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INTERIM CHEMICAL REVIEW COMMITTEE
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Geneva, 17 – 21 February 2002
Item 6 (b) on the provisional agenda •

INCLUSION OF CHEMICALS IN THE INTERIM PRIOR INFORMED CONSENT PROCEDURE - REVIEW OF PROPOSALS FOR SEVERELY HAZARDOUS PESTICIDE FORMULATIONS

GRANOX TBC and SPINOX T

Note by the Secretariat

1. Further to the information provided by the Secretariat in document UNEP/FAO/PIC/ICRC.3/17.Add.1 and UNEP/FAO/PIC/ICRC.3/17.Add.2 , the Secretariat would like to provide for your kind information those comments and information that have been received between 14 January and January 28, 2002, or have previously not been available in English.

• UNEP/FAO/PIC/ICRC3/1

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ANNEX I – Countries where the designated national authority responded to the request for information on the formulations Granox T.B.C. and Spinox T

As of 28 January 2002, the designated national authorities in the following countries had replied to the request for information of 25 October 2001.

Country/Organisation	Date received
Bhutan	18 December 2001
Burkina Faso	21 January 2002
Canada	9 January 2002
Chile	10 January 2002
People's Republic of China	19 December 2001
Colombia	26 November and 11 December 2001
Costa Rica	3 December 2001 and 18 January 2002
Czech Republic	17 December 2001
Estonia	26 November 2001
Finland	6 December 2001
Israel	27 December 2001
RDA Republic of Korea	17 December 2001
Latvia	25 November 2001
Lesotho	18 December 2001
Malaysia	9 January 2002
Mexico	20 December 2001
New Zealand	11 December 2001
Papua New Guinea	14 January 2002
Peru	16 January 2002
Tanzania	10 January 2002
Thailand	23 January 2002
Trinidad	16 january 2002
Turkey	17 December 2001
Vietnam	9 January 2002
Zimbabwe	8 December 2001
Europan Union	18 December 2001

A copy of the correspondence and attachments submitted to the Secretariat has been sent to the chair of the inter-sessional task group on these two formulations. A complete set of this correspondence will be available at the third session of the Committee in February 2002.

ANNEX II - Senegal report

REPORT OF THE RESEARCH ON THE EPIDEMIC OF AN UNKNOWN ETIOLOGIC ILLNESS IN KOLDA

DECEMBER 2000

Dr. Eugenia Gomes do Espirito Santo, SNGE[1], Dr Laurence Marrama, IPD[2], Dr Kader Ndiaye, IPD [2], Dr Malan Coly, WHO [3], Dr Dior Diagne, ISED[4], Dr Pape Ndour, ISED Dr Ousseynou Ba[5]

[1] SNGE- National Service for Major Endemic Diseases
[2] IPD- Pasteur Institute in Dakar

[3] WHO- World Health Organisation
[4] ISED- Department of Health and Development
[5] Medical region of Kolda, Regional Service for Major Endemic Diseases

Abbreviations

DPV	Plant Protection Office
DS	Health Office
IC	Male nurse Head of Post
IPD	Pasteur Institute in Dakar
ISED	Institute of Health and Developement
MS	Ministry of Health
WHO	World Health Organisation
RM	Medical Region
SENECHIM	Senegal Chimie
SNGE	National Service for Major Endemic Diseases
SODEFITEX	Senegal Development Company of Fibres and Textiles
SONACOS	National Company of Oleaginous Plants
SINAGRAINE	National Company for Seeds
SPIA	Company of Industrial and Agricultural Products
UCAD	Univerity Cheikh Anta Diop

Summary

In August 2000, several cases of a illness mainly characterised by a stress dyspnea and oedemas on lower limbs and on the face, have been reported in the area of Tankon village, in the Sédhiou health district , Kolda Region. Joint research was carried out by SNGE/Pasteur Institute from 5th to 10th September to confirm the existence of the epidemic, to document the evidence of disease cases and fatalities, to makes tests and obtain any information which might direct the research on aetiology. The survey was carried out in two villages, where the number of cases and fatalities was prevalent, Tankon and Sam Toulou.

It was observed that close contacts with the sick cases (wives, children) in the concessions brought no new cases among children and very few among women. Furthermore, fever was present in less than 50% of cases and all biological and virological analysis were normal. The possibility of an infectious disease was then excluded. A toxic aethiology seemed then the most probable hypothesis. Cash crop (cotton and peanuts)and food crop (maize and millet) are both practised in that area of the Kolda region. Several kinds of pesticide and insecticide seem to be used by farmers in that area. Most of those products circulate illegally and are sold outside official channels.

The epidemiological research was carried out from 3rd to 17th November 2000 to specify the aetiology of the observed disease. 118 cases meeting the criteria of the illness have been reported in 12 of the 16 visited villages The area where the illness occurs covers a radius of 40 km within the Kolda and Sédhiou districts, the village of Saré Sama, Kolda district, being the epicentre. Not all places in that area have been involved.

