-five percent (85%) of the distributors and retail dealers know about other sources of supply. Ghana, Ivory Coast, Mali, Nigeria and China are by order of importance the major suppliers.

It is common to find inappropriate packaging in registered retailers such as labels containing instructions in English. These products usually come from Ghana and Nigeria.



1)


2)

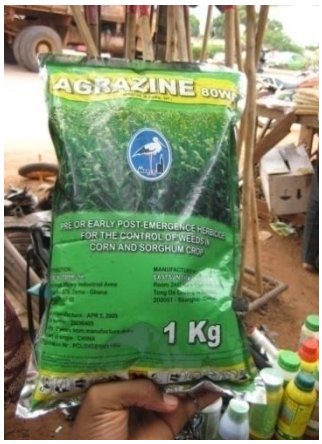
3)

Photos 1, 2 and 3: Chemicals coming from Ghana and found on the market

According to retail vendors, the practice of selling non-registered chemicals and authorized ones (i.e. registered by the Sahelian Pesticide Committee) is due to high competitiveness on the market.

Retail vendors from the area Solenzo have said that the reason why most pesticides come from Ghana, Mali and Ivory Coast is due to the fact that products sold by SAPHYTO are far too expensive.

Photo 4: Formulation containing Paraquat



Photos 5 and 6: Formulations containing atrazine

IV-2-4. Pesticide management

Management of left-over products

About 10% of distributors have reported receiving left-over pesticides from their customers. In 78 % of cases they are unused pesticides which are still in sealed containers and not obsolete, so they offered for re-sale. However, generally speaking, the probability of finding obsolete chemicals is extremely high.

Storage of agro-chemicals

Thirty-seven percent (37%) of the surveyed distributors have a wharehouse. In half of the cases, pesticide storage facilities are considered to be appropriate. Adequate storage facilities are found mainly within the largest and most organized establishements such as SOFITEX and SHAPHYTO. In some rural towns (Tansila for example), it has been found that pesticide street vendors store their products in their sleeping rooms.

Orderly storage accounts for 64% of the surveyed cases and non orderly storage accounts for 36% of the remaining ones.


7)

8)

9)

Photos7, 8 and 9: Storage of pesticides at some vendors' places: 7) Pesticides and goods for sale, 8) Unseggregated Products, 9) Chemicals stored on shelves

Thirty percent (30%) of the surveyed premises had trained wharehouse keepers and in 51% of cases, they used storage data sheets. Seventy-nine percent (79%) of the surveyed retailers and distributors were not using safety data sheets.

Photo 10: Example of a storage data sheet from a pesticide vendor

Stock management is carried out as follows: compliance with initial packaging or repackaging. It has been noted that most retail dealers (91%) keep the products in their original containers. Repackaging is done mainly in large pesticide distribution establishments (SCAB, SAPHYTO).

Figure 2 shows the distribution of pesticide distributors and retailers according to their stock management practices.

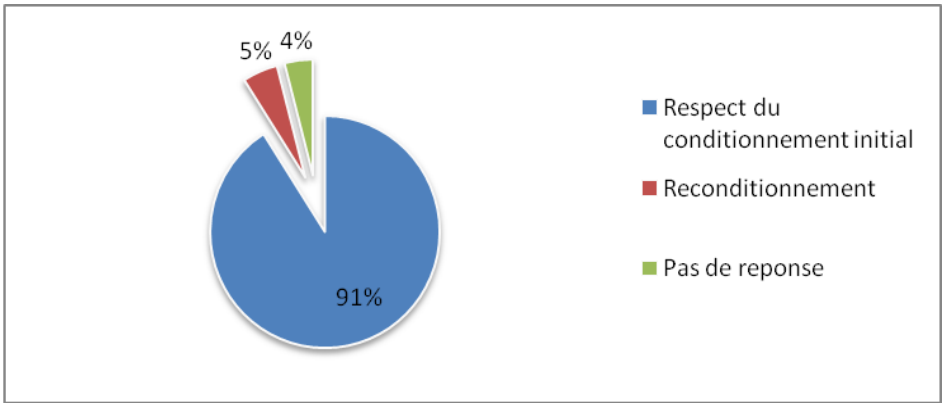


Figure 2: Stock management practices followed by pesticide distributors and retailers

(Text in the table)

Comply with initial packaging

Repackaging

No answer

Availability of First-Aid-Kit

Only 14% of the surveyed premises have a First-Aid-Kit. Products found in the First-Aid-Kits include alcohol, vegetable charcoal, amoxicillin, paracetamol, atropine, *Aloe vera*, soap, ibuprofen, quinine, efferalgan, pre-cut adhesive strip dressings, active charcoal, gloves, masks, mercurochrome.

Only the main wholesale companies (SCAB, SAPHYTO) have well-equipped First-Aid Kits.

Management of empty containers

In 32% of cases, premises have reported treating their empty containers. The different container management practices and the occurrence of such practices are summarized in Figure 3 hereunder.

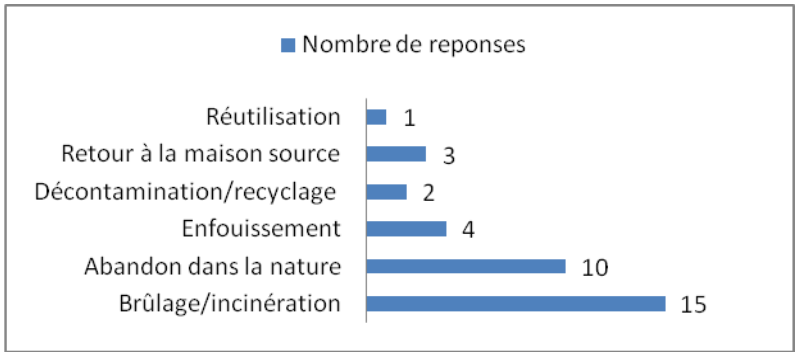


Figure3: Managament of empty containers by pesticide distributors

(Text in Table)

Re-use/Return to the original supplier/Decontamination/recycling/Burying/Dumping into the environment/Burning/incineration

Structures such as SOFITEX store their empty containers and return them to the main pesticide supplier in Bobo.

Photo 11: Empty container abandoned into nature

Photo 12: Containers stored with goods

Results of the study carried out on empty containers management indicate that, in most cases, pesticide containers are being re-used. Some companies such as SOFITEX return empty containers to their main pesticide suppliers which contribute to reducing risks associated with those chemicals. Other licensed premises such as SPAPHYTO have their decontamination and recycling facilities onsite and are able to treat their own pesticide wastes.

Careless practices such as re-using empty pesticide containers, dumping them into nature or burning them constitute major risks to human and animal health and the environment.

IV-2-5 Risk prevention and protection measures for farmers

Ninety-two percent (92%) of the surveyed distributors have reported to be aware of risks associated with the use and handling of pesticides.

Three quarters (3/4) of the distributors provide their customers with information related to the proper use of pesticides.

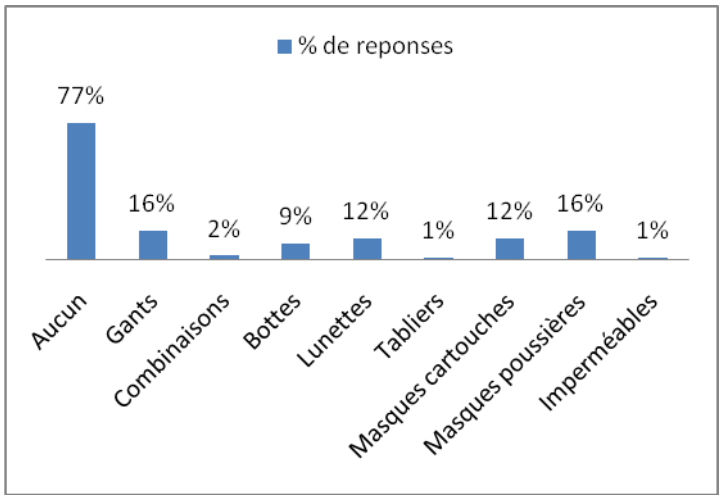
Training sessions on the appropriate use of pesticides aimed at farmers are being organised by the major pesticide distributors. In 16% of cases, training courses are organized by companies themselves with a frequency of once a year in 10 % of cases, and of twice a year in 4% of cases. Training sesssions are free in 14% of cases.

Training sessions provided to farmers and distributors usually take place at the beginning of each agricultural season. SOFITEX organises two training sessions per season.

Personal Protective Equipment

In 20 % of cases, pesticide distributors provide PPE to farmers. Main protection gear includes gloves (16%) and dust masks (16%). Overalls are provided in 2% of cases.

Figure 4 shows the different types of personal protective equipments provided to farmers



Text in Table

(None, Gloves, Overalls, Boots, Glasses, Aprons, Cartridge masks, Dust masks, Raincoats)

Figure 4: Personal protective equipments provided to farmers by pesticide vendors

Some establishments do not sell personal protective equipments but have equipped operators to do pesticide treatments for farmers on request. Other places provide gloves or dust masks for free but payment is required for the use of other personal protective gear.

Findings of the survey carried out among distributors

Informal trade accounts for most of pesticide distribution and trade activities and a few private professional establishments are licensed to sell pesticides. Most of the trade activities carried out by distributors and retailers are uncontrolled and illegal and contribute to increasing risks posed to farmers, communities and the vendors themselves who are not aware of the hazards associated with the products they handle all day long.

Most of the products sold are pesticide formulations in the form of emulsifiable concentrates (EC) or active ingredients belonging to chemical families which have been banned under international agreements or subject to restrictions. They are:

- ✓ Lindane which is included in Annex III of the Rotterdam Convention (chemicals subject to the PIC Procedure), in the LRTAP List and the PAN Dirty Dozen List from PAN UK (List of list, 2009);
- ✓ Paraquat which is included in the PAN Dirty Dozen List of PAN UK (List of list, 2009) and was found in (6) of the recorded pesticide formulations.

Similarly, pesticide formulations containing active ingredients such as atrazine and paraquat, and banned by the CPS are being found in local market places and sold to farmers. Those pesticide formulations have severe adverse effects on users' health (acute intoxication risks related to the use of paraquat) and on the environnement (water contamination risks related to the use of atrazine which is present in 26 of the recorded formulations).

Some banned pesticide formulations containing active ingredients such as endosulfan (ROCKY 386 EC) were not recorded among retail dealers but were found to be commonly used by cotton producers. This can be due to the fact that some vendors managed to hide certain products when they saw interviewers coming or that some farmers rely on sources of supply other than those which have been recorded especially when they are living close to neighbouring countries.

Major concerns related to pesticide management in the private sector can be summarized as follows:

– non-compliance with regulation with respect to the distribution of pesticides by registered vendors;

–lack of knowledge and training of pesticide distributors and vendors who are unable to provide proper advice to their customers;

–lack of knowledge of vendors and customers on pesticide toxicity: pesticides and food commodities are sold in the same shops;
– huge transboundary trade of illegal and banned chemicals.

IV-3- Results of the survey carried out among farmers

IV-3-1 Socio-demographic characteristics of the surveyed farmers

In total, 650 farmers distributed in 16 towns and 6 provinces of the three (3) studied regions were surveyed.

IV-3-1-1. Sex and age of farmers

In the studied zone, pesticide application was found to be predominantly a male activity. In fact, 98.3% of the surveyed persons involved in the application of pesticides were men. Only 1.7% of the applicators were women.
Table II shows the age distribution of farmers

Table II: Age distribution of farmers

Age category (years)	**10 – 20**	**20 - 30**	**30 – 40**	**40 - 50**	**50 – 60**	**60 – 70**	**70 - 80**	**Total**
Number	11	125	224	191	80	18	1	650
Percentage	1.7	19.2	34.5	29.4	12.3	2.8	0.2	100

The average age of farmers is 39.58 ± 10.30 years. The youngest person involved in pesticide application operations is 17 years old as the oldest one is 75. Results given in the table indicate that activities related to pesticide applications involved individuals of different age categories. Even though the majority of workers involved are less than 60, some of the operators are over 60 (3%). This raises some concern as it is known that the functional capacity of human vital organs such as kidneys decrease with age. Consequently, it contributes to increasing health risks related to the exposure of pesticides as the elimination of xenobiotics from the human body diminishes considerably in elderly people. Besides, age can be a factor that fosters the recourse to pesticides in that older people seem to have a tendency to use herbicides to eradicate weeds rather than pulling them by hand.

IV-3-1-2. Educational level among farmers

60.5% of the surveyed population had no education at all, 31.8% of them had gone though primary education and 7.7% had a secondary education level. Overall the level of education of surveyed farmers is low. Illiterate farmers cannot read labels and follow recommended instructions for the proper use of pesticides. This fact does hinder the implementation of a scheme aimed at reducing health risks. However, farmers who have acquired literacy in the indigenous language can constitute an asset for the community. As a matter of fact, training programmes on the management and proper use of pesticides can be designed and provided in the local language. Such programmes could initially target a restricted number of individuals who will eventually be requested to take over training among the other members of the community.

IV-3-1-3. Farmers' extent of experience in the use and handling of pesticides

The results of the study indicating the extent of farmers' experience in handling pesticides are reported in Table III.

Table III: Distribution of farmers according to their experience in pesticide use

Age category (years)	**0 -10**	**10 - 20**	**20 - 30**	**30 - 40**	**40 -50**	**Total**
Number	**250**	**237**	**113**	**36**	**5**	**641**
Percentage	**39%**	**37%**	**17.6%**	**5.6%**	**0.8%**	**100%**

The study has shown that the extent of farmers' experience related to the use of pesticides can vary considerably. Some workers had a short experience of two years in applying pesticides while others have been doing this work for more than fifty years. However, contrary to the idea that experience can be an asset, we have been able to see directly from the fields that pesticide operators with the longest experience did not necessarily give the best example. As a matter of fact, they were applying pesticides without personal protective equipments on the pretence that they did not feel there were any risks in handling pesticides.

IV-3-2.Use and safe management of pesticides by farmers

IV-3-2-1. Pesticide treatment equipment

The study shows that the equipment used were mainly backpack sprayers with a volume capacity of 10 to 20 L (in 96 % of cases) and Ultra Low Volume sprayers (ULV) or Ultra Bas Volume (UBV) sprayers with a volume capacity ranging from 1 to 5 L (4 % of cases).

IV-3-2-2. Management of left-over pesticides after treatment

Figure 5 shows the distribution of farmers according to their management practices with respect to left-over pesticides after treatment operations in the fields

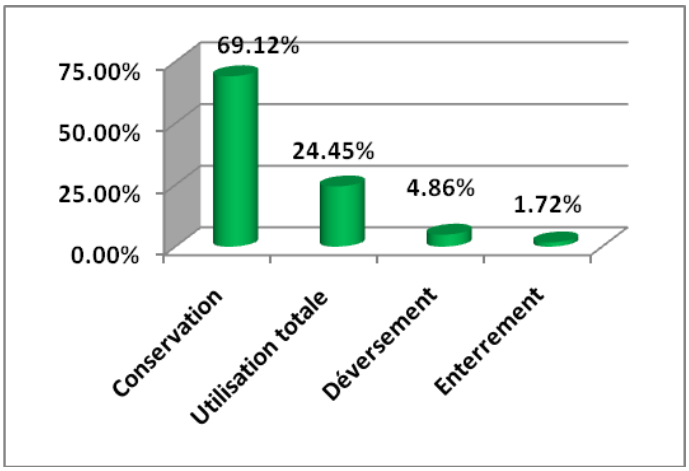


Figure 5: Management practices of left-over pesticides by farmers

24.45% of farmers reported not having any left-over pesticides as they knew the exact quantitites required for treatment. Most of the surveyed farmworkers (69.12%) keep their unused pesticides for further applications. They stored them at their place or in the fields. A few of them have declared dumping them into nature (4.86%) or burying them (1.72%). The conclusion drawn on pesticide management practices among farmers is that the careless habit of storing pesticides at home severely exposes family members to risks in terms of health while discharging them into the environment or burying them inevitably leads to environmental contamination.

IV-3-2-3. Management of empty pesticide containers after use

Figure 6 shows the distribution of farmers according to the answer they gave on empty pesticide containers management.

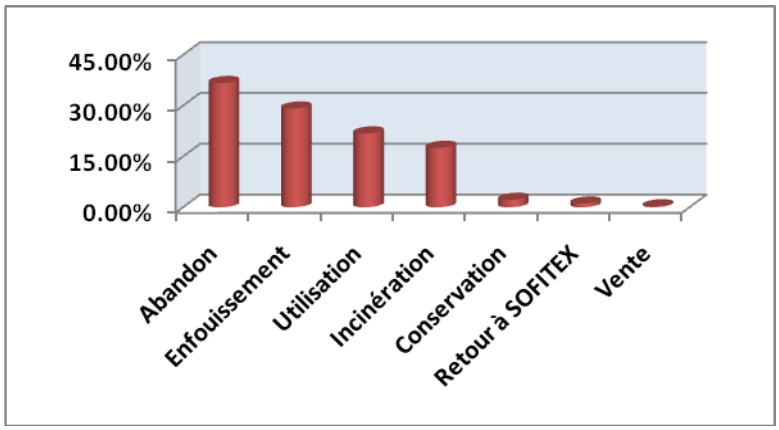
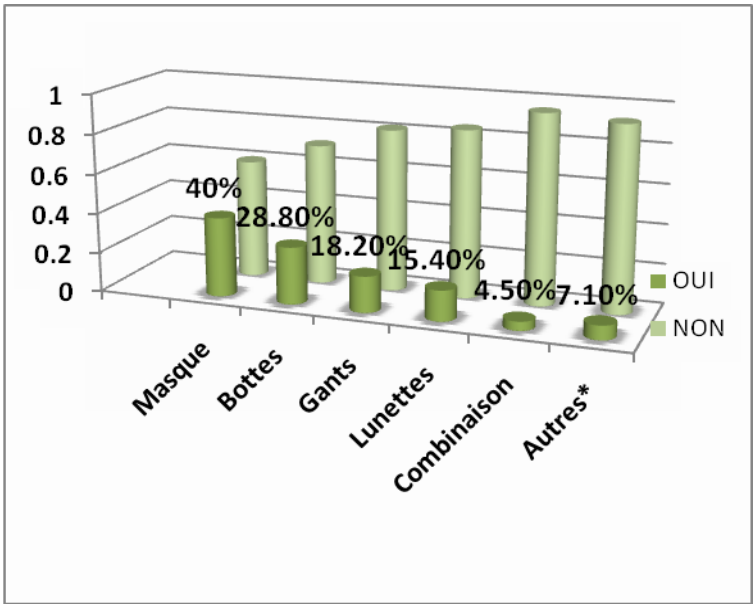


Figure 6: Farmers' management of empty containers

A certain number of farmers (36.68%) abandon empty containers into the environment as they are or after destroying them and leave them either in their fields or place them into holes or lower areas, thus increasing the risk of environmental contamination. In 21.79% of cases, empty packaging was re-used. Re-using empty containers contributes to increasing healh risks as pesticide residues cannot be completely eliminated by simply rinsing containers.

IV-3-2-4. Use of protective gear

Figure 6 summarizes the distribution of the different types of personal protective equipment worn by farmers and the frequency with which they are used.



* The caption "Others" refers to *allternative* types of protection worn by individuals applying pesticides when *conventional* gears are not available. Examples of *alternative* equipment are head scarves, bags, old clothes, socks, closed shoes, etc..

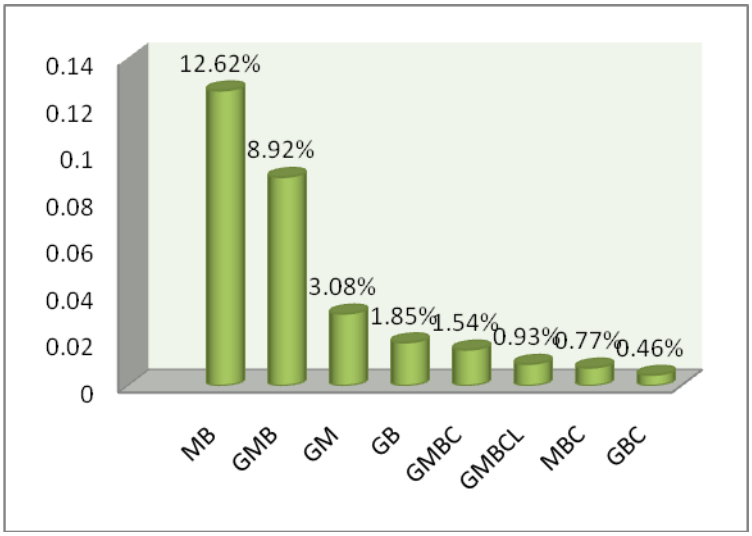
Figure 6: PPE worn by the surveyed persons involved in the application of pesticides

Text in Table

(Masks, Boots, Gloves, Glasses, Overalls, Others)

Figure 6 shows that of the protective gear most widely worn by farmers, masks are the most used (40% of farmers use them, 39% of which are dust masks against 1% are masks cartridge filters), followed by boots (28.8%), with the combination of the two are the least used used (4.5%). It stands out that protection is usually incomplete as confirmed in Figure 7 which outlines the different set of personal protective gear worn by farmers during pesticide applications. Very few farmers have full protection.

Figure 7 shows that 12.62 % of farmers wear both masks and boots, while only 0.93% wears gloves, boots, overall, mask and glasses at the same time. Masks with filter cartridges are worn in combination with gloves, boots, coveralls and goggles in only 0.31% of cases. The scarse use of personal protective equipment and the tendency to have only partial protection inevitably leads to high exposure risks among pesticide applicators.



None: no protection;
MB: masks + boots;
GMB: gloves + masks + boots;
GM: gloves + masks;
GB: gloves + boots;
GMBO: glovess + masks + boots + overall
GMBOG: gloves + masks + boots + overall + glasses;
MBO: mask + boots + overall;
GBO: gloves + boots + overall;

Figure 7: Combination of protective gears worn by surveyed persons involved in the application of pesticides

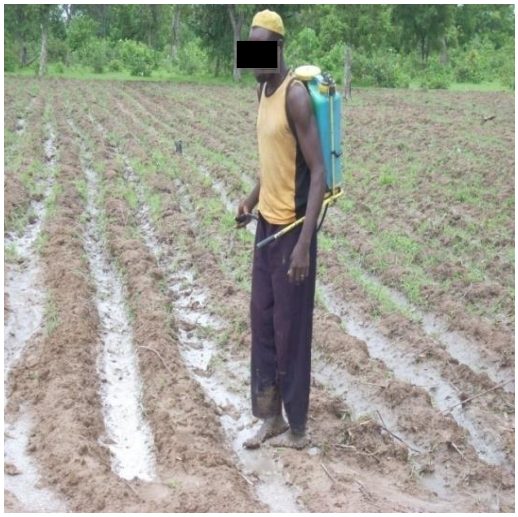
Surveyed persons were asked to explain why they did not use PPE and their comments were the following:

- Have no financial means to buy PPE;
- PPE are too expensive and not affordable on a farmers'budget;
- Do not know about their existence;
- Are expecting PPE to be provided for free;
- Unavailability of such equipments in the market place;
- PPE are not adapted to local weather conditions. For instance, some farmers said they feel discomfort and that they could not breathe properly while wearing PPE during spraying activity;
- Do not think of pesticide hazards

Intoxication risks to which applicators are exposed depends partly on the conditions in which pesticides are used and especially on the use made of personal protective equipment. If it is

accepted that to ensure proper applicator protection should be joint use of suitable gloves, boots, coveralls, masks with cartridge filters and goggles, it appears that only 0.31% of farmers are entitled to this recommended protection. The majority of those who considered themselves to be protected during applications, that is to say 12.62% of the surveyed persons use only masks and boots.

Another sad fact which adds to the already low level of protection among farmers is that they usually wear inadequate and poor protective equipment. Alternatives to the use of conventional protective equipment are found to be very basic and consisting in using latex gloves or simple plastic bags instead of rubber gloves, old and torn clothes instead of overalls, socks instead or boots. Those substitutes cannot ensure the safe handling of pesticides and contribute to higher risks of exposure among applicators.


13)


14)

Photos 13 and 14: Farmers' protection during pesticide application

IV-3-2-5. Perception of health risks among farmers

Most of the farmers with whom we talked reported to be aware of the adverse effects of pesticides on their health and that of others. When asked what types of risks they were exposed to when using pesticides, the following responses were given:

- Pesticides can cause human poisoning;
- Can cause headaches, stomach pain;
- Can cause skin diseases;
- Can cause pain in the eyes;
- Can cause a cold;
- Can kill animals;

- Can make people sick;
- Can kill;
- etc.

IV-3-2-6. Perception and factors of environmental risks among farmers

Contamination risks of watering places according to their distance from agricultural fields

The majority of farmers (67.5%) have reported having a watering place in their fields or in the vicinity. As shown in Figure 9, 12.41% of watering places are found in the fields and a large number of them are situated at less than a hundred metres from the fields. The vicinity of watering sources to fields increases the risks of water contamination by pesticides released through different mediums.

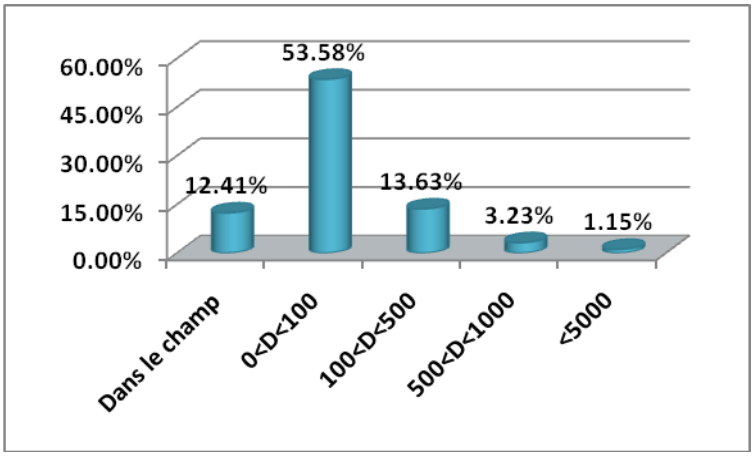


Figure 8: Distance between watering places and fields

(Text in the Table)

In the field

Risks associated with the use of water from watering sources

Uses made of water from watering sources are shown in Figure 9. It has been observed that in 50% of the watering places, water was used for consumption, in 29.26% of them it was used to mix or dilute pesticides and 26.96% of these structures were used to provide water for animals.

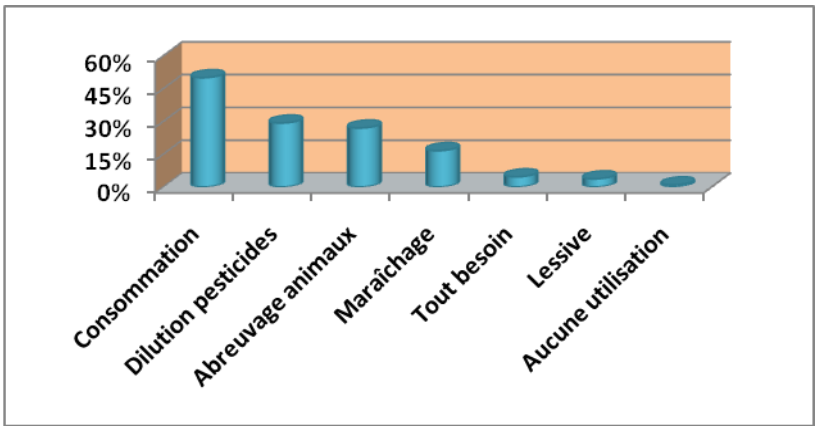


Figure 9: Uses of watering places

(Text in the table)

Consumption/Dilution of pesticides/Watering sources for animals/Horticulture/Any use/Washing/No use

Facts on the Loss of biodiversity

Surveyed farmers have observed that there is a corrrelation between pesticide treatments and the decline in numbers of various species: farmyard animals, birds, aquatic animals, land vertebrates and invertebrates etc.

IV-3-3. Toxicity of pesticides used by farmers

IV-3-3-1. Identification of pesticides used by farmers

The table of Annex 7 lists all of the pesticides together with their active ingredient(s) that surveyed farmers have reported having recoursed to in the agricultural sector. A total of 78 products have been reported to be used. Information such as the WHO toxicity classification of chemicals as well as the regulatory status of the products under the Sahelian Pesticide Committe (CSP) is also included. Out of these products, 33 pesticide formulations (42.31 %) have been authorized for sale by the CSP.

IV-3-3-2. Pesticide Toxicity

Health damages caused by xenobiotics in general and pesticides in particular are linked to their toxic potential. Pesticides used by farmers are divided into different hazard classes under the WHO classification:

The WHO Classification of Pesticides by Hazard

	LD50 acute (mg/kg body weight)	

	Rat			
Class and correspondence	ORAL		DERMAL	
	Solid	Liquid	Solid	Liquid
Ia - Extremely hazardous **Very toxic**	< 5	< 20	< 10	420
Ib -Highly hazardous **Toxic**	5-50	20-200	10-100	40-400
II - Moderately hazardous **Harmful**	50-500	200-2000	100-1000	400-4000
III - Slightly hazardous **Handle with care**	>500	> 2000	>100	> 4000
IV - Unlikely to present acute hazard in normal use				

Restricted Use Pesticide Classification

	Can be used by
Ia - Extremely hazardous **Very toxic**	Only licensed applicators
Ib -Highly hazardous **Toxic**	Certified and experienced applicators under close supervision
II - Moderately hazardous	Experienced applicators under close supervision who strictly follow precautionary measures
III - Slightly hazardous	Experienced applicators complying with routine safety requirements

Two of the pesticides used fall under Class Ib of the WHO Classification. Pesticides falling into that category are highly hazardous and can be used only by certified and trained applicators and under close supervision. The use of such products should be strictly forbidden to farmers who have no training, who do not have appropriate personal protective equipment and who tend to underestimate pesticide-related hazards.

Seventeen pesticides fall under Class II. They are considered as moderately hazardous and their use is restricted to trained applicators under close supervision who strictly comply with recommended precautionary measures. The population studied during our survey with its limited level of education, lack of training and the general tendency not to comply with safety requirements in terms of protective equipment should in no way use this category of pesticides.

It has been noted that most of the pesticides used fall under class III (26 out of 78). They are rated as slightly hazardous and can be used by trained applicators who comply with recommended precautionary measures. Well-trained farmers who would comply with

recommended patterns of use and safety requirements should be able to handle these products with no major risk of intoxication.

Seven of the pesticides used by farm-workers belong to class U and are unlikely to present acute hazards under normal use. Complying both with restrictions of use and precautionary measures is a way for pesticide applicators to ensure their safety.

IV-3-3-3. Major sources of supply

Local markets have been reported to be the first source of supply for pesticides to farmers. Moreover, SOFITEX, which is a state-owned company supporting cotton producers, provides its customers with agricultural inputs including pesticides. Cotton producers are generally organized into cooperatives under the National Union of Cotton Producers in Burkina Faso (UNBCP) which ensures the supply of inputs to its members. As a matter of fact, the UNPCB delivers pesticides to its farmers. Other sources of supply have been mentioned as well and include SAPHYTO, Chinese bilateral aid and FAO. Some farmers located in the vicinity of neighbouring countries (Area of Tansili) have reported getting their supplies from Mali or Ivory Coast, which is evidence of the illegal and uncontrolled trade in the region.

IV-4. Health effects associated with the use and management of pesticides

III-4-1. Types of ailments affecting farmers during and after the use of pesticides

Figure 10 shows the distribution of the different types of ailments affecting farmers and their rate of prevalance

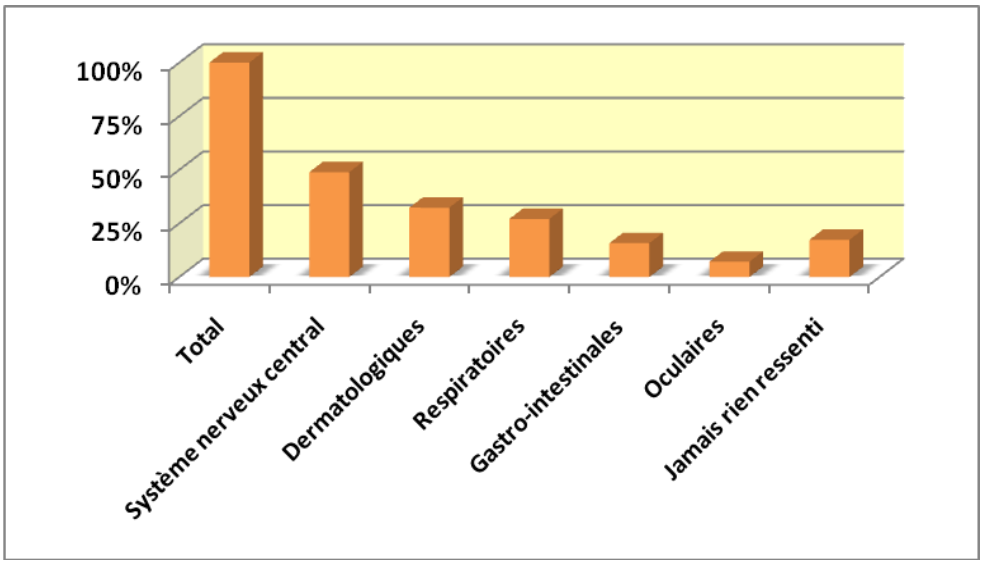


Figure 10: Distribution of farmers according to the type of ailments

Text in the Table

Total/Central nervous system CNS/Dermal affections/respiratory affections/Gastrointestinal affections/Ocular affections/no symptoms

Figure 10 indicate that the majority of surveyed farmers (82.66%) report having experienced, at least on one occasion, a feeling of ill-health during or just after pesticide applications while 17.34% of them have never felt anything. Major types of ailments reported during interviews with farmers are, by decreasing order of importance, those affecting the central nervous system (experienced by 48.92% of farmers), dermal affections (32.35%), respiratory affections (27.09%), gastrointestinal affections (15.79%) and ocular affections (7.12%). It has been noted that the disturbance to the central nervous system is prevalent. As a matter of fact, exposure to insecticides is known to have severe adverse effects on the nervous system.

Table IV lists the main symptoms associated with the different types of ailments

Table IV: Distribution of symptoms associated with the different types of ailments

Ailments	CNS	Dermal	Respiratory	Gastrointestinal	Ocular	Other sign
Signs	Vertigo	Itching	Cold	Abdominal pain	Blurred vision	Palpitations
	Cephalea	Smarting	Cough	Diarrhea	Smarting	Sweating
	Fever	Skin irritation	Respiratory problems	Vomiting	Tearing	Heart rhythm problems
	Drowsiness/ Insomnia	Skin burn	Chest constriction	-	-	Tremor

IV-4-2. Intoxication cases reported by surveyed farmers

A total of 296 intoxication cases were reported among the surveyed farmers. In general, poisonings were accompanied by dermal affections (itching, smarting, skin burns, skin troubles, scars, full lesion of the contaminated area), respiratory ailments (smarting, burning and itching of the respiratory tract, respiratory problems and cough), ocular affections (burning sensation in the conjunctiva, blurred vision, smarting, burning sensation in the eyes, sight loss), gastrointestinal affections (abdominal pain, nausea, vomiting), cephalea and vertigo. In some cases, the intoxicated person lost consciousness. Table V provides the distribution of reported intoxication cases among pesticide applicators together with the main symptoms experienced.

Table V: Summary of intoxication incidents recorded among farmers 1/6

Chemicals	Pesticide Category	WHO Classification	CSP Registration	Type of incident	Number of cases	Intoxication Symptoms	Total number of Incidents
GRAMOXONE (paraquat 200 g/l)	Herbicide	II	No	Dermal	38	Itching, irritation, skin burns, skin rash, scars, complete lesion of the contaminated area, fever, sweating, dizziness, headaches, bone pain, faintings	54
				Inhalation	08	Irritation, itching, burns, respiratory problems, cough, headaches, vomiting, fever, blurred vision, eye pain, buzzing ears	
				Ocular	05	Conjunctiva burns, blurred vision, irritation and eye burns, headaches, scars	
				Ingestion	03	Abdominal pains, nausea, vomiting, jaw paralysis	
ROCKY 386 EC (cypermethrine 36 g/l +endosulfan 350 g/l)	Insecticide	II	No	Dermal	16	Itching, irritation, burns, abdominal pains, dizziness, headaches, vomiting, cold, fever, shivering, dizziness, fainting, tiredness, skin rash	35
				Inhalation	10	Headache, vomiting, faintaing, respiratory problems, burns, cold, abdominal pain, diarrhea, eye pain	
				Ocular	06	Burns, itching, smarting eye, tearing, occular irritation, eye pain, headaches	
				Ingestion	03	Abdominal pains, vomiting, restlessness, aggressivity, confusional state	
CONQUEST 176 EC (cypermethrine 144 g/l + acetamipride 32 g/l)	Insecticide	II	Yes	Dermal	09	Burns, irritation, itching, shivering, restlessness, cold, persistent dizziness	22
				Inhalation	06	Shivering, vomiting, tiredness, dizziness, fainting, cold	
				Eye	04	Tearing, eye pain, smarting eye, eyeball acute pain	
				Ingestion	03	Abdominal pain, diarrhea, vomiting, delirium	
CAPT FORTE 184 WG (lambdacyhalothrine 120 g/l + acetamipride 64 g/l)	Insecticide	II	Yes	Dermal	09	Itching, skin burns, headache	21
				Inhalation	09	Headache, buzzing, dizziness, fever, abdominal pain, vomiting, itching, fainting, diarrhea	
				Ocular	01	Blurred vision, redness	
				Ingestion	02	Headache, cough, cardiac problem	

Table V: Summary of intoxication incidents recorded among producers 2/6

Chemicals	Pesticide Category	WHO Classification	CSP Registration	Type of incident	Number of cases	Intoxication Symptoms	Total number of Incidents
ROUNDUP 360 SL (glyphosate 360 g/l)	Herbicide	III	Yes	Skin	09	Itching, burns, skin rash, headache, respiratory problems, vomiting, eye burns	19
				Inhalation	04	Cold, headache, dizziness, skin rash, fever	
				Eye	03	Irritation, eye burns	
				Ingestion	03	Abdominal pains, nausea, abdominal swelling	
DECIS 25 EC (deltamethrine 25 g/l)	Insecticide	II	Yes	Skin	03	Itching, burns, scars, chronic pain	15
				Inhalation	06	Respiratory problems, dizziness, shivering, cold, headache, fainting, eye burns	
				Oculaire	04	Eye burns, fainting	
				Ingestion	02	Headache, vomiting, dizziness, diarrhea	
DELTAPHOS 210 EC (deltamethrine + triazophos)	Insecticide	Ib	No	Skin	04	Itching, burns, fever, abdominal pain, scar, fainting	14
				Inhalation	08	Respiratory problems, headaches, dizziness, abdominal pain, vomiting	
				Eye	01	Eye burns	
				Ingestion	01	Sweating, vomiting, diarrhea	
CONQUEST 88 EC (cypermethrine 80 g/l + acetamipride 16 g/l)	Insecticide	II	Yes	Skin	06	Itching, fever, headaches, burns, fainting	11
				Inhalation	05	Fever, blurred vision, abdominal pain, cold, cough, headaches, dizziness, fainting	
LAMDEX 430 EC (lamda-cyhalotrine (30 g/l + chlorpyrifos-éthyl 400 g/l)	Insecticide	II	Yes	Skin	05	Itching, burns, nausea, headaches, fever, pimples	10
				Inhalation	03	Dizziness, tiredness, burns, headaches, fever	
				Eye	02	Irritation, blurred vision, pimples	
CAIMAN SUPER (alpha-cypermethrine 18 g/l + endosulfan 350 g/l)	Insecticide	-	No	Skin	02	Burns, smarting eyes, itching, abdominal pain	08
				Inhalation	03	Dizziness, headaches, fever, cold, faintaing	
				Eye	01	Eye burns	
				Ingestion	02	Restlessness, aggressivity, confusional state	