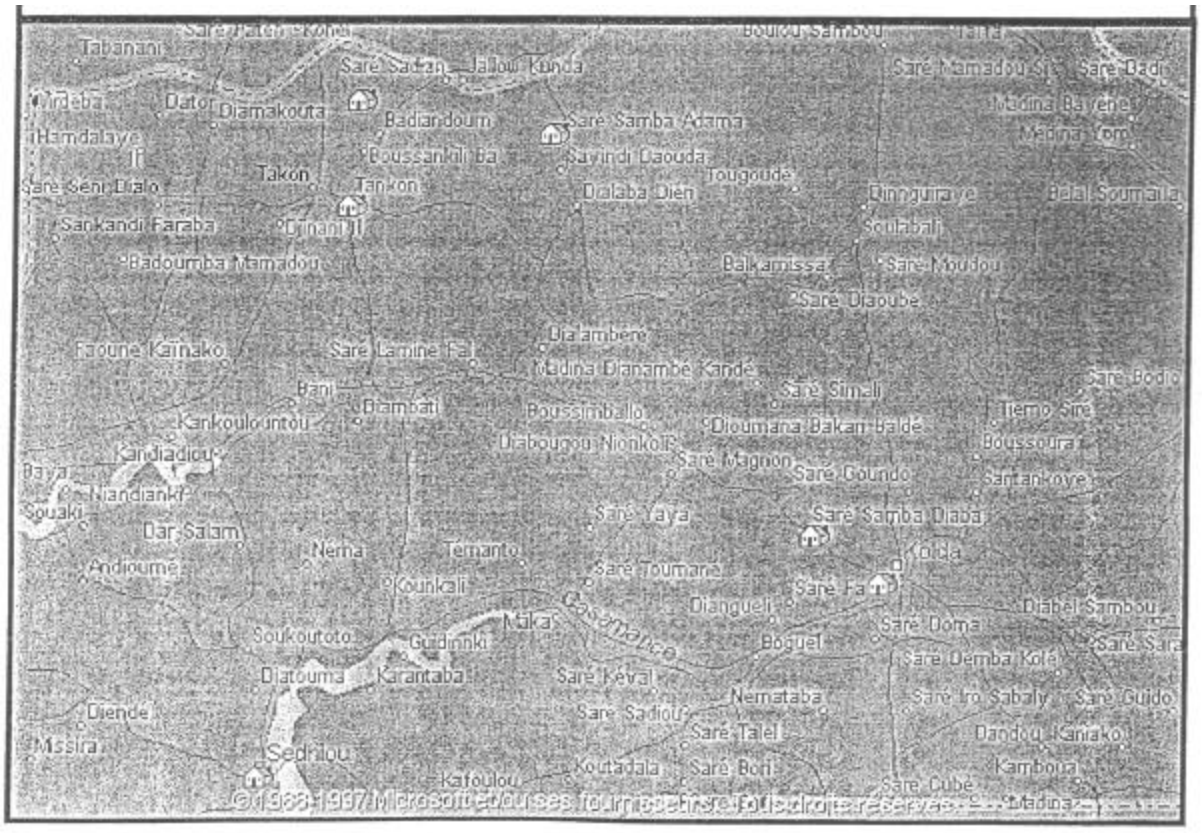
The distribution of disease cases shows that they were concentrated in the peanut farming areas during the period of agricultural labour, with a maximal peak in August, when all farmers received the seeds and started or finished sowing. All males and a significant number of women have been involved in this activity. Although for a certain number of women the contact has not been ascertained, the concentration of the illness among the most active age ranges during the sowing period, may suggest that contamination is connected to peanut farming. All cases concerned farmers who had taken part in peanut sowing. As far as the use of pesticides is concerned, the Senegalese Government decided, within its new land policy, to widen the list of farmers benefiting from the distribution of peanut seeds and pesticides. In the 1999/2000 campaign, not only the heads of concessions were beneficiaries of the distribution, but the heads of households as well. That means that the quantity of pesticide available and in circulation in each concession has doubled and sometimes even tripled.
An analysis of four samples of the two products used by farmers in the peanut sowing stage (Granox and Spinox) did not show any irregularity in the percentage of active substances in the products.

To sum up, signs and symptoms suggest a carbamate poisoning, and very likely from the carbofuran contained in the products delivered together with peanut seeds. The widening of the list of beneficiaries provoked an over consumption of these products and consequently, an over exposure of individuals handling the seeds: young boys and a small proportion of women working in peanut fields. Furthermore, many new farmers not used to handling these products, may have over-estimated the quantity of product necessary to fill the seeder. It is regrettable that the distribution of pesticide products, which surely holds poison hazards, is not accompanied by good information on risks related to these products, and on care needed in their use, mainly washing hands , wearing masks and gloves, and staying out of the direction of the wind.