TableV: Summary of intoxication incidents recorded among producers 3/6

Chemicals	Pesticide Category	WHO Classification	CSP Registration	Type of incident	Number of incidents	Intoxication Symptoms	Total number of incidents
CYPERCAL 230 EC (cypermethrine 30 + profenofos 200 g/l)	Insecticide	II	Yes	Skin	03	Itching, irritation, burns	08
				Inhalation	03	Cold, cough, tiredness, dizziness, sweating, insomnia	
				Eye	01	Eye burns	
				Ingestion	01	Vomiting, fainting	
BLAST 46 EC (lamdacyhalotrine 30 g/l + acetamipride 16 g/l)	Insecticide		No	Skin	05	Itching, skin burns, swelling, abdominal pain	07
				Inhalation	01	Burns, dizziness	
				Eye	01	Eye burns, swelling, cold	
CALFOS 500 EC (profenofos 500 g/l)	Insecticide	II	Yes	Skin	01	Itching, facila inflammation	06
				Inhalation	05	Fever, tiredness, dizziness, cold, nausea, respiratory problems	
CAPT 88 EC (acetamipride 16 g/l + cypermethrine 82 g/l)	Insecticide	II	Yes	Skin	03	Irritation, skin burns, headaches, respiratory problems, abdominal pain, fever.	06
				Inhalation	03	Headaches, abdominal pain, respiratory problems, cold, itching, eye pain, dizziness, headaches, skin rash.	
KALACH 360 SL (glyphosate 360 g/l)	Herbicide	III	Yes	Skin	03	Burns, itching, skin rash, eye burns	06
				Inhalation	02	Acute headaches, shivering, abdominal swelling	
				Eye	01	Eye burns	
LAMBDACAL P 636 (lambda-cyhalothrine 36 g/l + profénofos 600 g/l**)**	Insecticide	II	Yes	Skin	03	Itching, skin burns	06
				Inhalation	02	Headaches, abdominal pain, fainting	
				Eye	01	Tearing, blurred vision.	
COTODON PLUS GOLD 450 EC (S-metolachlore 245 g/l + terbutryne 196 g/l)	Herbicide	III	Yes	Skin	02	Burns, itching, complete destruction of the zone, headaches, dizziness, abdominal pain	05
				Inhalation	02	Dizziness, fever, headaches, fainting	
				Eye	01	Eye burns, dizziness, faintaing	

Table V: Summary of intoxication incidents recorded among producers 4/6

Chemicals	Pesticide Category	WHO Classification	CSP Registration CSP	Type of incident	Number of incidents	Intoxication Symptoms	Total number of incidents
FURY P 212 EC (zeta-cypermethrine 12 g/l + profenefos 200 g/l)	Insecticide	II	Yes	Skin	03	Itching, burns, skin rash, headaches, vomiting	04
				Ingestion	01	Dizziness, vomiting, tiredness	
TOUCHDOWN (glyphosate 500 g/l)	Herbicide	III	Yes	Skin	02	Burns, complete lesion of the skin	03
				Inhalation	01	Itching, skin burn	
TOPSTAR (Oxadiargyl 400 g/l)	Herbicide	III	Yes	Skin	02	Burns	02
ADWUMA WURA(glyphosate 360 g/l)	Herbicide	III	No	Skin	02	Itching, burns, tiredness	02
CAIMAN ROUGE (endosulfan 250 g/l + thirame 205 g/l)	Insecticide	II	No	Skin	02	Burns, itching, iritatation, fever, restlessness	02
CALLOXONE SUPER (paraquat 200 g/l)	Herbicide	II	No	Inhalation	01	Itching	02
				Eye	01	Eye pain	
GRAMOQUAT SUPER (paraquat chloride 200 g/l)	Herbicide	II	No	Eye	02	Scars in the eyes, sight loss	02
STOMP 330 EC (pendimethaline 330 g/l)	Herbicide	II	No	Inhalation	02	Dizziness, headaches, abdominal pain, vomiting	02
ACTION 80 DF(diuron 800 g/l)	Herbicide		No	Skin	01	Itching, burns	01
ATRAZ 80 WP(atrazine 800)	Herbicide		No	Eye	01	Blurred vision	01
AVAUNT 150 EC(indoxacarb 150g/l)	Insecticide	II	Yes	Inhalation	01	Respiratory problems, cough	01
AVENTURA	-	-	-	Skin	01	Smarting eye, blurred vision	01
BENAXONE (paraquat chloride 200 g/l)	Herbicide	II	No	Inhalation	01	Cold, headaches, dizziness, buzzing	01
CALLIFOR G (prometryne 250 g/l + fluometuron 250 g/l + glyphosate 60 g/l)	Herbicide	III	Yes	Inhalation	01	Cold	01

TableV: Summary of intoxication incidents recorded among producers 5/6

Chemicals	Pesticide Category	WHO Classification	CSP Registration	Type OF incidents	Number of incidents	Intoxication Symptoms	Total number of incidents
CAPORAL 500 EC(profenofos 500 g/l)	Insecticide	II	Yes	Skin	01	Itching, skin burns	01
COTONET (metolachlore 333 g/l + terbutine 167 g/l)	Herbicide	III	No	Skin	01	Skin burns	01
CURACRON 500 EC(profenofos 500 g/l)	Insecticide	III	Yes	Ingestion	01	Itching, vomiting	01
ENDOCOTON 500 EC (endosulfan 500 g/l)	Insecticide	Ib	No	Skin	01	Skin burns	01
FANGA 500 EC (profénofos 500g/l)	Insecticide	II	No	Inhalation	01	Respiratory problems	01
FLUORALM 500 SC (fluométuron 250 g/l +prométryne 250 g/l)	Herbicide	IV	No	Skin	01	Burns, itching, eye burns	01
FURADAN (carbofuran 5%)	Insecticide	Ib	No	Eye	01	Tiredness, fainting	01
GALLANT SUPER(Haloxyfop-R-methyl 104 g/l)	Herbicide	III	Yes	Eye	01	State of unconsciousness for three days	01
GARIL (trichlopyr 72g/l + propanyl 360 g/l)	Insecticide	II	No	Eye	01	Eye redness, swollen face	01
GLYPHADER 75(glyphosate 750 g/l)	Herbicide	III	Yes	Skin	01	Itching, cold	01
HERBEXTRA (2,4, D de sel d'amine 720 g/l)	Herbicide	II	Yes	Skin	01	Itching, skin burn	01
KITAZINE	-	-	-	Inhalation	01	Diarrhea	01
LASSO (atrazine 250 g/l + alachlore 350 g/l)	Herbicide	III	No	Eye	01	Total sight loss	01

Table V: Summary of intoxication incidents recorded among producers 6/6

Chemicals	Pesticide Category	WHO Classification	CSP Registration	Type of incident	Number of incidents	Intoxication Symptoms	Total number of incidents
LUMAX 537,5 SE (S-metolachlore 375 g/l + mesotrione 375 g/l)	Herbicide	III	No	Skin	01	Burns, complete lesion of the skin	01
NICOMAIS 4O SC (nicosulfuron 400 g/l)	Herbicide	III	Yes	Skin	01	Fever, sweating, abdominal pain, burns	01
RONSTAR (oxadiazon 200 g/l + propanyl 400 g/l)	Herbicide		No	Skin	01	Skin burns	01
TAMARIS	-	-	-	Skin	01	Itching, burns	01
TOPSTAR (Oxadiargyl 400 g/l)	Herbicide	III	Yes	Skin	01	Burns	01

With regard to incident frequency rate, GRAMOXONE alone (paraquat 200 g/l) has been implicated in 54 intoxication cases and is the product which has caused the most health problems among agricultural producers. Three other pesticide formulations containing paraquat, i.e. CALLOXONE SUPER (paraquat 200 g/l), GRAMOQUAT SUPER (paraquat chloride 200 g/l) and BENAXONE (paraquat chloride 200 g/l) have been reported to be implicated in 5 intoxication cases, bringing to 59 the total number of paraquat-related incidents. Caustic lesions which characterized the initial phase of paraquat intoxication were found to be symptoms affecting some of the patients. (Mégarbane, 2003).

The ROCKY 386 EC pesticide formulation (cypermethrine 36 g/l +endosulfan 350 g/l) comes second with 35 intoxication cases. Despite the fact that Endosulfan is banned in CILSS countries, it is still found in some pestide formulations such as CAIMAN SUPER (alpha-cypermethrine 18 g/l + endosulfan 350 g/l) CAIMAN ROUGE (endosulfan 250 g/l + thirame 205 g/l) and ENDOCOTON 500 EC (endosulfan 500 g/l) which altogether have been been incriminated in 11 intoxication cases, bringing to 46 the total number of endosulfan-related intoxication cases.

CONQUEST 176 EC (cyperméthrine 144 g/l + acétamipride 32 g/l) comes third with regard to incident frequency.

Exposure route distribution among the 296 poisoning cases

Figure 11 gives the exposure route distribution among poisoning cases

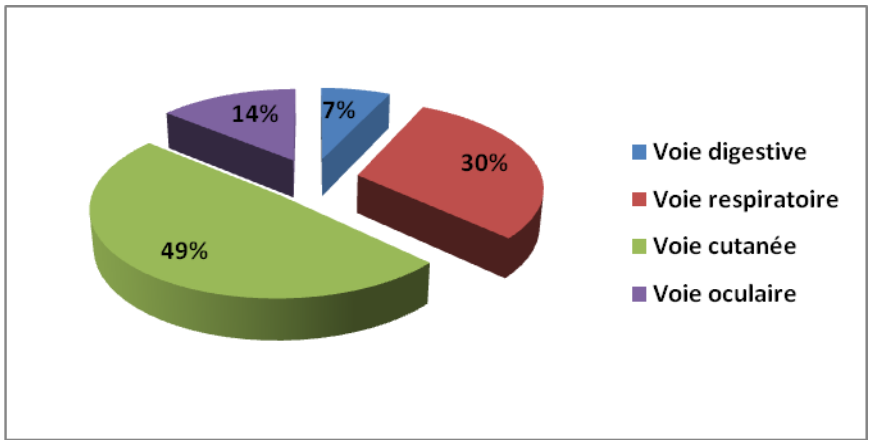


Figure 11: Exposure route distribution among poisoning cases

Ingestion, Inhalation, Dermal, Ocular,

The exposure route distribution is as follows: 145 contamination cases occur through dermal contact, 89 through the respiratory tract (inhalation), 40 through ocular contact and 22 cases through the digestive tract (ingestion). Dermal contact is the primary route of chemical

exposure and accounts for 49% of the reported cases which is evidence of the correlation between the prevalance of intoxication through dermal contact and the scarse use of overalls as protective clothing. In fact, as seen earlier, only 4.5% of agricultural producers wear overalls during pesticide application operations whereas 96% of them are using backpack sprayers.

IV-4-3. Management of poisoning incidents by farmers

Table VI summarizes farmers' behaviour following intoxication incidents and their rate of occurence

Table VI: Farmers' behaviour after contact with plant protection products

Pratices	Number	Percentage
Drink milk	54	8,32
Drink tamarind	15	2,31
Drink lemon juice	13	2,00
Drink sour juice	1	0,15
Drink sorrel juice	2	0,31
Drink Nescafé	2	0,31
Take paracetamol	1	0,15
Ingest charcoal and vomit	1	0,15
Go to healthcare center (CSPS)	25	3,85
Get rid of	7	1,08
Rub herself/himself with lemon leaves	20	3,08
Rub herself/himself with sorrel leaves	1	0,15
Rub herself/himself with vines	1	0,15
Apply ointment	1	0,15
Apply shea-butter	43	6,62
Wash with soap	540	83,20
Wash with potash soap	8	1,23
Wash with warm water	1	0,15
Wash with salted water	1	0,15
Suck sugar	1	0,15
No answer	8	1,23

As seen above a large proportion of farmers have recourse to traditional medecine. This is not surprising when it is known that 80% of the population in developing countries use medicinal plants to cure themselves (OMS, 2002). Only 3.08% of farmers go to healthcare service centres.

IV-4-4. Medical care and pesticide-related incidents

Medical care for pesticide-related incidents is not provided to agricultural producers. The cost of healthcare and medical exams has to be borne by farmers themselves. The study highlights the fact that there is no effective system to monitor farmers' health. It would be appropriate to take initiatives through existing health cooperatives or mutual healthcare scheme

or through the establishment of such structures to develop a medical surveillance programme and a healthcare scheme to deal specifically with health incidents related to the use of pesticides.

IV-5.Results of the survey carried out in health service centres

This section indicates the number of pestidice intoxication cases reported to health service centres. In total, 42 health centres of which 40 Health and Social Advancement Centres (CSPS) and two (2) Health centres with surgical facilities (CMA) have been covered by the present study. Intoxication incidents were divided into the three (3) following categories on the basis of the level of details that were provided:

IV-5-1.Pesticide intoxication cases reported without detailed information

922 cases falling into this category were found to have been reported to the 42 health centers since 2002. Table VII gives the intoxication case distribution according to the victims' region and province of origin. The Boucle du Mouhoun comes first with 46.10% of reported cases, followed by the Hauts Bassins region with 38.28% of cases, and the Cascades with 15.62% of intoxication cases.

TableVII: Distribution of the 922 intoxication cases reported with no detailed information according to the victims' place of origin

Region	Province	Number	Percentage per region	Total per region
Boucle du Mouhoun	Banwa	273	64.24%	**425 (46.10%)**
	Mouhoun	152	35.76%	
Cascades	Léraba	144	100%	**144 (15.62%)**
Hauts-Bassins	Houet	35	9.92%	**353 (38.28%)**
	Kénédougou	182	51.56%	
	Tuy	136	38.53%	
Total		**922**		**(100%)**

The present results support earlier findings from Toé *et al,* (2000 and 2002) confirming the prevalance of intoxication cases in the Mouhoun area. Due to data storage problems and staff mobility, some health centres were not able to consistently record intoxication cases that have occurred since 2002. As a result, the effective number of incidents cases should be higher than the one given here.

IV-5-2. Pesticide intoxication cases reported with brief information

They include intoxication cases for which basic information is available. The information provided is related to the identity of the injured person (sex and age), the incident circumstance and its outcome. A total of 81 recorded intoxication cases fall into this category. As seen below most of the incidents were recorded in the Boucle de Mouhoun region (49.3%), followed by the Hauts-Bassins area with 34.6% of cases and the Cascades region with 16% of cases. Table VIII gives the intoxication case distribution according to the relevant regions and provinces.

Table VIII: Distribution of the 81 intoxication cases reported with basic information according to the place of origin

Region	Province	Number	Percentage per region	Total per region
Boucle du Mouhoun	Banwa	1	2.5%	**40 (49.3%)**
	Mouhoun	39	97.5%	
Cascades	Léraba	13	100%	**13 (16%)**
Hauts-Bassins	Balé	1	3.57%	**28 (34.6%)**
	Houet	11	39.29%	
	Kénédougou	16	57.14%	
Total		**81**		**81 (100%)**

Distribution of the 81 intoxication cases according to sex and age

The majority of victims were women accounting for 70.37% of reported cases against 29.63% for men.

The largest proportion of victims were adults (54.33%) whereas 19.75% of them were minors and 17.28% adolescents. In 8.84% of the cases, age could not be identified. (See Figure 12).

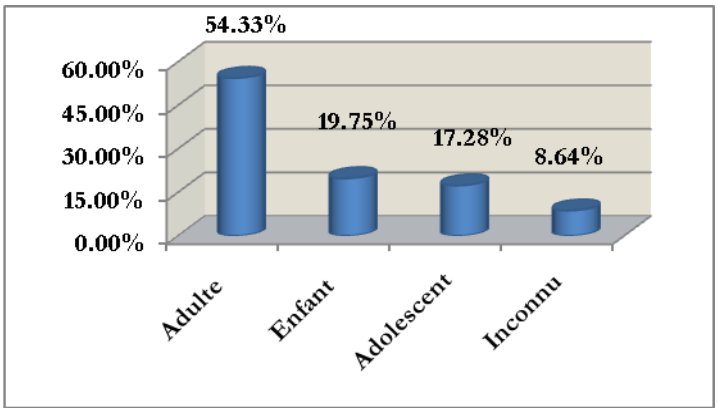
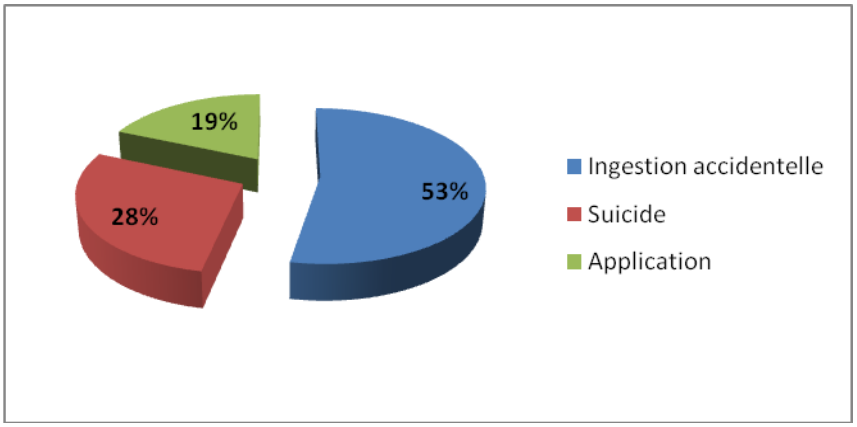


Figure 12: Age distribution among the 81 intoxication cases

Text in the Table (Adult/Child/Adolescent/Unknow)

Distribution of the 81 intoxication cases according to incident circumstances

The majoritiy of intoxication cases (53%) were due to unintentional ingestion of pesticides by the victims (Figure 13). It has been observed that 19% of cases occurred during agricultural work involving the use of pesticides. This percentage corresponds to 15 individuals. The perusal of survey factsheets has revealed that only one person was wearing protective equipment at the time of the pesticide handling operation that led to the incident. As mentioned earlier, pesticide application operations without the use of personal protective equipment inevitably exposes applicators to high intoxication risks.



Unintentional ingestion/suicide/pesticide application

Figure 13: Distribution of the 81 poisoning cases according to incident circumstances

Application: intoxication incidents occurred during pestidice treatments in the field or while handling treated seeds.

Ingestion: in our context intoxication cases include:

Food intoxications: intoxications occurring after having ingested cereals which had been preserved with chemicals and used to cook meals. This raises the problem of the identification of appropriate pesticides for the preservation of stored food and of the compliance with recommended doses.

Cases resulting from a mistake: intoxications resulting from the ingestion of liquid or solid pesticide formulations which have been mistaken for water, drinks, food or medical substances. They indicate, on the one hand, how carelessly left-over pesticides or chemical stocks are managed and on the other hand, they highlight the lack of knowledge about the risks associated with pesticides.

Intoxications resulting from the use of empty containers: intoxications resulting from the consumption of water or food stored in empty pesticide containers which have not been previously decontaminated or properly cleaned.

Suicide: Some individuals facing personal problems try to commit suicide by ingesting pesticides.

Distribution of the 81 intoxication cases according to the year of occurrence of the incident

Figure 14 lists the number of intoxication incidents according to the year of occurence.

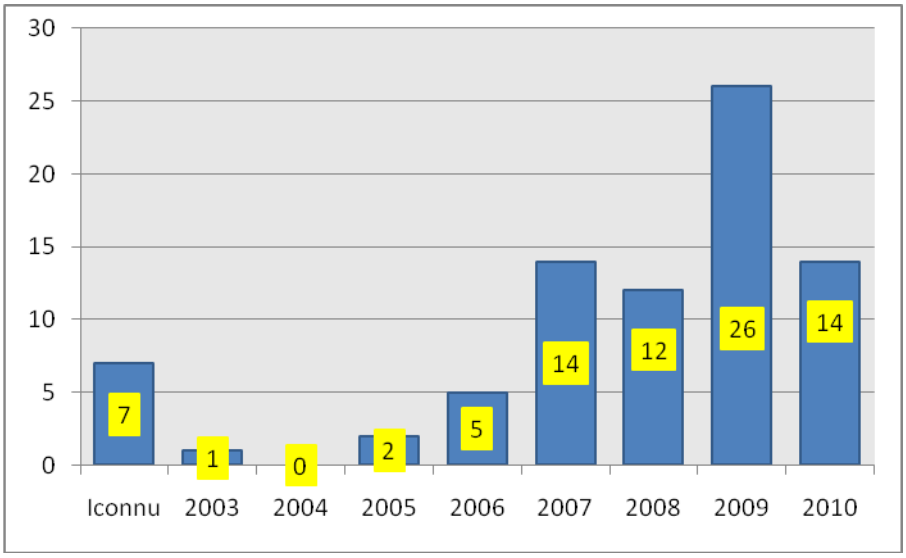


Figure 14: Distribution of the number of intoxication cases according to the year of occurence.

As seen in Figure 14, the number of intoxication cases increases annually. With regard to 2010, the number of cases refers to the ones registered between January and the first two weeks of June, which implies that only the beginning of the winter season is taken into account.

Distribution of the 81 intoxication cases according to the outcome of the incident

The majority of victims, i.e. 80.25% have recovered whereas in 10% of cases, intoxication incidents were fatal. In 7.4% of cases, the outcome was unknown.

IV-5-3. Intoxication cases reported together with some detailed information

All recorded intoxication cases for which the implicated pesticide(s) was/were identified fall into this category. Overall, out of the 22 cases recorded, five (5) occurred during agricultural work involving the use of pesticides during application operations or the use of treated seeds. Six (6) of them result from the use of empty pesticide containers. Seven (7) cases are related to suicide and the four (4) remaining cases result from the ingestion of a chemical product which had been mistaken for a drink or a food substance. Table IX presents the intoxication symptoms related to the incriminated pesticides together with their active ingredients and corresponding concentrations.

Table IX: Intoxication cases (recorded within CSPS) where the incriminated pesticides and the poisoning circumstances of the incidents were clearly identified 1/3

Intoxication circumstance	Name of chemicals	Active ingredients and concentration	WHO Classification	Number of cases	Symptoms	Outcome
Application of agricultural pesticides or handling of pesticide-treated seeds	CAPT 88 EC	Acetamipride (16 g/l) Cypermethrine (82 g/l)	II	1	Dizziness, headache, blurred vision, vomiting	Recovery
	CONQUEST 88	Cypermethrine (82 g/l) Profenofos (600 g/l)	II	1	Dizziness, excessive sweating, convulsion, staggering, excessive salivation, nausea and vomiting, restlessness, diarrhea	Recovery
	GRAMOXONE	Paraquat (200 g/l)	II	2	Dizziness, headache, excessive sweating, blurred vision, hand tremor, convulsion, narrow pupils/miosis, staggering, excessive salivation excessive, nausea and vomiting	Recovery
	PROCOT 40 WS	Carbosulfan (250 g/kg) Carbendazim (100 g/kg) Metalaxyl-M (50 g/kg)	II	1	Abdominal pain	Recovery

Table IX: Intoxication cases (recorded within CSPS) where the incriminated pesticides and the poisoning circumstances of the incidents were clearly identified 2/3

Intoxication circurmstance	Name of chemicals	Active ingredients and concentration	WHO Classification	Number of incidents	Symptoms	Outcome
Handling of packagings or consumption of food which had been placed in empty pesticide containers	CALTHIO C	Chlorpyrifos-ethyl (250g/l) Thirame (250 g/l)	-	1	Excessive sweating, convulsion, excessive salivation	Death
	GRAMOXONE	Paraquat (200 g/l)	II	1	Dizziness, convulsion, staggering, excessive salivation, nausea and vomiting	Recovery
	DECIS 25 EC	Deltamethrine (25 g/l)	II	3	Excessive sweating, blurred vision, hand tremor, convulsion, staggering, excessive salivation excessive, nausea and vomiting	Transfer
	ADWUMA WURA	Glyphosate (480)	III	1	Headache, excessive sweating, blurred vision, hand tremor, excessive salivation, nausea and vomiting	Recovery
	FURADAN	Carbofuran (5%)	-	1	Headache, excessive sweating, blurred vision, hand tremor, excessive salivation, nausea and vomiting	Recovery
	LAMDEX 480 EC	Lambdacyhalothrine (30 g/l) Chlorpyrifos-ethyl (400 g/l)	II	1	Dizziness, headache, excessive sweating, convulsion, excessive salivation, nausea and vomiting	Recovery
	CAIMAN ROUGE	Endosulfan (250 g/l)	II	1	Dizziness, headaches, convulsion, nausea and vomiting, restlessness	Recovery

Table IX: Intoxication cases (recorded within CSPS) where the incriminated pesticides and the incident circumstances were clearly identified 3/3

Intoxication circumstance	Name of chemicals	Active ingredients and concentration	WHO Classification	Number of incidents	Symptoms	Outcome
Suicide	ROCKY C 386 C	Endosulfan (350 g/l) Cypermethrine (36 g/l)	III	3	Headaches, profuse sweating, convulsion, excessive salivation, nausesa and vomiting	Transfer and recovery
	ROCKY 350 EC	Endosulfan (350 g/l)	II	1	Dizziness, profuse sweating, narrow pupils/miosis, excessive salivation, nausea and vomiting, dyspnea	Death
	DECIS	Deltamethrine (25 g/l)	II	1	Profuse sweating, excessive salivation, nausea and vomiting, convulsion	Transfer
	CALTHIO DS	Endosulfan (25%) Cypermethrine (25%)	-	1	Restlessness, delirium	Death
	CAPT 80 DS	Acetamipride (16 g/l) Cypermethrine (72 g/l)	II	1	Sweating, blurred vision, narrow pupils/miosis, unconsciousness	Recovery
Confusion over the pesticide (liquid formulation) and a drink (including water) or a food or medical powder	ROCKY 350 EC	Endosulfan (350 g/l)	II	1	No description	Death
	FURADAN	Carbofuran (5%)	-	1	No description	Death
	LAMDEX 480 EC	Lamdacyhalothrine (30 g/l) Chlorpyrifos-ethyl (400 g/l)	II	1	Dizziness, headaches, profuse sweating, convulsion, excessive salivation, nausea and vomiting	Death
	CAIMAN ROUGE	Endosulfan (250 g/l) Thirame (250 g/l)	II	1	Dizziness, headaches, convulsion, nausea and vomiting, restlessness	Recovery

Out of the seventeen injured individuals, fifteen (15) were men (i.e. 77.3%) and five (5) were women (27.7%). The incidents occured between 2003 and 2010 and have increased from 1 to 5 over the years (Figure 16).

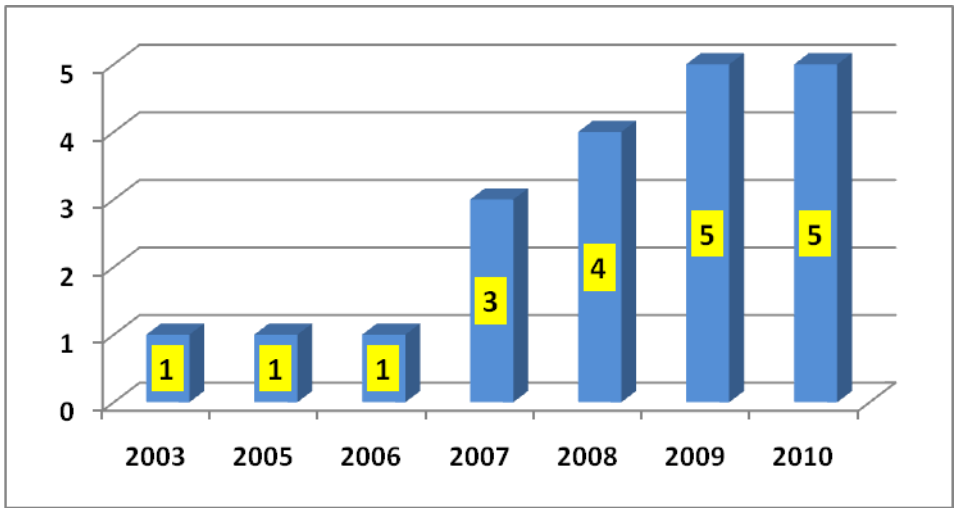


Figure 16: Distribution of the 22 intoxication cases according to the year of occurence

IV-5-4. Capactiy to deal with intoxication incidents

Overall, it has been found that health personnel have little information about pesticides. Out of the 42 surveyed health officers, 20 (47.62%) declared not having much knowledge about pesticides whereas twenty-two (22), i.e. 52.37% knew some facts about pesticides; each of them were able to quote some of the pesticide formulations' names. On the basis of the frequency with which chemicals were quoted, it has been found that GRAMOXONE and ROUNDUP were the best known ones (respectively quoted by 17 and 15 agents). Some pesticides were quoted at the most by three (3) agents only. They are: ALLIGATOR, ATRALM, ATRAZINE, CALTHIO, CONQUEST, COTODON, DECIS, ENDOSULFAN, GLYPHADER, HERBEXTRA, KALACH, RAMBO, ROCKY and TOUCHDOWN.

The lack of knowledge about pesticides presents a serious handicap in that it inhibits dealing effectively with intoxication incidents. In fact, only a correct and complete etiology of pesticide-related ailments can help to provide the appropriate treatment. However, it has been observed, through data collection on intoxciation cases at health centres' level, that, in most situations, diagnostics carried out did not identify the incriminated pesticides, in which case, the administered cure can only be inadequate or even have adverse effects on patients' health. In most intoxication cases, and independently of the route of exposure and of the pesticide formulation implicated, active charcoal and atropine were the only forms of treatment provided. Medical care related to intoxication cases is definitely insufficient.

The study also reveals that there is a tendency among people, who are usually characterized by a low level of education, not to talk much about pesticide poisoning issues. As a consequence, incident cases, if they are ever reported to health centres tend to be reported late. Poisoning victims only go to health care centres once they realize that their life is endangered. According to health agents, most of the intoxication victims coming to the centres do not immediately admit that their ailments are related to pesticide intoxication. A long and complex investigation is required before patients finally reveal the cause of their problems.

V- CONSTRAINTS AND LIMITS OF THE STUDY

V-1 Constraints of the study

At the farmers level, the major difficulties we encountered were related to:

- their unavailability as the survey took place at the peak of the winter season when they were busy with preparatory field work and sowing;
- their reluctance to speak about issues related to experienced and observed intoxication cases;
- Their illiteracy and thus their ignorance of the brand names of products they used, which makes it difficult to identiy incriminated chemicals;
- Their lack of knowledge on pesticide-related symptoms;

At the health personnel's level, the major difficulties we came across were related to:

- The unavailability of activity reports or registers in some of the health centres visited due partly to staff mobility;
- The refusal of some patients to talk about their accident;
- The tendency for the injured to be cured at home with traditional practices, in which case, incidents were not reported to health centres;
- The lack of information on the identity of pesticides and on the poisoning incident circumstances in patients' personal records.

At the pesticide distributors and retailers level, their distrust towards interviewers and their unwillingness to answer questions.

V-2 Limits of the study

One of the limits of the study is related to the data collection method. Data on pesticide intoxication incidents was collected by means of prospective surveys and interviewers found themselves confronted by the unavailability of information regarding the identification of pesticide formulations implicated in poisoning incidents, the incident circumstances, the protection measures taken for pesticide handling and use and precautionary measures.

The fact that it was not possible to verify if precautionary measures intended for farmers were effectively taken during pesticide treatments constitutes another limit of the survey. A farmer could well report wearing personal protective equipment for pesticide applications while not doing so in reality.

VI- RECOMMENDATIONS

☞ Given the economic importance of pesticide trade for distributors and retailers, and

- In view of the low level of education and training among most pesticide distributors and retailers,
- In view of the role that distributors and retailers play in pesticide management processes through the advice they can provide to farmers,
- Noting the government's commitment to play a central role in controlling agro-chemicals through the National Commission on the Control of Pesticides,

We would then recommend:

✓ Supporting the strengthening of capacities to control the distribution of pesticides in the study zone in particular and in the whole country,

✓ organizing training sessions with a view to disseminating knowledge on the hazards associated with pesticides, the relevant techniques of use and tools on the management of left-over pesticides and empty containers.

☞ Given the high incidence of health problems resulting from the use of pesticides on farmers, and

- In view of the low level of education among the population,
- In view of their lack of knowledge about pesticides and the hazards associated with them,
- In view of the inexistence of training among them,
- In view of the lack of a health surveillance plan of action,
- In view of the limited knowledge of pesticides amongst health personnel,
- In view of the difficulties in providing medical care to intoxicated individuals,

We would then recommend:

- ✓ organizing training sessions aimed at farmers using pesticides,
- ✓ implementing a health surveillance plan to monitor farmers,
- ✓ organizing training sessions aimed at health agents.

Given the objective of the PIC Procedure under the Rotterdam Convention, and

- In view of the lack of human and material resources of the Directorate of Plant Protection (DPV),
- In view of the difficulties encountered by health research units and healthcare centres,

We would then recommend that FAO/PIC supports and helps strengthen the Crop Protection Directorate (DPV), health research units and healthcare centres capacities.

CONCLUSION

The overall objective of the present study is to contribute to achieving improvements in human health and to protect the environment. The work which has been conducted has enabled us to list the range of pesticides marketed in the study zone, to identify and describe health problems associated with the use of pesticides affecting farmers as well as associated risk factors.

A total of 153 pesticide formulations were recorded in the 97 establishments involved in pesticide distribution and trade. But despite the large number of agro-chemicals on the market, little efforts have been made to help minimize heath and environmental risks associated with their use.

By recognizing the possible adverse effects of pesticides on human-beings, different categories of animals, plants, water and soil, the majority of farmers have shown to be aware of health and environmental risks resulting from the use of agro-chemical products. However, such knowledge has not necessarily led them to adopt responsible attitudes and to manage pesticides in a safer manner. In fact, personal protective equipment is only worn by a very limited number of workers, either out of carelessness or because farmers cannot afford them (only 0.31% of farmers use the personal protective equipment recommended. This sad fact highlights the non-compliance with Good Agricultural Practices. Similarly, irresponsible behaviour causing health and environmental damage such as, storing pesticides in sleeping rooms and exposing family members without informing them, using inappropriate products for domestic purposes, dumping empty containers into the environment or burying them in the soil, remain very common.

Data collected to assess the adverse effects of pesticides on farmers highlights the recurrence of health problems related to the use of agro-chemicals. Out of 42 surveyed health centres, 922 pesticide-related poisoning cases have been recorded since 2002. In 22 of those cases, the incriminated pesticide formulations and the incident circumstances were identified. Five of the 22 cases occurred during pesticide applications in the fields. 296 intoxication cases which occurred during pesticide treatments were reported among agricultural producers. Paraquat, which has been implicated in 59 poisoning incidents has been identified as the most hazardous active ingredient found in pesticide formulations. Formulations containing the combination of endosulfan/cypermethrine come second and have been found to be responsible for 35 poisoning cases. Present or delayed manifestations of pesticide exposure which affect 82.66% of farmers highlights the constant threat that pesticides pose to human health and their possible toxic chronic effects.

In view of their severe adverse effects on farmers, and in order to protect human health and the environment, special attention should be brought to active ingredients such as paraquat or endosulfan to effectively ban them and propose them for inclusion in Annex III of the Rotterdam Convention. To this purpose, advanced investigations together with more in-depth studies should be carried out over a longer period of time to complement the present pilot study. Further studies should be undertaken through the joint collaboration of health centres and agricultural services in order to have a better understanding of the different types of intoxication cases.

It is then highly recommended to strengthen the Directorate for Plant Protection capacities (DPV), as well as that of health research units and healthcare centres.

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ANNEXES

Annex 1: Questionnaire aimed at pesticide distributors/retailers

QUESTIONNAIRE

"Study on Agro-chemical Poisoning in Agriculture (Burkina Faso Pilot Study)"

Form aimed at pesticide distributors/retailers

Date: /__/__/ - /__/__/ - 2010	Sheet n° /__/__/__/ Investigator code /__/__/	Location code: /__//__/ Department: …….

1. RESPONDENT IDENTITY

Occupation: ……	Structure name: ……

2. PRODUCT IDENTITY

See Form in Annex

3. PESTICIDE MANAGEMENT

3.1. Do you have unused pesticides that have been returned by farmers in your building? Yes /__/ no /__/

3.1.1. If yes, what do you do with them?.....

3.2. Do you know of any other sources of pesticide supply for farmers? Yes /__/ no /__/

3.2.1. If yes, which ones? .....

3.3. Do you have a pesticide wharehouse? Yes /__/ No /__/

If yes: 3.3.1. Is the storage facility appropriate? Yes /__/ No /__/

3.3.2. What type of storage is it? Seggregated /__/ Unseggregated/__/

3.3.3. Do you have a trained wharehouse person?: Yes /__/ No /__/

3.3.4. Is there a storage data sheet? Yes /__/ No /__/

3.4. Is there a safety data sheet: Yes /__/ No /__/

3.5. How are pesticide stocks managed? packaging/__/ repackaging/__/

3.6. Is there a First-Aid-Kit? Yes /__/ no /__/

3.6.1. If yes, what does it contain? …….....……....

3.7. What do you do with empty pesticide packagings?

……..……

4. PREVENTION AND PROTECTION MEASURES

4.1. Do you know about any potential risks related to the use of pesticides (or the exposure to pesticides? Yes /__/ no /__/

4.1.1. If yes, which ones?.....

4.2. Do you provide your customers with information on:

4.2.1. The risks associated with the use of pesticides? Yes /__/ no /__/

4.2.2. Proper pesticide handling techniques? Yes /__/ no /__/

4.3. Are there any training sessions on the use of pesticides aimed at farmers? Yes /__/ no /__/

4.3.1. If yes, with which frequency (number of times per year)? ……

4.3.2. Are the training sessions free? Yes /__/ no /__/

4.4. Is there any personal protective equipment made available to customers? Yes /__/ no/__/

4.4.1. If yes, which ones? Gloves /__/ boots /__/ aprons /__/ overalls /__/ glasses /__/

Cartridge masks /__/ dust masks /__/ other /__/ …….