BACKGROUND

On 29th August 2000, a sick person was evacuated from the village of Tankon, in the health district of Sédhiou, Kolda region, with a medical history characterised mainly by a stress dyspnea and oedemas on lower limbs and face. The chief doctor of the District was then informed by letter by the male nurse, head of the health post (ICP) of Tankon, that five persons had already died with the described symptoms. A health district team went to the village of Tankon on the same day and gathered the following information: six fatalities with the described symptoms, three of them being in the same family, had occurred in the village of Tankon since July. Three more fatalities had occurred in the Tièvel Birane, Digante and Samba Thioune villages, within a limit of 12 km around Tankon. Fatalities had also been reported in the Saré Daouda, Saré Sama and Saeé Doro Thiam villages, in the border area with the Kolda district (chart 1).

Chart 1: Area of the Kolda and Sedhiou districts where cases of the disease have been reported.



Medical examination on four sick persons evacuated to the health centre of Sédhiou between 30th August and 2nd September and on 14 subjects identified by ICP in the Tankon village on 31st August, enabled a definition of the medical chart. All sick cases demonstrated stress dyspnea and oedemas on lower limbs. It concerned mainly male adults. Symptoms started one or two months before the test took place. The blood test on one of the sick cases showed the presence of mycrocitic anemia, normal azotemia and absence of hepatic cytolysis.

A joint SNGE/Pasteur Institute investigation was carried out from 5th to 10th September to confirm the existence of the epidemic, to document sick cases and fatalities, to take samples and obtain any information which may direct the etiological research. The two villages where cases of illness and fatalities notified were the most numerous (Tankon and Sam Toulou) were selected for this preliminary investigation.
Investigation enumerated 45 suspicious cases, among which were 18 fatalities, manifesting the following medical signs : oedemas, dyspnea and thoracic pains. The following observations were added to the medical chart as follows:

The disease lasts from 5 to 60 days, on an average of 16 days;

- Fever was reported in approximately 50% of cases and 50% of the persons who died didn't present fever;
- Shivering or sweating is rare;
- No haemorrhage was reported;
- Abdominal pains were rare and essentially preceded death;
- There were rare neurological manifestations, not serious paraesthesia (2/45)
- Four subjects presented jaundice and in three cases it preceded death;

Sierological research (IgM) of arbovirus (Yellow fever, Dengue 2, West Nile, Fever of the Rift Valley, Chikunguya and Crimea Congo) on 57 test cases turned out negative. Research of bacteriological agents by culture turned out negative after 10 days.
We have not yet received the results of the toxicological analysis made by the UCAD Control Laboratory. The biological analysis made on four persons in the Tankon village, showing oedemas on lower limbs, dyspnea and thoracic pains for 19 to 45 days, were close to standards, except for one neutropenia noted in four subjects.

Biological, virological and toxicological analysis added to the above medical history, did not allow a determination of the causes and agents of the epidemic, nonetheless epidemiological data indicated suspicions of a disease of toxic, medicinal aetiology, or caused by the use of chemical products such as pesticides or insecticides with pulmonary or cardiovascular damages. The medical history did not suggest an infective aetiology: fever was almost absent, general conditions were maintained in cases with favourable evolution. Biological analysis on tested subjects remained at standard levels. Furthermore, there was no evidence of inter-human transmission. The family in close contact with the sick did not seem more affected then other subjects.

A pathology of toxic aetiology seemed the most probable hypothesis. That area in the Kolda region is a rural zone where cash crop (cotton and peanuts) and food crop (maize and millet) are both practised. Various types of pesticides and insecticides seem to be commonly used by farmers. Most of those products circulate illegally and outside official channels.

To complete this first short study, an epidemiological research has been carried out from 3rd to 17th November 2000 to find the aetiology of the disease under study. This report contains the preliminary results of that survey.

2 SURVEY OBJECTIVES

To describe the epidemic and follow the aethiological research of the disease by:

- The definition of the geographic area of the epidemic;
- The complete inventory of cases and fatalities in the villages where epidemc is present;
- The complete inventory of cases and fatalities in the files of the health service in the area of the epidemic
- The setting up of a case-control study with complete description of the medical history according to a definition of cases, the study of previous pathology, food habits, use of medicines and of the handling of insecticides and pesticides;
- A study among the population with an interview of the person in charge of the husbandry and agriculture services, and to any person involved in the sale and trade of pesticide products;
- The collection of urine samples for new biological researches;

3 METHOD

Field investigation took place from 4th to 18th November 2000. It involved a case-control study using a questionnaire and a study of the population with directed interviews to several persons involved in agriculture and in the production of pesticides. All attempts to identify the consultants in the files of health centres failed. In general, files are badly kept and the sick cases are in most cases not registered because they either deceased soon after their arrival at the health centre, or arrived there at night; sometimes, they are received there informally, knowing somebody working in the centre. Furthermore, a consistent number of persons turn to Gambia health facilities, the area being close to that country.

3.1 CASE-CONTROL STUDY

3.1.1 DEFINITION OF CASES AND CONTROLS

A case is any subject living in the epidemic area as notified by the Chief Doctors of the district from January 2000 and presenting dyspnea or oedemas on limbs and/or face since January 2000. Controls have been chosen among subjects not presenting those symptoms and matched with cases by sex and age. Two controls have been chosen for one case: the first one among the inhabitants of the concession to which the case belongs, and the second one in the nearest concession with no cases of the disease. The nearest concession is that which is as close as possible to the case domicile. When a control could not be found in the same concession as the sick person, the two controls have been looked for in the nearest concessions and, when necessary, in the nearest village.

3.1.2 COLLECTION OF DATA

The collection of data for the case-control study took place from the 3rd to 17th November. It consisted of systematic research in a certain number of villages where cases of the disease had already been reported by the health district. Other cases had spontaneously been reported by local people. Some villages could not be visited because of the scheduled time for the investigation. However, since the objective of the research is to describe better the disease and identify the causes of the epidemic, the non-exhaustive research of cases does not seem to be a problem.

The questionnaire (annex 1) includes questions on the identity of the case, social-demographic information, questions enabling the description of the clinical disease, questions on lab tests made during the illness and questions on the use of chemical products and medicines by the sick and the members of the house during the period under study.

For each case, two controls of the same sex and same age have been chosen: the first one in the same concession and the second one in the nearest concession. When a control could not be found in the same concession as the sick person, the two controls have been taken from the nearest concessions and, if necessary, from the nearest place. As in certain places the number of cases in the most involved age range was very high , only one control was chosen for each case. A sample of urine was taken for each case to check the presence of proteins, glucose, and blood. The reading was done on site with test paper.

3.2 DEFINITION OF SURVEY AREA

The survey took place at first in the villages identified by the team of the two health districts of Kolda and Sedhiou, where cases of the disease had been reported. Other villages were added to the initial list during the survey, according to the statements of local people and local health officers. The villages where cases were reported and their population are listed in annex 4. These data have been taken from the 1988 census, to which an annual increase rate of 3% has been added.

3.3 STUDY OF THE USE OF PESTICIDES

To support the hypothesis of intoxication due to the use of pesticides, besides the data resulting from the case-control study, open talks were held with the persons in charge of the Company for Development of Textiles Fibres (SODEDITEX, Societe de Developpement des Fibres Textiles), the National Company for Oleaginous Trade of Senegal (SONACOS, Societe Nationale du Commerce d'Oleagineux du Senegal), the Plant Protection Office (DPV, Direction de la Protection des Végétaux), and the SENCHIM (Senegal Chimie), which produces one of the most frequently used pesticides products in the region.

3.4 DATA ENTRY AND ANALYSIS

The case-control survey data were collected with an application based on SPSS data Entry software.
Data management and analysis were made with SPSS Statistic Analysis version 10.0

Descriptive analysis of the social-demographic characteristics and of signs and symptoms of cases have been made with the frequency chart. Association between the illness and exposure to insecticides has been estimated with the odds ratio (OR) and its confidence intervals at 95%. Chi-2 tests have been used to assess the effects on the illness produced by the exposure to insecticides, in presence or absence of surveyed social and demographic factors, such as age, occupation, contacts and pathologic antecedents. All "P values" presented have been considered relevant if values were <0.05.

4 SURVEY MANAGEMENT

The survey was carried out by the National Service for Major Endemic Diseases (SNGE, Service national des Grandes Endemies) with the technical and financial contribution of the Pasteur Institute in Dakar (IPD), of the World Health Organisation (WHO) and of the French Co-operation and jointly with the regional services of Kolda (the Medical Region, the Service for Major Endemic, and the Health Districts of Sedhiou and Kolda). Epidemiological survey on the field was carried out by:

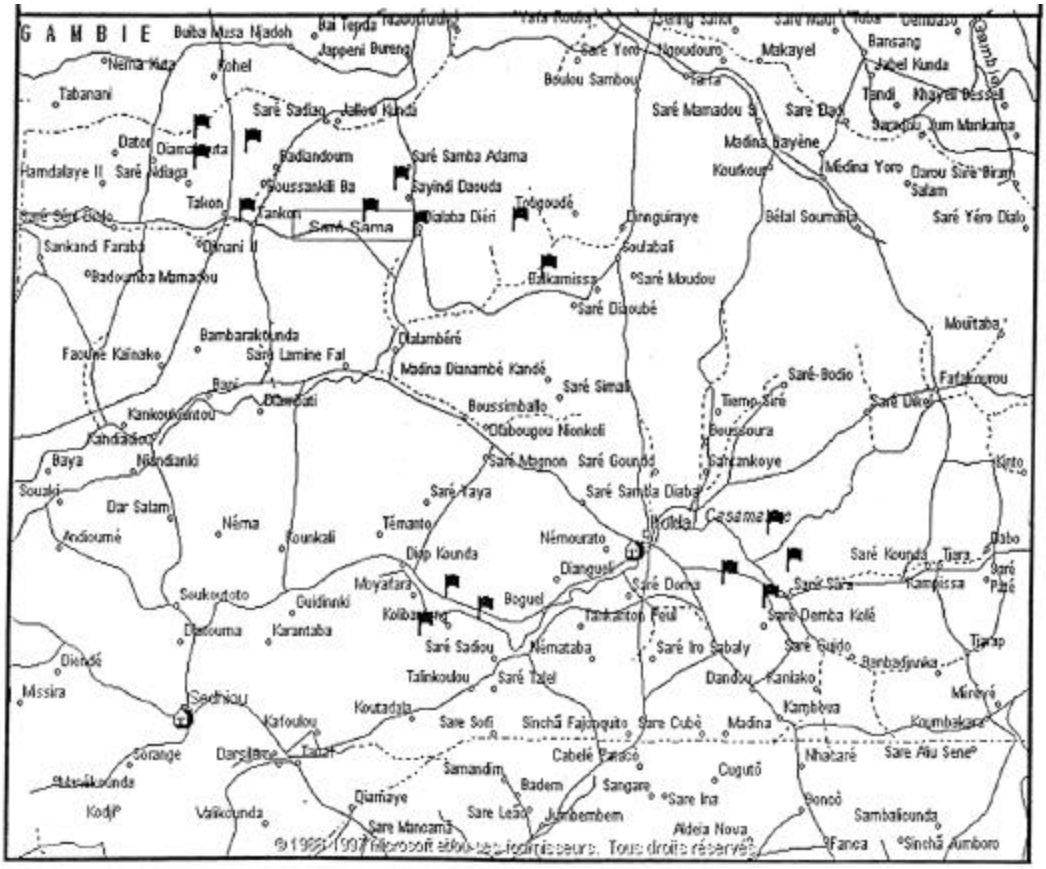
National Service for Major Endemic Diseases:	Dr Laurence Marrama
Pasteur Institute in Dakar :	Dr Kader Ndiaye
World Health Organisation (WHO):	Dr Malan Coly
Kolda Service for Major Endemic Diseases:	Dr Osseynou Ba
ISED:	M Pape Ndour
ISED:	Dr Dior Diagne