4.5. Do you think that these products have adverse effects on health? Yes /__/ No /__/

4.5.1. If yes, why?

…….....……

4.5.2. If not, why?

……..

4.6. Do you think that these products pose a threat to the environment? Yes /__/ No /__/

4.6.1. If yes, why?

……..……

4.6.2. If not, why?

……..

5. SUGGESTIONS AND RECOMMENDATIONS

5.1. Please provide your suggestions/recommendations regarding the use of pesticides in general

---

Thank you for your attention!!!

Questionnaire aimed at pesticide distributors/retailers (Separate part)

Sheet n° /__/__/__/

Formulation	Type of formulation*	Name and concentration of active ingredients	Suppliers	Country of origin	Date of expiry	Amount sold	
1.		---------- ---------- ----------				2009/2010 ----------	2008/2009 ----------
						2007/2008 ----------	2006/2007 ----------
2.		---------- ---------- ----------				2009/2010 ----------	2008/2009 ----------
						2007/2008 ----------	2006/2007 ----------
3.		---------- ---------- ----------				2009/2010 ----------	2008/2009 ----------
						2007/2008 ----------	2006/2007 ----------
4.		---------- ---------- ----------				2009/2010 ----------	2008/2009 ----------
						2007/2008 ----------	2006/2007 ----------
5.		---------- ---------- ----------				2009/2010 ----------	2008/2009 ----------
						2007/2008 ----------	2006/2007 ----------

*EC, WP, DP, SP, ULV, TA, GR …

Annex 2: Questionnaire aimed at farmers

QUESTIONNAIRE

"Study on Agro-chemical Poisoning in Agriculture (Burkina Faso Pilot Study) "

Questionnaire aimed at farmers

Date: /__/__/-/__/__/- 2010	Sheet n° /__/__/__/ Investigator code /__/__/	Location c Departmen

1. RESPONDENT IDENTITY

1.1. Age /__/__/	1.2. Sex M /__/ F /__/	1.3. Occupation: ……

1.4. Level of education: None /__/ Primary /__/ Secondary /__/ Tertiary /__/

1.5. Literacy language: French /__/ Local language /__/

2. KNOWLEDGE ABOUT THE PESTICIDE

2.1. Which pesticides do you use? (Please specify names and their physical aspect: solid, liquid or gas substance)

……...……

2.1.1. If the farmer does not know product names, ask her/him why?

……

2.2. Do you know the following products, GRAMOXONE, CALLOXONE, atrazine, endosulfan? Yes /__/ No /__/

2.2.1. If yes, which of these products do you use?

…….....……....

2.3. How do you acquire products you are using?

At the local market /__/ at a licensed retailer /__/ at SOFITEX /__/ Other ……

2.4. Do you think you incur risks when you are exposed to those chemicals?

Yes /__/ No /__/

2.4.1. If yes, which risks?

……

2.5. Have you already had an incident related to the use of those products? Yes /__/ No /__/

If yes:

2.5.1. Specify the type of incident: skin /__/ inhalation /__/ ingestion /__/ eye /__/

2.5.2. Specify the product name: ……...…….

2.5.3. Describe experienced symptoms:……...…….

……...……...……

2.6. What was your reaction in this situation?

……

2.7. Have you already seen a person injured while using these products?

Yes /__/ No /__/

2.7.1 If yes: Which year?

Indicate : Her/his name …….……; Her/his age /__/__/ yrs; Her/His sex M /__/ F /__/

Specify the type of incident: skin /__/ inhalation /__/ ingestion /__/ eye /__/

Specify the product name: ……

Describe observed symptoms……...…….

…….

2.8. What do you think of those products/what is your opinion on those products?

……..……..…

2.9. What do you do with empty pesticide containers? …….....

2.10. If there are unused products left, what do you do with them? …….....

3. CONDITIONS IN WHICH THE PRODUCT WAS USED

3.1. Since when have you been using pesticides? .....……

3.2. Do you wear any protective equipment during pesticide applications? Yes /__/ No /__/

3.2.1. If yes, which ones? gloves /__/ boots /__/ aprons /__/ overalls /__/ glasses /__/
cartridge mask /__/ dust mask /__/ other /__/ …….

3.2.2. If not, why?.....

3.3. Are you satisfied with this equipment? Yes /__/ No /__/

3.3.1. If not, why? …..……...……...

3.4. What type of equipment do you use to apply those pesticides?

Backpack sprayer /__/ hand sprayers (ULV, UBV) /__/ Other (specify name) /__/ ……..

3.5. What is the tank volume of this equipment? …… litres

3.6. What quantity of pesticide is applied per hectare? ..... litres/ha

3.7. Are the pesticides ready for use? /__/ or to be diluted /__/.

3.7.1. If diluted, give the quantity of pesticide used per litre of water: ……./…….. litre of water

3.8. How big is the area you treat during an agricultural season? …… hectares

3.9. How many treatments do you apply during an agricultural season? ……

3.10. In which month of the year do you apply: The first treatment? ..... The last treatment? ….....

3.11. Which amount of product do you handle? per day /__/ per week /__/ per month /__/

3.12. Have you had any training related to the use of pesticides? Yes /__/ No /__/

3.12.1. If yes: - date of the training received: …… - through which structure? .....
- what do you remember of the training?

……

3.15. After having treated a field, how long does it take before you come back to the same field? .....

3.16. After exposure, what do you usually do? .....……..……...

4. HEALTH EFFECTS

4.1. What do you feel during the use and/or handling of those products?

……

4.2. What do you feel after your work?

4.2.1. In the following hours:

……..……

4.2.2. In the following days:

……..……

4.3. Do you have any medical follow-up related to the use of those products? Yes /__/ No /__/

4.4. Do you see a general practitioner? Yes /__/ No /__/

4.4.1. If yes: once a/year /__/ twice a /year /__/ other /__/ ……

4.5. Do you have any medical care protection in case of disease?:

Individual /__/ Mutual or cooperative/__/ Other /__/ …….

5. PERCEPTION OF ENVIRONMENTAL RISKS

5.1. Is there any water source (well, stream, river, forage,) in the vicinity or in your fields?

Yes /__/ No /__/

5.1.1. If yes, specify ……

5.1.2. What is the distance between the water source and the area you are treating? ……

5.1.3. What is the water source used for? ……..

5.2. Have you noticed the death or disappearance of some insects or animals since you have been using the chemicals?

Yes /__/ No /__/

5.2.1. If yes, which ones? .....

5.3. Do you think that those products pose a risk to the environment? Yes /__/ No /__/

5.3.1. If yes, why? .....

5.3.2. If not, why? …...……...……..

6. SUGGESTIONS AND RECOMMENDATION

6.1. Please provide your suggestions/recommendations concerning the use of pesticides in general.

Annex 3: Questionnaire aimed at health officers 1/2

"Study on Agro-chemical Poisoning in Agriculture (Burkina Faso Pilot Study)"

Date:/__/__/-/__/__/- 2010	Sheet N° /__/__/__/ Investigator Code /__/__/

1.1. Sex M /__/ F /__/	1.2. Occupation: _____

2.

2.1 Do you know which pesticides are commonly used by farmers in your area of work?

Yes /__/ No /__/

2.1.1. If yes, quote some of them..……...…

2.2. Have you received any training related to the treatment of pesticide intoxications? Yes /__/ No /__/

2.2.1. If yes, where? Training school/__/ Seminar /__/ Workshop /__/ Other.……..……

2.3. How many intoxication cases have been treated in your health center since 2002? /__/__/__/__/

2.4. Have you ever heard about paraquat, atrazine or endosulfan? Yes /__/ No /__/

2.4.1. If yes, how many intoxication cases associated with those pesticides have you recorded? /__/__/__/

2.5. Have you heard about any other intoxication cases related to those pesticides and which have not been reported to your health centre?

Yes /__/ No /__/

2.5.1. If yes, please provide comments on those incidents

.....

7.1. Please provide your suggestions/recommendations regarding the use of pesticides in general

---

Annex 3: Questionnaire aimed at health officers 2/2

Date:/__/__/-/__/__/- 2010

3.1. Formulation name: ……

3.2. Type of formulation

Emulsifiable Concentre (EC)/__/ Wettable Powder (WP) /__/ Dustable Powder (DP) /__/

Water soluble Powder (SP) /__/ Ultra Low Volume (ULV) /__/Tablet (TA) /__/Granule (GR) /__/

other (please specify) /__/ ……

3.3. Manufacturer Name /Distributor Name (if available): ……

3.4. Name and concentration of the active ingredient(s): …….

…….

…….

3.5. Was the chemical label available? Yes /__/ No /__/

4.1. Sex: Male /__/ Female /__/

4.2. Age /__/__/ If age unknown, specify: child (<14 yrs) /__/ adolescent (14-19 yrs) /__/ adult (>19 yrs) /__/

4.3. Activity carried out at the time of incident

Mixing/loading /__/ Application /__/ Re-entry /__/ Other ……..

4.4. Was the injured person wearing any personal protection equipment (PPE) during the activity?

Yes /__/ No /__/ No answer /__/

4.4.1. If yes, which ones: gloves /__/ boots /__/ aprons /__/ overalls /__/ glasses /__/

cartridge masks /__/ dust masks /__/ other/__/ ……

5.1. Date of accident: /__/__/-/__/__/-/__/__/

5.2. Location of accident: Village: _____ Department: _____ Province: _____

5.3. Intoxication circumstance?

Unintentional /__/ Intentional (suicide) /__/ Criminal (poisoning) /__/ Unknown /__/

5.3. Description of the accident

..……..……

5.4. Main experienced intoxication symptoms (check one or more of the following):

Dizziness /__/ Headaches /__/ Profuse sweating /__/ Blurred vision /__/

Hand tremor /__/ Convulsion /__/ Narrow pupils/miosis /__/ Staggering /__/

Excessive salivation /__/ nausea/vomiting /__/ others (please specify) /__/ :

……

5.5. Outcome of the intoxication incident: Recovery /__/ Death /__/ Transfer /__/ Transfer and death /__/ Unknown /__/

5.6. Were other individuals affected in the same accident? Yes /__/ No /__/

5.6.1. If yes, how many? /__/__/

5.6.2. What happened to them? ……...

6.1. Treatment given

……..……

6.2. Hospitalization? Yes /__/ No /__/ If yes, duration of the hospitalization? ……

Annex 4: List of recorded active ingredients and their characteristics

(Source: Footprint PPDB, 2010 and PAN UK, 2009)

N°	Active ingredient	WHO Classification	Chemical family	Pesticide categorie	Inclusion to Annex 1
1.	2,4 D	II	Alkylchlorophenoxy	Herbicide	Yes
2.	Acetamipride	NL	Neonicotinoid	Insecticide	Yes
3.	Acetochlore	III	Chloroacetamide	Herbicide	No*
4.	Aclonifene	U	Diphenyl ether	Herbicide	Yes
5.	Alachlore	III	Chloroacetamide	Herbicide	No
6.	Alphacypermethrin e	II	Pyrethroid	Insecticide	Yes
7.	Atrazine	U	Triazine	Herbicide	No
8.	Bensulfuron-methyl	U	Sulfonylurea	Herbicide	Yes
9.	Bifenthrine	II	Pyrethroid	Insecticide	No**
10.	Carbofuran	Ib	Carbamate	Insecticide	No
11.	Carboxine	U	Oxathiin	Fungicide	No*
12.	Cartap	II	Nereistoxin analogue insecticides	Insecticide	No
13.	Chlorpyrifos-éthyl	II	Organophosphorus	Insecticide	Yes
14.	Clethodim	III	Cyclohexanedione	Herbicide	No*
15.	Clomazone	II	Isoxazolidinone	Herbicide	Yes
16.	Cycloxydime	U	Cyclohexanedione	Herbicide	No*
17.	Cypermethrine	II	Pyrethroid	Insecticide	Yes
18.	Deltamethrine	II	Pyrethroid	Insecticide	Yes
19.	Difenoconazole	III	Triazole	Fungicide	Yes
20.	Diuron	U	Phenylurea	Herbicide	Yes
21.	Endosulfan	II	Organochlorine	Insecticide	No
22.	Fenvalerate	II	Pyrethroid	Insecticide	No
23.	Fluazifop-p-butyl	III	Aryloxyphenoxypropionate	Herbicide	No*
24.	Flubendiamide	NL	Benzene-dicarboxamide	Insecticide	No**
25.	Fluometuron	U	Phenylurea	Herbicide	No*
26.	Furathiocarbe	Ib	Carbamate	Insecticide	No
27.	Glyphosate	U	Phosphonoglycine	Herbicide	Yes
28.	Haloxyfop-R-methyl	II	Aryloxyphenoxypropionate	Herbicide	No*
29.	Imidaclopride	II	Neonicotinoid	Insecticide	Yes
30.	Indoxacarb	NL	Oxadiazine	Insecticide	Yes
31.	Isoxaflutol	NL	Isoxazole	Herbicide	Yes
32.	Lambdacyhalothri	II	Pyrethroid	Insecticide	Yes

	ne				
33.	Lindane	II	Organochlorine	Insecticide	No
34.	Manebe	U	Dithiocarbamate	Fungicide	Yes
35.	Metalaxyl-M	II	Phenylamide	Fungicide	Yes
36.	Metolachlore	III	Chloroacetamide	Herbicide	No
37.	Nicosulfuron	U	Sulfonylurea	Herbicide	Yes
38.	Oxadiargyl	NL	Oxidiazole	Herbicide	Yes
39.	Oxadiazon	U	Oxidiazole	Herbicide	Yes
40.	Paraquat	II	Bipyridylium	Herbicide	No
41.	Pendimethaline	III	Dinitroaniline	Herbicide	Yes
42.	Permethrine	II	Pyrethroid	Insecticide	No
43.	Phosphure d'alumine	FM	Inorganic compound	Insecticide	Yes
44.	Profenofos	II	Organophosphorus	Insecticide	No
45.	Prometryne	U	Triazine	Herbicide	No
46.	Propanil	III	Anilide	Herbicide	No*
47.	Pyrimiphos-methyl	III	Organophosphorus	Insecticide	Yes
48.	Pyriproxyfene	U	Juvenile hormone mimic	Insecticide	Yes
49.	Quizalofop-p-ethyl	NL	Aryloxyphenoxypropionate	Herbicide	Yes
50.	S-Metalochlore	III	Chloroacetamide	Herbicide	Yes
51.	Spirotetramate	NL	Tetramic acid	Insecticide	No**
52.	Terbutryne	U	Triazine	Herbicide	No
53.	Thiamethoxam	III	Neonicotinoid	Insecticide	Yes
54.	Thirame	III	Dithiocarbamate	Fungicide	Yes
55.	Triazophos	Ib	Organophosphorus	Insecticide	No
56.	Trichlopyr	III	Pyridine compound	Herbicide	Yes

* Re-submitted ** Pending

Annex 5: List of recorded active ingredients and their inclusion to international conventions and to the PAN Dirty Dozen List

N°	Active Ingredients		Cancer			EDC			Pesticides toxic to bees	
		Conventions	USEPA	EU	IARC	EU	OSF	WWF	USEPA	UK PSD
1.	2,4 D					2		X		
2.	Acetamipride									
3.	Acetochlore		SECP			1	X	X		
4.	Aclonifene									
5.	Alachlore		L2	3		1	X	X		
6.	Alpha cypermethrine								X	X
7.	Atrazine				3	1	X	X		
8.	Bensulfuron-methyl									
9.	Bifenthrine		C			1	X	X	X	X
10.	Carbofuran					2		X	X	
11.	Carboxine									
12.	Cartap									
13.	Chlorpyrifos-éthyl									
14.	Clethodim									
15.	Clomazone									
16.	Cycloxydime									
17.	Cypermethrine		C							X
18.	Deltamethrine				3	1		X	X	X
19.	Difenoconazole		C							
20.	Diuron		KNOW	3		2				
21.	Endosulfan					2	X	X		
22.	Fenvalerate				3	2		X		
23.	Fluazifop-p-butyl									
24.	Flubendiamide									
25.	Fluometuron		C		3					X
26.	Furathiocarbe									
27.	Glyphosate									
28.	Haloxyfop-R-methyl		B2							
29.	Imidaclopride								X	X
30.	Indoxacarb								X	X
31.	Isoxaflutole		L1							
32.	Lambdacyhalothrine					1		X	X	X

33.	Lindane	PIC/LRTAP /Dirty Dozen	3		2B	1	X	X		
34.	Manebe		B2		3	1	X	X		
35.	Metalaxyl-M									
36.	Metolachlore		C							
37.	Nicosulfuron									
38.	Oxadiargyl									
39.	Oxadiazon		C							
40.	Paraquat	Dirty Dozen								
41.	Pendimethaline		C							
42.	Permethrine		2		3	2	X	X		
43.	Phosphure alumine									
44.	Profenofos									
45.	Prometryne					2				
46.	Propanil		3			2				
47.	Pyrimiphos-methyl									
48.	Pyriproxyfene									
49.	Quizalofop-p-ethyl									
50.	S-Metalochlore		C							
51.	Spirotetramate									
52.	Terbutryne		C			1		X		
53.	Thiamethoxam									
54.	Thirame				3	1	X			
55.	Triazophos									
56.	Trichlopyr									

Annex 6: Pesticide formulations which were identified during the survey among dealers/vendeurs

N°	Formulation	Type of formulation	Active ingredients	Concentrations	Pesticide category	WHO Classification	Chemicals' sources	Dealers' source of supply	Registration CSP*
1.	ACEPRONET 400	EC	Acetochlore	250	Herbicide	III	China	Mali	No
			Prometryne	150					
2.	ACTELLIC SUPER	WG	Pyrimiphos-methyl	16	Insecticide		France	Burkina	No
			Permethrine	32					
3.	ACTELLIC 50	EC	Pyrimiphos-methyl	500	Insecticide	III	Switzerland	Burkina	Yes
4.	ACTELLIC SUPER		Pyrimiphos-methyl	16	Insecticide		SAPHYTO	Burkina	No
			Permethrine	3					
5.	ACTION 80 DF	DF	Diuron	800	Herbicide		SCAB	Cameroon	No
6.	ADWUMA WURA	SL	Glyphosate	480	Herbicide		China	Ghana	No
7.	ADWUMA WURA 75.7%	GR	Glyphosate	757	Herbicide		China	Ghana	No
8.	ADWUMAMU HENE		Glyphosate	410	Herbicide			Ghana	No
9.	AGRAZINE 500	SC	Atrazine	500	Herbicide		China	Burkina/Ghana	No
10.	AGRAZINE 80 WP	WP	Atrazine	800	Herbicide		France/China	Ghana/Burkina	No
11.	AGRAZINE 90	DF	Atrazine	900	Herbicide		China/France	China	No
12.	AGRAZINE DF	WG	Atrazine	900	Herbicide		France		No
13.	AKIZON 40 SC	SC	Nicosulfuron	40	Herbicide	III	France	Burkina	Yes
14.	ALLIGATOR 400 EC	EC	Pendimethaline	400	Herbicide	III	France	Burkina, Mali	Yes
15.	APRON PLUS 50 DS	DS	Metalaxyl-M	100	Insecticide			Ivory Coast	
			Carboxine	60					
			Furathiocarbe	340					
16.	APRON STAR 42 WS	WS	Thiamethoxam	20%	Insecticide		Switzerland		