5 OBSERVATIONS AND ANALYSIS

5.1 EPIDEMIC DISEASE AREA

The illness covers an area of approximately 40 Km among the Kolda and Sedhiou districts, its epicentre being at the Sare Sama village, Kolda District (Chart 2). Not all sites of the area could be reached and cases have been classified in four distinct areas, according to the health post control zone they belong to: Sare Bidji, Ndora, Diana Malari and Tankon. It is a very isolated area, connected to the district chief town by tracks in very bad condition, impracticable by car during the rainy season. They are villages north of Kolda and of Sedhiou, at the border with Gambia, for which reason people living in that area often go to Gambia health services with their problems.

Chart 2: Area of the epidemic



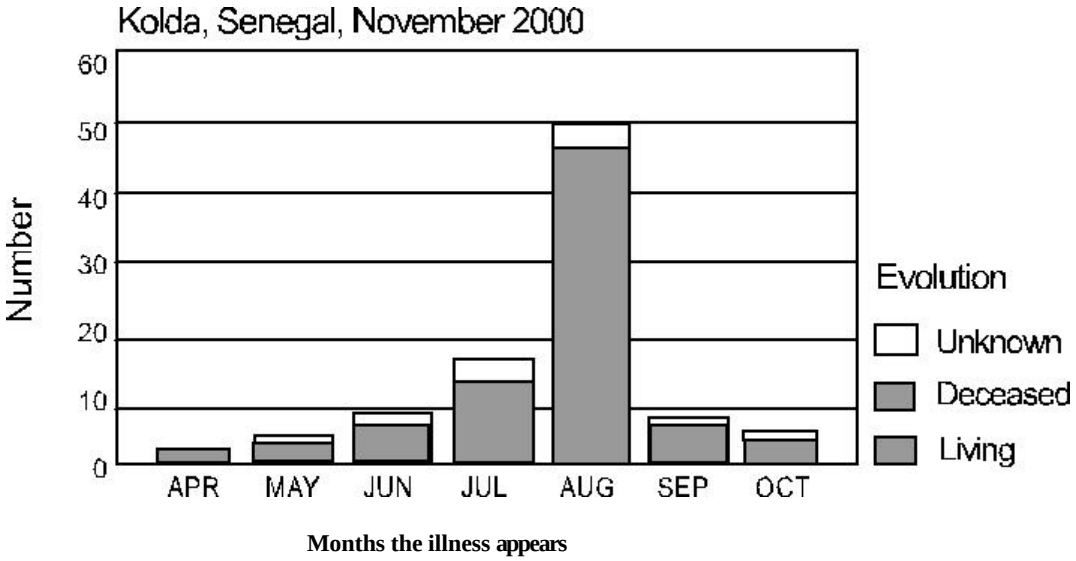
5.2 DISEASE DESCRIPTION

During the survey, 118 cases meeting the criteria of the case have been identified in 12 out of 16 villages called on. Distribution of cases by village is shown in chart 2.

Chart 1: Division of pathologic cases of unknown aetiology according to the village of origin

Villages	Number of cases	%
Sare' Dauda	11	9.4
Sare' Doro Thiam	3	2.6
Same Gagna	6	5.1
Sare' Kanta	10	8.5
Sare' Mama Coly	5	4.3
Sare' sara	8	6.8
Sare' Sama	25	21.4
Sare' Thierno	16	13.7
Sam Toulou	11	9.4
Tankon	16	13.7
Bambadalla	5	4.3
Tievel Birane	1	0.9
Total	117	100.0

Graph 1: Number of cases and fatalities during the months the illness appears



Cases appeared between April and October 2000. During the survey, 118 cases were reported in the villages visited, with 22 fatalities. Ninety four cases (79.5%) concerned males and 24 (20.5%) females. The average age of men was 35.5 (32.6-38.4) and the average age of women was 3.2.3 (27.4-37.2). Average age for men and women was 32. Minimum age was 12 for men and 10 for women. Maximum age was 66 and 60 respectively for men and women. 74.1% were farmers, 18.1% housewives, 1.7% traders and 4.3% worked in different fields: craftsmen and marabous, among others.

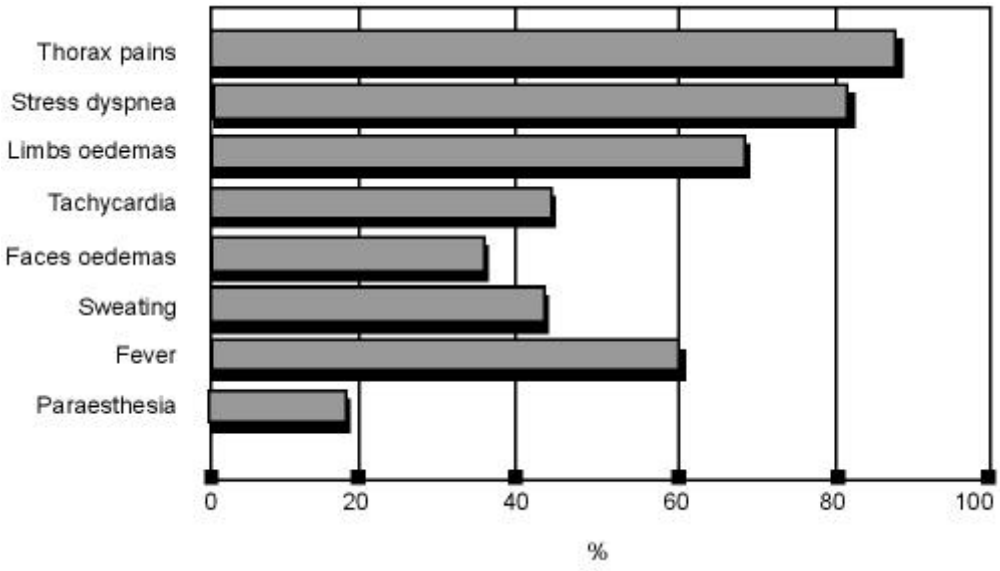
Chart 2: proportion of cases according to sex and age

Age range	Male		Female		Total	
	N	%	N	%	N	%
1-19	17	18.3	3	12.5	20	17.1
20-40	45	48.4	17	70.8	62	53.0
41-60	28	30.1	4	16.7	32	27.4
>60	3	3.2			3	2.6
Total	93	100.0	24	100.0	117	100.0

Clinical manifestations (see picture 2) are, by frequency order, thoracic pain (87.3%), stress dyspnea (80.3%), limbs oedemas (69.5%), fever (60.2%) and tachycardia (42.4%). Approximately 42% of the sick cases showed sweating and 35.6% face oedemas. Average time before death was 15 days. Death rate was 21.6%. Most fatalities occurred in the villages before any medical intervention. When the survey took place, 13 (12.7%) were convalescent and the remaining 67 (65.7%) had recovered.

Approximately 10% of cases went to public health centres (Kolda Health Centre and Health Post in the involved area). Nonetheless, none of the sick cases could be found in the health facilities files. For this reason, no information on treatment or medical charts could be gathered in these structures. Likewise,Tankon PS and Ndora PS areas being close to Gambia, an important share of the sick cases from these regions were treated in Gambia health centres.

Graph 2: Clinical manifestations in 118 cases of the illness with unknown aetiology, Kolda Region



Some cases in the Tankon and Ndora area, were treated by an attendant with his own private consulting room in the Goutou village, a few kilometres from Gambia. According to local people, the patients in Goutou had recovered. Talks with the attendant identified and confirmed the medical history of the disease. In addition to signs and symptoms we have already mentioned, some patients had cough and bronchoconstriction. Treatment consisted in atropine sulphate, corticoids, anti-inflammatory and traditional treatments based on plants with emetic proprieties. These treatments seem to bring good results, according to the declarations of the attendant and the treated persons.

Urine analysis were within standards limits. Clinical examination of cases during the survey did not show any significant alteration in the examined constants (fever, blood pressure mucous membrane, breathing frequency and pulse.)

5.3 CASE-CONTROL STUDY

Data analysis of cases and controls matched by sex and age range is shown in chart 3. Cases and controls did not present major differences in the factors studied: occupation: farmer, movements in the last 6 months, presence of pesticides in the concession and handling of the product by the patient. Indeed, the presence of pesticides was reported in cases and controls in the same proportion, and both cases and controls declared to have handled the products under consideration (Granox and Spinox) just before the illness showed. Unfortunately, reliable answers being very difficult to obtain from local people, details on their use and on the quantities of product used by individuals could not be studied and quantified.