			Metalaxyl-M	20%					
			Difenoconazole	2%					
17.	ATRAHERB	SC	Atrazine	50%	Herbicide		China	Ghana	No
18.	ATRALM 500	EC/SC	Atrazine	500	Herbicide		SENEFURA/SCAB	Burkina	No
19.	ATRALM 90	WG	Atrazine	900	Herbicide		SENEFURA	Burkina	No
20.	ATRAVIC 500 SC	SC	Atrazine	500	Herbicide		SAPHYTO	France	No
21.	ATRAZ 50	FW	Atrazine	500	Herbicide		Cantonments Accra	China	No
22.	ATRAZ 80 WP	WP	Atrazine	800	Herbicide		SARO AGROCHEM	Nigeria	No
23.	ATRAZILA 500	SC	Atrazine	500	Herbicide		Kumark Trading Ent.	China	No
24.	ATRAZILA 80 WP	WP	Atrazine	800	Herbicide		Shenzhen Baocheng Chemical industry co. Ltd	China, Ghana	No
25.	ATRAZINE		Atrazine		Herbicide		Japan	Ghana	No
26.	ATRAZINE WEEDICIDE		Atrazine		Herbicide		Japan	Ghana	No
27.	AVAUNT 150 EC	EC	Indoxacarb	150	Insecticide	II	SOFITEX/SAPHYTO	Burkina	Yes
28.	BACCARA 335 EC	EC	Propanil	260	Herbicide		SAPHYTO	Burkina	No
			2,4 D	75					
29.	BENAXONE SUPER		Paraquat	270	Herbicide		Bentronic Productions	Ghana	No
30.	BEXTRA		2,4 D	720	Herbicide		CalliGhana/Ghana Bentronic Production	Ghana	No
31.	BISTAR 10 WP	WP	Bifenthrine	10%	Insecticide	II		Burkina	Yes
32.	BLAST 46 EC	EC	Lambdacyhalothrine	30	Insecticide		SAPHYTO	Chine	No
			Acetamipride	16					
33.	CAIMAN ROUGE	DP	Endosulfan	25%	Insecticide	II	SOFITEX/SSI	Senegal	No
			Thirame	25%					
34.	CAIMAN SUPER	EC	Alphacypermethrine	18	Insecticide		SSI	China	No
			Endosulfan	350					
35.	CALFOS 500 EC	EC	Profenofos	500	Insecticide	II	SAPHYTO	Burkina	Yes

36.	CALLIFOR	WG	Prometryne	440	Herbicide		SAPHYTO		No
			Fluometuron	440					
37.	CALLIFOR 500	SC	Prometryne	250	Herbicide	III	SAPHYTO	France	Yes
			Fluometuron	250					
38.	CALLIFOR G	WG	Prometryne	250	Herbicide	III	SAPHYTO	France	Yes
			Fluometuron	250					
			Glyphosate	60					
39.	CALLIHERB	EC/SL	2,4 D of amine salt	720	Herbicide		SAPHYTO	France	No
40.	CALLIMAN 80 WP	WP	Manebe	80	Fongicide		Callivoire	Ivory Coast	No
41.	CALLITRAZ 90 WG	WG	Atrazine	900	Herbicide		SAPHYTO		No
42.	CALLOXONE SUPER	SL	Paraquat	200	Insecticide		SAPHYTO	Burkina	No
43.	CALRIZ	EC	Propanil	360	Herbicide		SAPHYTO	France	No
			Trichlopyr	72					
44.	CALTHIO C	WG/WS	Chlorpyrifos-ethyl	25%	Insecticide		SAPHYTO/FASOCOTON	France	No
			Thirame	25%					
45.	CALTHIO DS	DS	Lindane	25%	Insecticide		SAPHYTO	Burkina	No
			Thirame	25%					
46.	CALTHIO E	DP	Endosulfan	25%	Insecticide		SCAB	Burkina	No
			Thirame	25%					
47.	CAPT 80 EC	EC	Acetamipride	16	Insecticide		SAPHYTO	Ivory Coast, BF	No
			Cypermethrine	72					
48.	CAPT 88 EC	EC	Acetamipride	16	Insecticide	II	Ivory Coast /ALM	Ivory Coast/China	Yes
			Cypermethrine	72					
49.	CARBODAN 3% G		Carbofuran	30	Insecticide		Makhteshim Agan France	Ghana	No
50.	CELTACAL 12,5 EC	EC	Deltamethrine	12,5	Insecticide		SAPHYTO	France	No
51.	CIGOGNE	EC	Profenofos	150	Insecticide		STEPC Abidjan	France	No

			Cypermethrine	36					
52.	CODAL gold 412,5 DC	EC	S-Metolachlore	162,5	Herbicide	III	SAPHYTO/SYNGENTA	Ivory Coast/Switzerland	Yes
			Prometryne	250					
53.	CONQUEST C 88 EC	EC	Cypermethrine	72	Insecticide	II	SAPHYTO	Burkina	Yes
			Acetamipride	16					
54.	CONQUEST C 176 EC	EC	Acetamipride	32	Insecticide	II	SAPHYTO	Burkina	Yes
			Cypermethrine	144					
55.	COTODON PLUS 500 EC	EC	Metolachlore	250	Herbicide	III	NOVARTIS	France	No
			Atrazine	250					
56.	COTONET 500 EC	EC	Metolachlore	333	Herbicide		DTE SA Chine	China	No
			Terbutryne	167					
57.	CURACRON 500 EC	EC	Profenofos	500	Insecticide	III	SOFITEX	Ivory Coast	Yes
58.	CYPERCAL 25 EC	EC	Cypermethrine	25	Insecticide		SAPHYTO	France	
59.	CYPERCAL 50 EC	EC	Cypermethrine	50	Insecticide	III	SAPHYTO		No
60.	CYPERCAL P 690 EC	EC	Profenofos	600	Insecticide	II	SAPHYTO	Burkina	Yes
			Cypermethrine	90					
61.	CYPERPHOS	EC	Cypermethrine	36	Insecticide		Bayer crop science	Germany	No
			Triazophos	150			Bayer crop science	Germany	
62.	CYRENS 480 EC	EC	Chlorpyrifos-ethyl	480	Insecticide		SAVANA	France	No
63.	DECIS	EC	Deltamethrine	25	Insecticide		STEPC/Bayer crop science	Ivory Coast	Yes
64.	DECTACOL 12,5	EC	Deltamethrine	12,5	Insecticide		SAPHYTO	Burkina	No
65.	DIAFURAN	WG	Carbofuran	5%	Insecticide		SAPHYTO	France	No
66.	DIGA FAGALAN 360 SL	SL	Glyphosate	360	Herbicide	III	PROPHYMA/SAVANA	France/Cameroon	Yes
67.	DIURALM 80 WG	WG	Diuron	800	Herbicide	III	SENEFURA/ALM	ALM/China	Yes
68.	DOMINEX 100	GL	Alpha cypermethrine	100	Insecticide			USA	No
69.	DUREXA	WG	Chlorpyrifos-ethyl	3,50%	Insecticide		SAPHYTO	France	No

70.	ENDOCOTON 500 EC	EC	Endosulfan	500	Insecticide	Ib	SAPHYTO	Israel	No
71.	FANGA 500 EC	EC	Profenofos	500	Insecticide	II	SENEFURA	ALM	No
72.	FOCUS GLYPHOSATE 360 SL	SL	Glyphosate	360	Herbicide		SOFITEX	France	No
73.	FOCUS Ultra 100 EC	EC	Cycloxydime	100	Herbicide	III	BASF/Tech Agro International	EU	Yes
74.	FURADAN 5G	GR	Carbofuran	5%	Insecticide		SCAB/FMC	Belgium	No
75.	FUSILADE	EC	Fluazifop-p-butyl	125	Herbicide	III	SCAB	Ivory Coast	No
76.	GALAXY 450 EC	EC	Clomazone	150	Herbicide		SENEFURA/SAPHYTO	Burkina	No
			Pendimethaline	300					
77.	GALLANT SUPER	EC	Haloxyfop-R-methyl	104	Herbicide	III	Callivoire	France	Yes
78.	GARIL 432 EC	EC	Trichlopyr	72	Herbicide	II	SAPHYTO	Burkina	No
			Propanil	360					
79.	GLYCEL 410 SL	SL	Glyphosate	41%	Herbicide	II	Top phyt/ Topex Agro Elevage Developpement SARL CONAKRY	Ghana/India/Guinea	Yes
80.	GLYPHADER	SL	Glyphosate	310	Herbicide		SCAB		No
81.	GLYPHADER 480	SL	Glyphosate	480	Herbicide		Golden stork	GAGSIN PTE LTD Singapore	No
82.	GLYPHADER 75	SG	Glyphosate	680	Herbicide	III	SCAB	France/China	Yes
83.	GLYPHALM 500 WG	WG	Glyphosate	500	Herbicide	III	SENEFURA/ALM	France	Yes
84.	GLYPHALM 360 SL	SL	Glyphosate	360	Herbicide	III	SENEFURA/ALM	France	Yes
85.	GLYPHALM 720	WG	Glyphosate	720	Herbicide		SENEFURA	France	No
86.	GLYPHONET 360 SL	SL	Glyphosate	360	Herbicide	III	DTE SA Chine	China	Yes
87.	GLYSATE		Glyphosate	410	Herbicide		Yaw wussma Ventures	Ghana	No
88.	GRAMOQUAT	EC	Paraquat	200	Insecticide		Kumark Trading Ent.	China/Ghana	No

	SUPER		chloride						
89.	GRAMOXONE SUPER		Paraquat	28	Insecticide	II	SCAB		No
90.	HALONET SUPER 104 EC	EC	Haloxyfop-R-methyl	104	Herbicide	III	DTE SA Chine	China	No
91.	HERBALM	SL	2,4 D of amine salt	720	Herbicide		SENEFURA/ALM International	France	No
92.	HERBEXTRA 720 SL	SL	2,4 D of amine salt	720	Herbicide	II	SCAB, Kumark Trading Ent., SSI	Burkina, China	Yes
93.	HERBEXTRA 750 SL	SL	2,4 D of amine salt	750	Herbicide		SCAB	France	No
94.	HERBISUPER		Acetochlore	300	Herbicide	II	SCAB		No
			Atrazine	200					
95.	HERBIMAIS	DF	Atrazine	750	Herbicide		SCAB	SCPA SIVEX International	No
			Nicosulfuron	40					
96.	IBIS A	EC	Alphacypermethrine	36	Insecticide		SCAB/SSI	China	No
			Acetamipride	16					
97.	IBIS P	EC	Alphacypermethrine	15	Insecticide		SSI	China	No
			Profenofos	200					
98.	IKOKADIGNE	EC	Haloxyfop-R-methyl	104	Herbicide	II	SCAB	China/France	Yes
99.	KALACH 360 SL	SL	Glyphosate	360	Herbicide	III	SAPHYTO/CalliGhana	France	Yes
100.	KALACH EXTRA 70 SG	SG	Glyphosate	700	Herbicide	III	SAPHYTO	France	Yes
101.	KAMAXONE		Paraquat	200	Insecticide		Kumasi/Ghana	China	No
102.	KART 500 SP	SP	Cartap	500	Insecticide	II	STEPC	France	Yes
103.	KOMBAT	EC	Lambdacyhalothrine	25	Insecticide		SARO	Nigeria	No
104.	KUAPA WARA	EC	Glyphosate	480	Herbicide			Ghana	No
105.	KUM NWURA	ULV	Glyphosate	41%	Herbicide			Ghana	No

106.	LAGON 380 SC	SC	Isoxaflutol	50	Herbicide	III	STEPC/Bayer crop science	Germany/Spain	Yes
			Aclonifene	333					
107.	LAMBDA SUPER	EC	Lambdacyhalothrine	25	Insecticide		SCAB, Kumark Trading Ent.	China	No
108.	LAMBDACAL P 212 EC	EC	Profenofos	200	Insecticide	II	SAPHYTO	Burkina	No
			Lambdacyhalothrine	12					
109.	LAMBDACAL P 636 EC	EC	Profenofos	600	Insecticide	II	SOFITEX	Burkina	Yes
			Lambdacyhalothrine	36					
110.	LAMDEX 430 EC	EC	Lambdacyhalothrine	30	Insecticide	II	Makhteshim Chemical Works	Israel	Yes
			Chlorpyrifos-ethyl	400					
111.	LASSO	GD	Atrazine	180	Herbicide	III	SCAB/Candel	Belgium	No
			Alachlore	300					
112.	MALIK 108 EC	EC	Haloxyfop-R-methyl	108	Herbicide	III	SAVANA	France	Yes
113.	MALO BINFAGA	SL	2,4 D	720	Herbicide	II	SAVANA	France	Yes
114.	MILSATE	SL	Glyphosate	41%	Herbicide		Topaz Multi industrie Ghana	India	No
115.	MITOX	EC	Fenvalerate	200	Insecticide		Bentronic Productions	Ghana	No
116.	MOMTAZ 45 WS	WS	Imidaclopride	250	Insecticide	III	PROPHYMA/SAVANA	France	Yes
			Thirame	200					
117.	NICOMAIS 40	SC	Nicosulfuron	40	Herbicide	III	PROPHYMA/SAVANA	France/Cameroon	Yes
118.	NWURA WURA	SL	Glyphosate	480	Herbicide			Ghana/China	
119.	OXARIZ 250 EC	EC	Oxadiazon	250	Herbicide	III	SAVANA	France	Yes
120.	PACHA 25 EC	EC	Lambdacyhalothrine	15	Insecticide	II	SAVANA	France	No
			Acetamipride	10					
121.	PHOSTOXIN		Phosphure d'alumine		Insecticide		Kumark Trading Ent.	Ghana	No
122.	POWER	SL	Glyphosate	480	Herbicide			China	No

123.	POWER GLYPHOSATE 480I._P.A	SL	Glyphosate	41%	Herbicide			Ghana	No
124.	PRIMAGRAM 360	SC	Atrazine	370	Herbicide		SYNGENTA	Ivory Coast	No
			S-Metalochlore	290					
125.	PROTECTOR	EC	Lambdacyhalothrine	30	Insecticide		SENEFURA, SOFITEX/AF-Chem SOFACO-CI	AF Chem SA Abidjan, Ivory Coast	No
			Pyriproxyfene	30					
126.	RISTAR	EC	Oxadiazon	250	Herbicide		SCAB	Burkina	No
127.	RIZTOP 250 EC	EC	Oxadiazon	250	Herbicide		SAPHYTO	France	No
128.	ROCKY 386 EC	EC	Endosulfan	350	Insecticide	III	SAPHYTO	Burkina	No
			Cypermethrine	36					
129.	RONSTAR PL	EC	Oxadiazon	80	Herbicide		SAPHYTO/Bayer crop science	Burkina/ Ivory Coast	No
			Propanil	400					
130.	ROUNDUP 360 SL	SL	Glyphosate	360	Herbicide	III	SCAB	Burkina/Canada/ Switzerland/Belgium/ Ghana	Yes
131.	ROUNDUP 680	SP	Glyphosate	680	Herbicide		SCAB	Burkina	No
132.	ROUNDUP 680 BIOSEC	EC	Glyphosate	680	Herbicide		SCAB	Canada/Burkina/Belgium	No
133.	ROUNDUP TURBO		Glyphosate	450	Herbicide	III	SCAB		Yes
134.	SAMORY	WP	Bensulfuron-methyl	100	Herbicide	III	SCAB	France/Mali	Yes
135.	SELECT 120 EC	EC	Clethodim	120	Herbicide	III	SAPHYTO	France	Yes
136.	SHARP	SL	Glyphosate	480	Herbicide		Kumark Trading Ent.	China	No
137.	SHARP 80 g/L	SL	Glyphosate	380	Herbicide			Ghana	No
138.	SHYE NWURA	EC	Glyphosate	480%	Herbicide			Ghana/China	No
139.	SINOSATE	SL	Glyphosate	41%	Herbicide		Natosh Enterprise AGRO-DIVISION Ghana	China	No
140.	STOMP	CS	Pendimethaline	455	Herbicide		SENEFURA/BASF	France	No
141.	STOMP 500 EC	EC	Pendimethaline	500	Herbicide		SOFITEX	Italy	No

142.	SUPRAXONE	EC	Paraquat	200	Insecticide		Golden stork	Ghana	No
143.	TARGA SUPER 50	EC	Quizalofop-p-éthyl	50	Herbicide		SAPHYTO/SOFITEX	Burkina/Japan	No
144.	TEMPRA	WG	Diuron	900	Herbicide		SAPHYTO		No
145.	TERMICAL 480 EC	EC	Chlorpyrifos-ethyl	480	Insecticide		SAPHYTO	France	No
146.	TIHAN 175 O-TEQ		Spirotetramate	75	Insecticide	III	SCAB/Bayer crop science	Germany	Yes
147.			Flubendiamide	100					
148.	TITAN 25 EC	EC	Acetamipride	25	Insecticide		SAPHYTO	France	No
149.	TOPSTAR	SC	Oxadiargyl	400	Herbicide	III	SCAB, SAPHYTO	Burkina	Yes
150.	TOUCHDOWN	SC	Glyphosate	500	Herbicide		SYNGENTA	Ivory Coast	No
151.	TOUCHDOWN HI TECH	SL	Glyphosate	500	Herbicide			Ghana	No
152.	TRAZINE	SC	Atrazine	500	Herbicide		Bentronic Productions	Ghana	No
153.	WEED FAST	SL	Glyphosate	480	Herbicide		WEYOUNG CW Kumassi	WE YOUNG industrie	No

* Global list of January 2010

Annex 7: Chemicals used by agricultural producers

Formulation	Active ingredients	Pesticide category	WHO classification	CSP Registration
ACEPRONET 400 EC	Acetochlore 250 Prometryne 150	Herbicide	III	No
ACTION 80 DF	Diuron 800	Herbicide		No
ADWUMA WURA	Glyphosate 480	Herbicide		No
ADWUMAMU HENE	Glyphosate 410	Herbicide		No
AGRAZINE 90	Atrazine 900	Herbicide		No
AKIZON 40 SC	Nicosulfuron (40g/l)	Herbicide	III	Yes
APRON PLUS	Metalaxyl-M 100 Carboxine 60 Furathiocarbe 340	Fongicide		No
ATRALM 500 EC	Atrazine 500	Herbicide	U	No
ATRALM 500 SC	Atrazine 500	Herbicide	U	No
ATRALM 90 WG	Atrazine 900	Herbicide	U	No
ATRAVIC	Atrazine 500	Herbicide	U	No
ATRAZ 80 WP	Atrazine 800	Herbicide	U	No
ATRAZILA 500 SC	Atrazine 500	Herbicide	U	No
ATRAZINE	Atrazine	Herbicide	U	No
ATRAZILA 80 WP	Atrazine 800	Herbicide		No
AVAUNT 150 EC	Indoxacarb150	Insecticide	II	Yes
BENAXONE SUPER	Paraquat chloride 200	Herbicide		No
BLAST 46 EC	Lambda-cyhalothrine 30 Acetamipride 16	Insecticide		No
CAIMAN ROUGE	Endosulfan25% Thirame25%	Insecticide	II	No
CALFOS 500 EC	Profenofos (500g/l)	Insecticide	II	Yes
CALLIFOR	Prometryne (440g/l) Fluometuron (440g/l)	Herbicide	III	No
CALLIFOR 500 SC	Prometryne (250g/l) Fluometuron (250g/l)	Herbicide	III	Yes
CALLOXONE SUPER	Paraquat 200	Herbicide		No
CALRIZ	Propanil 360 Trichlopyr 72	Herbicide		No
CALTHIO	Endosulfan Thirame	Insecticide		No
CAPORAL 500 EC	Profenofos (500g/l)	Insecticide	II	Yes

CAPT 88 EC	Acetamipride (16g/l) Cypermethrine (72g/l)	Insecticide	II	Yes
CERETRAZ 500 SC				No
CODAL GOLD 412-5 DC	S-Metolachlore (162g/l) Prometryne (250g/l)	Herbicide	III	Yes
CONQUEST88 EC	Cypermethrine (72g/l) Acetamipride (16g/l)	Insecticide	II	Yes
CONQUEST 176 EC	Acetamipride (32g/l) Cypermethrine (144g/l)	Insecticide	II	Yes
COTODON PLUS GOLD 450 EC	s-métolachlore (245g/l) Terbutryne (196g/l)	Herbicide	III	No
COTODON PLUS 500 EC	Metolachlore (250g/l) Atrazine (250g/l)	Herbicide		No
CURACON 500 EC	Profenofos (500g/l)	Insecticide	III	Yes
CYPERCAL P 230 EC	Cypermethrine (30g/l) Profenofos (200g/l)	Insecticide	II	Yes
DIGA FAGALAN 360 SL	Glyphosate (360g/l)	Herbicide	III	Yes
DIURALM 80 WG	Diuron (800g/kg)	Herbicide	III	Yes
ENDOCOTON500 EC	Endosulfan (500g/l)	Insecticide	Ib	No
FANGA500 EC	Profenofos (500g/l)	Insecticide	II	No
FOCUS ULTRA100EC	Cycloxidime (100g/l)	Herbicide	III	Yes
FURY P 212 EC	Zeta-cyperméthrine (12g/l) Profenophos (200g/l)	Insecticide	II	Yes
FURY P 636 EC				No
GALLANT SUPER	Haloxyfop-R-methyl (104g/l)	Herbicide	III	Yes
GALAXY450 EC	Clomazone 150 Pendimethaline 300	Herbicide		No
GARIL432 EC	Trichlopyr (72g/l) Propanil (360g/l)	Herbicide	II	No
GLYCEL	Glyphosate 41%	Herbicide	II	Yes
GLYPHADER 480 SL	Glyphosate480	Herbicide	III	No
GLYPHONET360 SL	Glyphosate (360g/l)	Herbicide	III	Yes
GRAMOQUAT SUPER	Paraquat chloride 200 (276)	Herbicide		No
GRAMOXONE SUPER	Paraquat (200g/l)	Herbicide	II	No
HERBALM	2,4 D (750g/l)	Herbicide		No
HERBEXTRA 720 SL	2,4 D (720g/l)	Herbicide	III	Yes
HERBICOTON DF	Fluometuron (440g/l) Prometryne (440g/l)	Herbicide	III	Yes

HERBICOTON 500SC	Fluometuron (250g/l) Prometryne (250g/l)	Herbicide	III	Yes
IKOKADIGNE	Haloxyfop-R-methyl (104g/l)	Herbicide	II	Yes
KALACH 360 SL	Glyphosate (360g/l)	Herbicide	III	Yes
KALACH EXTRA 70SG	Glyphosate (700g/l)	Herbicide	III	Yes
KARATE MAX2,5 WG	Lambda-cyhalothrine (25g/l)	Insecticide	III	Yes
LAMBDACAL P 212 EC	Profenofos 600 Lambdacyhalothrine 36	Insecticide	II	Yes
LAMBDACAL P 636 EC	Profenofos (600g/l) Lambda-cyhalothrine (36g/l)	Insecticide	II	Yes
LASSO GD	Atrazine 180 Alachlore 300	Herbicide	III	No
MALO BINFAGA 720 SL	2,4 D (720 g/l)	Herbicide	II	Yes
NICOMAIS 40 SC	Nicosulfuron (400g/l)	Herbicide	III	Yes
NIVACRON				No
PRIMAGRAM 360	Atrazine S-Metalochlore	Herbicide		No
RICAL 345 EC	Propanil (230g/l) Thiobencarbe (115 g/l)	Herbicide	III	Yes
RISTAR	Oxadiazon 250	Herbicide		No
ROCKY386 EC	Endosulfan (350g/l) Cypermethrine (36g/l)	Insecticide	III	No
ROCKY 500 EC	Endosulfan (500 g/l)	Insecticide	Ib	No
RONSTAR PL	Oxadiazon 80 Propanil 400	Herbicide		No
ROUNDUP 360 SL	Glyphosate (360g/l)	Herbicide	III	Yes
RONSTAR EC	Oxadiazon 80 Propanil 400	Herbicide Herbicide		No
SAMORY	Bensulfuron-methyl (100g/kg)	Herbicide	III	Yes
SHYENWURA	Glyphosate 480%	Herbicide		No
STOMP	Pendimethaline 455	Herbicide		No
TARGA SUPER50 GL	Quizalofop-p-éthyl 50	Herbicide		No
TOP STAR400 SC	Oxadiargyl (400g/l)	Herbicide		No
TOUCHDOWN 500 SC	Glyphosate (500g/l)	Herbicide	III	Yes

Institut du Sahel

Liste positive des pesticides autorisés à la 34ème session ordinaire du Comité Sahélien des Pesticides

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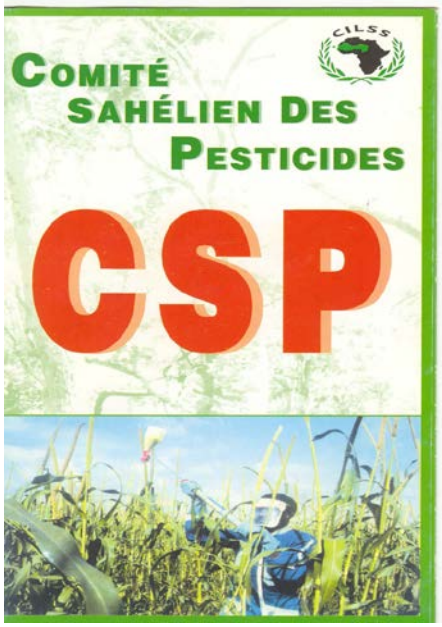
En attendant la mise en place effective des structures du Comité Ouest Africain d'Homologation des Pesticides (COAHP), l'Institut du Sahel (INSAH) a organisé du **26 au 30 Mai 2014** à Bamako, la **34ème** session ordinaire du Comité Sahélien des Pesticides (CSP).

Après examen des points ci-après:

1. le suivi des recommandations de la **33ème session ordinaire** et l'examen du rapport d'activités du Secrétariat Permanent ;
2. l'évaluation des dossiers de demande d'homologation de pesticides ;
3. la situation des activités des Comités Nationaux de Gestion des Pesticides (CNGP) ;
4. des sujets divers relatifs au fonctionnement du CSP.



la session a abouti à la publication ci-dessous de la **liste positive des pesticides autorisés**.

Pour plus d'informations s'adresser au Secrétaire Permanent du Comité Sahélien des Pesticides basé à L'Institut du Sahel à Bamako, Email : sylvain.ouedraogo@insah.org.

« Pesticides d'accord Santé et Environnement «

Liste positive des pesticides autorisés à la 34ème session du CSP

N°	Spécialité commerciale	Firme	N° Enr.	Arrvée	Décision CSP
1	TERBULOR 500 EC	AFCHEM SOFACO	790	14/04/2014	APV
2	EMARON	SAVANA	792	06/05/2014	APV
3	RUBIS	SAVANA	793	06/05/2014	APV
4	IDEFIX	SAVANA	795	06/05/2014	APV
5	SNIPER	Arysta LifeScience/MPC	796	08/05/2014	APV
6	HERBEXBAR 720 SL	BARRY AGRO CHEM	797	12/05/2014	APV
7	SEGAIBANA 40 SC	BARRY AGRO CHEM	771	15/05/2014	APV
8	GLYPHOBAR 480 SL	BARRY AGRO CHEM	770	13/05/2014	APV
9	SAVANEM	SAVANA	764	06/05/2014	APV
10	EMAPYR	SAVANA	740	06/05/2014	APV
11	MOVENTO PLUS	BAYER	754	09/05/2014	APV
12	LAGON 575 SC	BAYER	753	09/05/2014	APV
13	TIHAN 175 O_TEQ	BAYER	552	09/05/2014	APV
14	DABA 90 WG	Arysta LifeScience/MPC	693	08/05/2014	APV
15	CALTHIO MIX 485 WS	Arysta LifeScience/MPC	709	08/05/2014	APV
16	SUNPHOSATE 360 SL	WYNCA SUNSHINE	669	16/05/2014	APV
17	PIC 480 SC	ALM International	788	19/05/2014	APV
18	DESTROY 400 SL	ALM International	785	19/05/2014	APV
19	ALMECTINE 20 EC	ALM International	784	19/05/2014	APV
20	ASULOX	ALM International	783	19/05/2014	APV
21	LAMBDALM 50 EC	ALM International	787	19/05/2014	APV
22	CORAGEN 20 SC	ALM International	781	19/05/2014	APV
23	BRINO	BADA COMMERCE SARL	773	19/05/2014	APV
24	L'EPERVIER NOIR	DIENDERE IDRISSA	778	19/05/2014	APV
25	MAKI BLOCK	LIPHATECH / ARYSTA LIFE	769	19/05/2014	APV
26	PENDITROP 500 EC	TROPICS SARL	766	19/05/2014	APV
27	WAVETIDE	CIFI SARL	746	19/05/2014	APV
28	CONFO LIQUIDE	CIFI SARL	779	19/05/2014	APV
29	CONFO POMMADE	CIFI SARL	778	19/05/2014	APV
30	ALLIGATOR	SSI / LDC	502	13/05/2014	Hommologation accordée
31	FOCUS ULTRA 100 EC	BASF SE	515	28/04/2014	Hommologation accordée
32	THUNDER 145 O-TEQ	BAYER	492	09/05/2014	Extension accordée
33	SELECT 120 EC (Oignon)	Arysta LifeScience/MPC	444	04/04/2014	Extension accordée
34	PENCAL 500 EC (Canne)	Arysta LifeScience/MPC	760	14/05/2014	Extension accordée
35	STOMP 455 CS (Riz)	BASF SE	591	17/10/2013	Extension accordée
36	PENCAL 500 EC (Maïs)	Arysta LifeScience/MPC	760	14/05/2014	Extension accordée
37	ALLIGATOR (Coton)	SSI / LDC	502	13/05/2014	Extension accordée
38	LUMAX 537,5 SE (PRIMAGOLD 537,5 SE)	Arysta LifeScience/MPC	526	14/05/2014	Modification d'usage (réduction de dose) accordée
39	DABA 90 WG ABSOLUT 90 WG	Arysta LifeScience/MPC	693	14/05/2014	Nouveau nom commercial accordé

40	PENCAL 500 EC PARAGON 500 EC	Arysta LifeScience/MPC	760	08/05/2014	**Second nom commercial acordé**
41	ENGEO 247 SC ALIKA 247 SC	Arysta LifeScience/MPC	711	08/05/2014	**Second nom commercial accordé**
42	PYRICAL 5G	Arysta LifeScience/MPC	652	04/04/2014	**Renouvellement APV à compté de mai 2014**
43	PYRICAL 480 EC	Arysta LifeScience/MPC	615	04/04/2014	**Renouvellement APV à compter de mai 2014**
44	COBRA 120 EC	Arysta LifeScience/MPC	647	04/04/2014	**Renouvellement accordé à compter de mai 2014**
45	VIPER 46 EC	Arysta LifeScience/MPC	648	04/04/2014	**Renouvellement APV à compter de mai 2014**
46	TITAN 25 EC	Arysta LifeScience/MPC	605	04/04/2014	**Renouvellement APV à compter de mai 2014**
47	DELTACAL 12,5 EC	Arysta LifeScience/MPC	650	04/04/2014	**Renouvellement APV à compter de mai 2014**
48	CALRIZ	Arysta LifeScience/MPC	597	04/04/2014	**Renouvellement APV à compté de mai 2014**
49	CYPERANET 88 EC	Datong Entreprises SA	563	08/04/2014	**Renouvellement APV à compter de mai 2014**
50	NOMAX 150 SC	BASF SE	610	08/04/2014	**Renouvellement APV à compter de mai 2014**
51	ACTELIC SUPER DUST	Syngenta	649	08/04/2014	**Renouvellement APV à compté de mai 2014**
52	ROUNDUP 450 K	Monsanto Europe SAA	618	15/05/2014	**Renouvellement APV à compter de mai 2014**
53	ROUNDUP 360 K	Monsanto Europe SAA	617	15/05/2014	**Renouvellement APV à compter de mai 2014**
54	DJIGIKAN 800 EC	ALM internationale	644	19/05/2014	**Renouvellement APV à compter de mai 2014**
55	EMACOT 50 WG	SAVANA	620	06/05/2014	**Renouvellement APV à compter de mai 2014**
56	HERBALM 720 SL	ALM internationale	377	19/05/2014	**Renouvellement APV à compter de mai 2014**

57	MAMBA 360 SL(DOMINATOR 360 SL)	Dow AgroScience	385	14/05/2014	**Renouvellement Homologation à compter de juillet 2014**
58	CONQUEST C 88 EC	ArystaLifeScience	240		**Renouvellement Homologation à compter de juillet 2014**
59	CYPERCAL P230 EC	ArystaLifeScience	227	04/04/2014	**Renouvellement Homologation à compter de juillet 2014**

Le Président du Comité Sahélien des Pesticides (CSP)

Prof. Adama TOE

carbosulfan (Ref: OMS 3022)

** FMC 35001 ** Translations

GENERAL INFORMATION
for carbosulfan

Description: An insecticide for control of soil dwelling and foliar pests

Introduction: 1979, first reported; 1982, first introduced

EC Regulation 1107/2009 (repealing 91/414):

Status	Not approved
Dossier rapporteur/co-rapporteur	Belgium
Date inclusion expires	Expired

Approved for use (✓) or known to be used (#) in the following European countries:

AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK

Also registered in: Australia

General status:

Pesticide type	Insecticide, Nematicide
Substance group	Carbamate
Substance origin	Synthetic
Mode of action	Systemic with contact and stomach action. Acetylcholine esterase inhibitor.
CAS RN	55285-14-8
EC number	259-565-9

CIPAC number	417
US EPA chemical code	090602
Chiral molecule	No
Chemical formula	$C_{20}H_{32}N_2O_3S$
SMILES	c12c(CC(O2)(C)C)cccc1OC(N(SN(CCCC)CCCC)C)=O
International Chemical Identifier key (InChIKey)	JLQUFIHWVLZVTJ-UHFFFAOYSA-N
International Chemical Identifier (InChI)	InChI=1S/C20H32N2O3S/c1-6-8-13-22(14-9-7-2)26-21(5)19(23)24-17-12-10-11-16-15-20(3,4)25-18(16)17/h10-12H,6-9,13-15H2,1-5H3
Structure diagram/image available?	Yes
Molecular mass (g mol^{-1})	380.5
PIN (Preferred Identification Name)	2,2-dimethyl-2,3-dihydro-1-benzofuran-7-yl [(dibutylamino)sulfanyl]methylcarbamate
IUPAC name	2,3-dihydro-2,2-dimethylbenzofuran-7-yl (dibutylaminothio)methylcarbamate
CAS name	2,3-dihydro-2,2-dimethyl-7-benzofuranyl [(dibutylamino)thio]methylcarbamate
Other status information	-
Herbicide Resistance Classification (HRAC)	Not applicable
Herbicide Resistance Classification (WSSA)	Not applicable
Insecticide Resistance Classification (IRAC)	1A
Fungicide Resistance Classification (FRAC)	Not applicable
Physical state	Orange-yellow viscous liquid
Related substances & organisms	• zeta-cypermethrin • imidacloprid • pyridaben

Formulations:

Property	Value
Example manufacturers & suppliers of products using this active	• Belchim • Fargro • Agrinoon Enterprise Limited
Example products using this active	• Posse 10G • Marshal 10G • Advantage
UK LERAP status	None
Formulation and application details	Usually supplied as dry granules applied directly to soil or seed bed.

ENVIRONMENTAL FATE
for carbosulfan

Property		Value	Source/Quality Score/Other Information	Interpretation
Solubility - In water at 20°C (mg l^{-1})		0.11	A5	Low
Solubility - In organic solvents at 20°C (mg l^{-1})		Miscible	A5 - Acetone	-
		250000	A5 - Methanol	-
		Miscible	A5 - Toluene	-
		250000	A5 - Ethyl acetate	-
Melting point (°C)		Not applicable	Q3	-
Boiling point (°C)		219.3	A5	-
Degradation point (°C)		219.5	A5	-
Flashpoint (°C)		136.7	A4 - (unstabilised)	-
Octanol-water partition coefficient at	P	2.63×10^{07}	Calculated	-
	Log P	7.42	A5	High

pH 7, 20°C				
Bulk density (g ml^{-1})/Specific gravity		1.04	A5	-
Dissociation constant (pKa) at 25°C		Not applicable	A5	-
		Note: No dissociation		
Vapour pressure at 25°C (mPa)		0.0359	A5	Non-volatile
Henry's law constant at 25°C (Pa m^3 mol^{-1})		0.124	A5	Moderately volatile
Henry's law constant at 20°C (dimensionless)		1.83 X 10^{-05}	Q2	Moderately volatile
GUS leaching potential index		0.99	Calculated	Low leachability
SCI-GROW groundwater index (µg l^{-1}) for a 1 kg ha^{-1} or 1 l ha^{-1} application rate	Value	1.90 X 10^{-02}	Calculated	-
	Note	-		
Potential for particle bound transport index		-	Calculated	Medium
Maximum UV-vis absorption L mol^{-1} cm^{-1}		In acetonitrile: 200nm = 43420, 277.5nm = 3144; [In acetonitrile:water (50:50): 292nm = 274	A5	-
Surface tension (mN m^{-1})		-	-	-

Degradation:

Property		Value	Source/Quality Score/Other Information	Interpretation
Soil	DT50	21	A5	Non-persistent

degradation (days) (aerobic)	(typical)			
	DT50 (lab at 20°C)	29.2	A5	Non-persistent
	DT50 (field)	21	A5	Non-persistent
	DT90 (lab at 20°C)	740	A3	-
	DT90 (field)	-	-	-
	Note	EU dossier Lab studies DT50 range 9.5-19.4 d, DT90 range 14.52-1465 days; field studies DT50 range 0.35-71.9 d		
Aqueous photolysis DT50 (days) at pH 7	Value	0.6	A5	Fast
	Note	-		
Aqueous hydrolysis DT50 (days) at 20°C and pH 7	Value	0.5	A5	Non-persistent
	Note	pH sensitive: DT50 0.2 hours at pH 5, 7.2 days at pH 9, 20 degC		
Water-sediment DT50 (days)		4.8	A5	Fast
Water phase only DT50 (days)		1.6	A5	Moderately fast

Soil adsorption and mobility:

Property		Value	Source/Quality Score/Other Information	Interpretation
Linear	K_d	-	-	-
	K_{oc}	-		
	Notes and range	-		
Freundlich	K_f	52.5	A5	Slightly mobile

	K_{foc}	2113		
	$^{1}/_{n}$	1.00		
	Notes and range	EU dossier Kf range 40.69-75.32, Kfoc range 1644-2652 mL/g, 1/n range 0.96-1.04, Soils=4		
pH sensitivity		No		

Key metabolites:

Metabolite	Formation medium	Estimated maximum occurrence fraction	91/414 relevancy
carbofuran (Ref: OMS 864)	Soil	0.880	Major fraction, Relevant
3-ketocarbofuran	Soil	0.066	Relevant
dibutylamine	Soil	0.215	Major, Relevant