On the other hand, a major difference between cases and controls was observed in presence of previous pathology and in the number of patients in the concession. Indeed, subjects with no previous pathology in the last 6 months, had 7,3 more chances to become a case. Likewise, the risk to contract the illness was 3 times higher for those who had not taken any medicine in the same period. This can be explained by the fact that illness mainly struck young people and seems to be strictly connected to field labour. Now, it is necessary to be healthy to work in the fields. It may then be assumed that those who were ill in the period before the epidemic occurred, were less exposed to agricultural activities and therefore there were fewer chances to contract the disease. In approximately 73% cases, there was more than one case of illness in the concession, while the proportion didn't exceed 30% in cases (Chart 4). Furthermore, while hazard to contract the disease was not significantly connected to the frequency of contacts with cases outside the concession (chi-2=0.11; P=0.75), it was 5,6 times higher (95%IC=3.1-10.4) when there was more than one case of illness in the concession.

Chart 3: Odds ratio, 95% reliable interval (IC, intervalle de confiance) and test of Odds Ratio for the risk of illness

Factors studied	Odds Ratio		Odds Ratio test	
	Estimate	95% IC	Mantel-haenszel	P
Occupation:				
Farmer	1.62	0.74-3.57	1.03	0.31
Previous pathology				
No illness in the last 6 months	7.34	3.42-15.76	34.46	<0.00001
No medicine taken in the last 6 months	3.09	1.69-5.65	13.20	<0.00001
No travel in the last 6 months	1.67	0.54-1.47	2.96	0.085
Presence of one or more cases in the concession	5.64	3.06-10.42	64.4	<0.00001
Contact with cases outside the concession				
Frequent	1.12	0.68-1.86	0.11	0.75
Use of insecticides and pesticides in the concession	0.85	0.50-1.45	0.21	0.65
Handling of insecticide and pesticide products				
Granox	1.22	0.53-2.82	0.06	0.81
Spinox	0.89	0.48-1.63	0.05	0.62

Chart 4: proportion of cases and controls according to the number of cases in the concession.

Number of cases in the concession	Case		Control	
	Number	%	Number	%
0			115	69.3
1	31	27.0	34	20.5
2	34	29.6	9	5.4
3	24	20.9	5	3.0
4	11	9.6	2	1.2
5	5	4.3		
6	6	5.2	1	0.6
>=7	4	3.5		
Total	115	100.0	166	100.0
Chi-2=60.417; p = 0.00000000386				

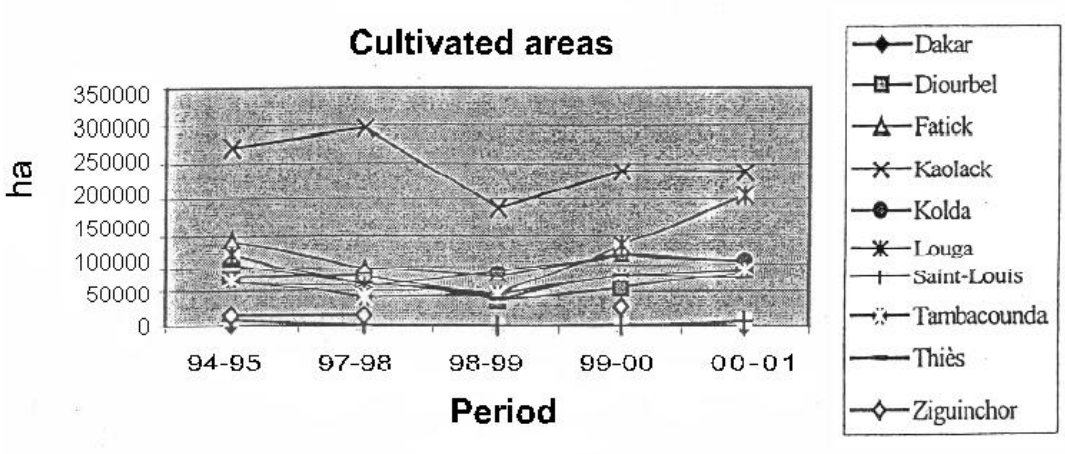
5.4 SURVEY OF THE USE OF PESTICIDES IN PEANUTS FARMING