Other known metabolites:

Metabolite name and reference	Aliases	Formation medium / Rate	Estimated maximum occurrence fraction	Metabolising enzymes
2,3-dihydro-2,2-dimethyl-3,7-benzofurandiol	3-hydroxy-7-phenol	Plant	-	-
2,3.dihydro-2,2-diemethyl-7-benzofuranol (Ref: NIA 10272) Note: Major, Relevant	carbofuran-7-phenol	Water/sediment; Plant	-	-

ECOTOXICOLOGY
for carbosulfan

Property		Value	Source/Quality Score/Other Information	Interpretation
Bio-concentration factor	BCF	990	A5 Whole fish	Threshold for concern
	CT_{50} (days)	0.09		-
Bioaccumulation potential		-	Calculated	Moderate
Mammals - Acute oral LD_{50} (mg kg^{-1})		101	A5 Rat	Moderate
Mammals - Short term dietary NOEL	(mg kg^{-1})	1.2	A5 Rat	High
	(ppm diet)	20		-
Birds - Acute LD_{50} (mg kg^{-1})		10	A5 *Anas platyrhynchos*	High
Birds - Short term dietary (LC_{50}/LD_{50})		3.99 mg kg bw^{-1} day^{-1}	A5 *Anas platyrhynchos*	-
Fish - Acute 96 hour LC_{50} (mg l^{-1})		0.015	A5 *Lepomis macrochirus*	High
Fish - Chronic 21 day NOEC (mg l^{-1})		0.003	A4 *Oncorhynchus mykiss*, 14 day	-
Aquatic invertebrates - Acute 48 hour EC_{50} (mg l^{-1})		0.0015	A5 *Daphnia magna*	High
Aquatic invertebrates - Chronic 21 day NOEC (mg l^{-1})		0.0032	A5 *Daphnia magna*	-
Aquatic crustaceans - Acute 96 hour LC_{50} (mg l^{-1})		-	-	-
Sediment dwelling organisms - Acute 96 hour LC_{50} (mg l^{-1})		-	-	-
Sediment dwelling organisms - Chronic 28 day NOEC, static, water (mg l^{-1})		-	-	-
Sediment dwelling organisms - Chronic 28 day NOEC, sediment (mg kg^{-1})		-	-	-
Aquatic plants - Acute 7 day EC_{50}, biomass (mg l^{-1})		-	-	-
Algae - Acute 72 hour EC_{50},		47	A5 *Raphidocelis*	Low

growth (mg l^{-1})			*subcapitata*	
Algae - Chronic 96 hour NOEC, growth (mg l^{-1})		-	-	-
Honeybees	Contact acute 48 hour LD_{50} (µg bee^{-1})	0.18	A5	High
	Oral acute 48 hour LD_{50} (µg bee^{-1})	1.04	A5	Moderate
	Unknown mode acute 48 hour LD_{50} (µg bee^{-1})	-	-	-
Earthworms - Acute 14 day LC_{50} (mg kg^{-1})		4.8	C3 *Lumbricus terrestris*	High
Earthworms - Chronic 14 day NOEC, reproduction (mg kg^{-1})		-	-	-
Other soil macro-organisms - e.g. Collembola	LR_{50} / EC_{50} / NOEC / % Effect	-	-	-
Other arthropod (1)	LR_{50} g ha^{-1}	-	-	-
	% Effect	100	Mortality Dose: 0.12 kg ha^{-1} A5 *Aphidius rhopalosiphi*, adult	Harmful
Other arthropod (2)	LR_{50} g ha^{-1}	-	-	-
	% Effect	96	Mortality Dose: 0.12 kg ha^{-1} A5 *Typhlodromus pyri*, protonymph	Harmful
Soil micro-organisms		-	-	-
Mesocosm study data	NOEAEC mg l^{-1}	-	-	-
	NOEAEC mg l^{-1}	-	-	-

HUMAN HEALTH AND PROTECTION
for carbosulfan

General:

Property		Value	Source/Quality Score/Other Information	Interpretation
Mammals - Acute oral LD_{50} (mg kg^{-1})		101	A5 Rat	Moderate
Mammals - Dermal LD50 (mg kg^{-1} body weight)		3700	A5 Rat	-
Mammals - Inhalation LC50 (mg l^{-1})		0.61	A5 Rat	-
Other Mammal toxicity endpoints		-		-
ADI - Acceptable Daily Intake (mg kg^{-1}bw day^{-1})		0.005	A5 Rat, SF=100	-
ARfD - Acute Reference Dose (mg kg^{-1}bw day^{-1})		0.005	A5 Rat, SF=100	-
AOEL - Acceptable Operator Exposure Level - Systemic (mg kg^{-1}bw day^{-1})		0.005	A5 Rat, SF=100	-
Dermal penetration studies (%)		0.2	A5 as formulation	-
Dangerous Substances Directive 76/464		-	-	-
Exposure Limits		-	-	-
Exposure Routes	Public	-		
	Occupational	-		
Examples of European MRLs (mg kg^{-1})	Value	Carrots: 0.1; Other vegetables, fruit and cereal grains: 0.05		
	Note	Current May 2007. For the EU pesticides database click here		
Drinking Water MAC (µg l^{-1})		-	-	-

Health issues:

Carcinogen	Mutagen	Endocrine disrupter	Reproduction / development effects	Cholinesterase inhibitor	Neurotoxicant	Respiratory tract irritant	Skin irritant	Eye irritant
X	-	X	?	✓	X	X	X	X
General human health issues	Skin sensitiser Impurites - N-nitrosodibutylamine - may be carcinogenic							

✓ : Yes, known to cause a problem
X : No, known not to cause a problem
? : Possibly, status not identified
- : No data

Handling issues:

Property	Value	Source/Quality Score/Other Information	Interpretation
General <="" font="">>	Not explosive or oxidising Tackle fires with foam, carbon dioxide or dry chemical methods IMDG Transport Code is usually 6.1		
CLP classification 2013	Health: H301, H317, H330 Environment: H400, H410		
EC Risk Classification <="" font="">>	T+ - Very toxic: R26 T - Toxic: R25 Xn - Harmful: R43 N - Dangerous for the environment: R50, R53		
EC Safety Classification <="" font="">>	S1/2, S28, S36/37, S38, S45, S60, S61, S63		
WHO Classification	II	-	Moderately hazardous
US EPA Classification (formulation)	No consensus across products or no products available	-	-
UN Number	2992		
Waste disposal & packaging <="" font="">>	Packaging Group III (minor danger)		

TRANSLATIONS
for carbosulfan

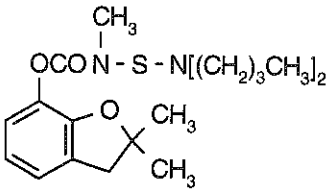
Language	Name
English	carbosulfan
French	carbosulfan
German	Carbosulfan
Danish	carbosulfan
Italian	carbosulfan
Spanish	carbosulfan
Greek	-
Slovenian	karbosulfan
Polish	karbosulfan
Swedish	karbosulfan
Hungarian	karboszulfan
Dutch	-

Record last updated: Monday 22 June 2015
Contact: aeru@herts.ac.uk

Plants Carbofuran is quickly metabolised into 3-hydroxycarbofuran and ketocarbofuran. **Soil/Environment** DT_{50} in soil *c.* 30–60 d. Most important metabolite is CO_2 formed by microbiological degradation of the phenol compounds. K_{oc} = 22.

110 carbosulfan *Insecticide*

carbamate



NOMENCLATURE
Common name carbosulfan (BSI, ANSI, draft E-ISO, (*m*) draft F-ISO)
IUPAC name 2,3-dihydro-2,2-dimethylbenzofuran-7-yl (dibutylaminothio)=methylcarbamate
Chemical Abstracts name 2,3-dihydro-2,2-dimethyl-7-benzofuranyl [(dibutylamino)thio]methylcarbamate
CAS RN *[55285–14–8]* **Development codes** FMC 35 001
Official codes OMS 3022

PHYSICAL CHEMISTRY
Mol. wt. 380.5 **M.f.** $C_{20}H_{32}N_2O_3S$ **Form** Orange to brown clear viscous liquid. **B.p.** 124–128 °C **V.p.** 0.041 mPa (25 °C) **S.g./density** 1.056 (20 °C) **Solubility** In water 0.3 ppm (25 °C). Miscible with most organic solvents, e.g. xylene, hexane, chloroform, dichloromethane, methanol, ethanol, acetone, etc. **Stability** Hydrolysed in aqueous media; DT_{50} (25 °C) in pure water <1 h (pH 4), 22 h (pH 6), 7.6 d (pH 7), 14.2 d (pH 8), >58.3 d (pH 9). **F.p.** 95 °C (closed cup)

COMMERCIALISATION
History Insecticide reported by E. C. Maitlen & N. A. Sladen (*Proc. Br. Crop Prot. Conf.*, 1979, **2**, 557). Introduced by FMC Corp. **Manufacturers** FMC; Kuo Ching

APPLICATIONS
Biochemistry Cholinesterase inhibitor; activity is due to *in vivo* cleavage of the N-S bond, resulting in conversion to carbofuran. **Mode of action** Systemic

insecticide with contact and stomach action. **Uses** Control of a wide range of soil-dwelling and foliar insect pests. Examples of uses include control of millipedes, springtails, symphylids, wireworms, pygmy mangold beetles, frit flies, white grubs, aphids, caterpillars, flea beetles, Colorado beetles, stem borers, leafhoppers, planthoppers, codling moth, scales and free-living nematodes. The product is used in a wide range of crops, e.g. cotton, sugar beet, potato, rice, top fruit, citrus, maize, vegetables, sugar cane and coffee. **Formulation types** GR; EC; WP; DP; UL; CS. **Mixtures** *(carbosulfan +)* endosulfan; zeta-cypermethrin. **Compatibility** Compatible with liquid fertilisers. **Selected tradenames** 'Marshal' (FMC)

ANALYSIS

Product analysis by rp hplc (*CIPAC Handbook*, 1992, **E**, 35). **Residues** determined by glc (B. Leppert *et al.*, *J. Agric. Food Chem.*, 1983, **31**, 220; 1984, **32**, 1441) or by hplc. Details available from FMC Agricultural Chemicals Group.

MAMMALIAN TOXICOLOGY

Reviews *Pesticide residues in food – 1986*. FAO Plant Production and Protection Paper 77, 1986. *Pesticide residues in food – 1986 evaluations*. FAO Plant Production and Protection Paper 78/2, 1987. **EHC** 64 (WHO, 1986; a review of carbamate insecticides in general). **Oral** Acute oral LD_{50} for male rats 250, female rats 185 mg/kg. **Skin and eye** Acute percutaneous LD_{50} for rats >2000 mg/kg. Slight eye irritant; moderate skin irritant. **Inhalation** LC_{50} (1 h) for male rats 1.53, female rats 0.61 mg/l air. **NOEL** (2 y) (oncogenic) for rats and mice 20 mg/kg diet. **ADI** (JMPR) 0.01 mg/kg b.w. [1986]. **Toxicity class** WHO (a.i.) II; EPA (formulation) I (4 EC), II (2.5 EC)

ECOTOXICOLOGY

Birds Acute oral LD_{50} for mallard ducks 8.1, quail 82, pheasants 20 mg/kg. **Fish** LC_{50} (96 h) for bluegill sunfish 0.015, trout 0.045 mg/l. **Bees** Toxic to bees. **Daphnia** LC_{50} (48 h) 1.5 µg/l. **Algae** (96 h) 20 mg/l.

ENVIRONMENTAL FATE

Animals In rats, following oral administration, rapidly metabolised by hydrolysis, oxidation and conjugation, forming carbofuran methylol, carbofuran phenol, and their 3-hydroxy and 3-keto derivatives; the metabolites are rapidly excreted. **Plants** Metabolites include carbofuran (*q.v.*) and 3-hydroxycarbofuran. **Soil/Environment** In soil, rapidly degraded under both aerobic and anaerobic conditions, DT_{50} c. 2–5 d; DT_{90} <3–38 d; the principal metabolite is carbofuran (*q.v.*). Under field conditions, carbosulfan and carbofuran are unlikely to leach to groundwater.

[(dibutylamino)thio]méthylcarbamate de 2,3-dihydro-2,2-diméthyl-7-benzofuryle

Créé le 02/03/10

Mise à jour le 11/07/13

Informations générales

N° CAS	55285-14-8
EINECS	
SANDRE	1864
Formule chimique	
PBT	
Perturbateur endocrinien	
Classification environnementale	-
Classification (suite)	
Réglementations ou programmes	- Arrêté du 07 décembre 2007 (substances soumises à redevance pour pollutions diffuses) - Arrêté du 12 novembre 2009 (substances soumises à redevance pour pollutions diffuses)

Propriétés physico-chimiques

Propriété	Valeur	Méthode	Validated	Commentaire	Référence
Bioaccumulation BCF	2205	calcul	non		S-EPA/SRC EPIsuite tool, v4.0 US EPA (2011)
Coefficient de partage carbone organique-eau (Koc) (L/kg)	9489	expérimentation	non		The FOOTPRINT Pesticide Properties DataBase. Database collated by the University of Hertfordshire as part of the EU-funded FOOTPRINT project (FP6-SSP-022704) FOOTPRINT
Log du coefficient de partage octanol-eau (log Kow)	7.42	expérimentation	non		The FOOTPRINT Pesticide Properties DataBase. Database collated by the University of Hertfordshire as part of the EU-funded FOOTPRINT project (FP6-SSP-022704) FOOTPRINT

Toxicologie

Seuil de toxicité en situation accidentelle

Propriété	1 mn	10 mn	20 mn	30 mn	60 mn	120 mn	240 mn	480 mn

Valeurs sanitaires

Fiche des seuils de toxicité aiguë

Fiche de données toxicologiques et environnementales des substances chimiques

VTR à seuil

Voie et durée d'exposition	Valeur	Unité	Commentaire	Référence

VTR sans seuil

Voie et durée d'exposition	Valeur	Unité	Commentaire	Référence

Base de données toxicologiques

IRIS

Ecotoxicologie

Technico-économie

Accidentel

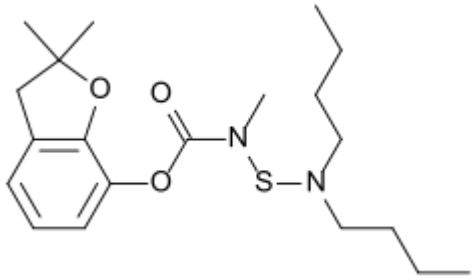
Autres informations

eChemPortal

Carbosulfan

Un article de Wikipédia, l'encyclopédie libre.
Aller à : navigation, rechercher

Carbosulfan



Identification	
N° CAS	55285-14-8
N° EINECS	259-565-9
SMILES	[Afficher]
InChI	[Afficher]

Propriétés chimiques	
Formule brute	$C_{20}H_{32}N_2O_3S$ [Isomères]
Masse molaire[1]	380,545 ± 0,025 g/mol C 63,12 %, H 8,48 %, N 7,36 %, O 12,61 %, S 8,43 %,

Précautions

Directive 67/548/EEC

T

N

[+]

Phrases R : 23/25, 43, 50/53,

Phrases S : (1/2), 24, 37, 38, 45, 60, 61,

SGH[2]

Le **carbosulfan** est une substance active de produit phytosanitaire (ou produit phytopharmaceutique, ou pesticide), qui présente un effet insecticide, et qui appartient à la famille chimique des carbamates. Du fait de sa toxicité, le carbosulfan est interdit en France depuis le 13 décembre 2008[3].

Danger
H301, H317, H331, H410,
[+]

Unités du SI et CNTP, sauf indication contraire.

Sommaire

[masquer]

- 1 Réglementation
- 2 Caractéristiques physico-chimiques
- 3 Écotoxicologie
- 4 Toxicité pour l'homme
- 5 Voir aussi
- 6 Références

Réglementation[modifier | modifier le code]

Sur le plan de la réglementation des produits phytopharmaceutiques :

- pour l'Union européenne : cette substance active est interdite par la décision 2007/415/CE à la suite de l'examen relatif à l'inscription à l'annexe I de la directive 91/414/CEE. Les autorisations en vigueur concernant les produits phytopharmaceutiques contenant du carbosulfan devront être retirées avant le 13 décembre 2007. À compter du 16 juin 2007, aucune autorisation ne peut être accordée ou reconduite pour les produits phytopharmaceutiques contenant cette substance. (décision du 13/06/2007, 2007/415/CE : JOUE L 156, 16 juin 2007).
- pour la France : cette substance active n'est pas autorisée dans la composition de préparations bénéficiant d'une autorisation de mise sur le marché. Les dates limites d'écoulement des stocks sont fixées par l'avis au Journal Officiel du 4 septembre 2007 au 30 mai 2008 à la distribution, et au 13 décembre 2008 à l'utilisation.

Cependant, ce produit serait toujours vendu en France par Belchim[4].

Caractéristiques physico-chimiques[modifier | modifier le code]

Les caractéristiques physico-chimiques dont l'ordre de grandeur est indiqué ci-après, influencent les risques de transfert de cette substance active vers les eaux, et le risque de pollution des eaux :

- Hydrolyse à pH 7 : instable,
- Solubilité : 0,3 $mg \cdot l^{-1}$,
- Durée de demi-vie : 4 jours. Ce paramètre, noté DT50, représente le potentiel de dégradation de cette substance active, et sa vitesse de dégradation dans le sol.

- Coefficient de partage octanol-eau : 2,19. Ce paramètre, noté log Kow ou log P, mesure l'hydrophilie (valeurs faibles) ou la lipophilie (valeurs fortes) de la substance active.

- Formule chimique (IUPAC): 2,3-dihydro-2,2-dimethylbenzofuran-7-yl (dibutylaminothio)methylcarbamate

Écotoxicologie[modifier | modifier le code]

Sur le plan de l'écotoxicologie, les concentrations létales 50 (CL50) dont l'ordre de grandeur est indiqué ci-après, sont observées :

- CL50 sur poissons : 0,0015 $mg \cdot l^{-1}$,
- CL50 sur daphnies : 0,0015 $mg \cdot l^{-1}$,

Toxicité pour l'homme[modifier | modifier le code]

Sur le plan de la toxicité pour l'Homme, la dose journalière acceptable (DJA) est de l'ordre de : 0,01 $mg \cdot kg^{-1} \cdot j^{-1}$.

Voir aussi[modifier | modifier le code]

- Substance active d'un produit phytopharmaceutique
- Liste de substances actives de produits phytosanitaires
- Liste de substances actives de produits phytopharmaceutiques autorisées par l'Union Européenne
- Liste de substances actives de produits phytopharmaceutiques interdites par l'Union Européenne

Références[modifier | modifier le code]

1. ↑ Masse molaire calculée d'après « Atomic weights of the elements 2007 » [archive], sur *www.chem.qmul.ac.uk*.
2. ↑ Numéro index 006-084-00-5 dans le tableau 3.1 de l'annexe VI du règlement CE N° 1272/2008 [archive] (16 décembre 2008)
3. ↑ « Avis aux fabricants, distributeurs et utilisateurs de produits phytopharmaceutiques contenant les substances carbosulfan, carbofuran, diuron, cadusafos, haloxyfop-R » [archive], MINISTÈRE DE L'AGRICULTURE ET DE LA PÊCHE
4. ↑ http://www.hellopro.fr/insecticide-pour-pomme-de-terre-alize-2001054-250872-produit.html [archive]

Catégories :

- Produit chimique toxique
- Produit chimique dangereux pour l'environnement
- Substance active de produit phytosanitaire
- Insecticide

| [+]