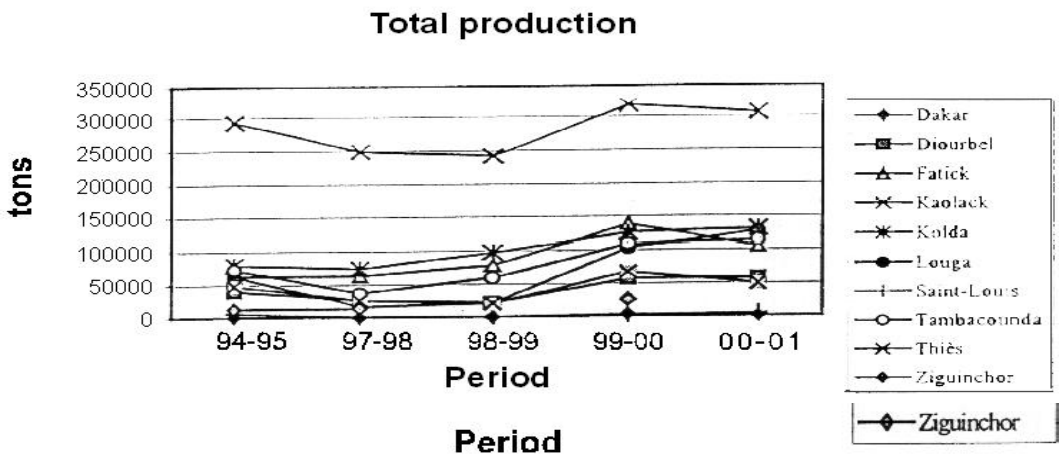
To confirm the hypothesis of pesticide poisoning, a survey on methods and products used in the region was carried out by the National Company of Oleaginous Farming (Soancos) in Kolda and in Sedhiou and by the Plant Protection Office (DPV) in Dakar. Persons in charge of SENCHIM, the firm producing pesticides distributed in the area, were also interviewed.

5.4.1 PEANUT FARMING

Peanut farming is predominant and the most extensive in the Kolda region, with a surface of 71.617 ha. The surface assigned to cotton doesn't exceed 20.000 ha. Evolution of cultivated land, production in Kg per hectare and total peanut oil production are presented per region in Senegal on chart 3a, 3band 3c. The production of oil peanuts has consistently increased since 1998 thanks to the Government aid on products (seeds, pesticides, fertilizers,). So, the overall production in Senegal rose from 1042 kg in 1998 to 11.00kg in 1999. As a result of the surface increase and yield improvement, there was an overall increase of production from 540.773 tons in 1998 to 950.000 tons in 1999.

Pictures 3a, 3b,3c: Final results of peanut crop in 1994 and 2000 and estimate for the period 2000/2001 per region.





Some regions acknowledged a reduction of cultivated land during the period 2000-2001, which corresponds to the winter ploughing and harvest of the year 2000 and to storage and trading in 2000, despite an increase of beneficiaries. An increase in yield and overall production of oil peanuts has been reported in the Kolda region in parallel with a reduction of cultivated land (Chart 5). According to experts, the phenomenon can be explained by quantity availability, and by a sufficient quality of inputs, and by a good rainy season.

Chart 5: differences in cultivated land, yield and peanuts production between the period 1999/2000 and the period 2000/2001.

Region	Area	Yield	Production
Dakar	-3720	-131	-2758
Diourbel	25238	-325	-141
Fatick	-14755	-153	-33153
Kaolack	-2094	-38	-11829
Kolda	-11978	161	5214
Louga	69397	-143	24073
Saint Louis	-5346	-383	2374
Thies	8847	-81	5060
Ziguinchor	-9889	-134	-17672

5.4.2 PESTICIDES .

Several pesticides have been used in the Kolda region all along the 1999/2000 campaign: between December and January during storage; between February and March to preserve seeds and during the sowing period from May to August when seeds were distributed to farmers.

Sonacos distributed to the heads of concession, registered in the village group, seeds and a bag of antifungal composed of 15% Thiram, 7% Benomyl and 10% Carbofuran per 100 tons peanuts sowed during the previous campaign. DPV let out on contract the purchase of antifungal every year. In 1999 the antifungal was supplied by Sechim, which produces Granox, and in 2000 by SPIA which produces Spinox. The two products have exactly the same composition .

Benomyl and Carbofurame belong to the carbamate chemical group. Carbamate is a generic term given to carbamic acid salts which formula is NH2CO2H. Thiram is a biscarbamate, a generic term given to molecules containing at least two carbamate groups: thiocarbamate or dithiocarbamate.Thiram contains two dithiocarbamate groups linked one to the other by sulphur atoms. These substances may be rapidly absorbed through lungs, skin, gastrointestinal system and mucous membrane. Carbofuran is the most toxic of the three substances. It provokes a cholinesterase reversible inhibition in most tissues and mainly in the central nervous system, muscles and blood with acetylcoline accumulation. The substance decays

in high temperature and produces toxic smoke containing azote oxide. Nonetheless, a dangerous concentration of suspended particles in the air can be rapidly reached by dispersion, especially in the form of dust. Effects of an even short exposure may be delayed and may have cumulative effects.

Intoxication through inhalation of carbofuran provokes muscarinic intoxication (myosis, excessive salivation, bradycardia, artery hypertension and asthmatiform dyspnea) and nicotinic intoxication (fasciculation, muscles cramps, involuntary movements and respiratory muscles paralysis, then tachycardia, hypertension, confusion, ataxia, convulsive coma, risk of haemodynamic shock and bronchial occlusion through hypersecretion and broncoconstriction). Respriratory signs like asthmatic dyspnea and bronchial hypersecretion appear very early. Antidote to carbofuran intoxication is antropine 2 to 4 mg in IV for adults and 0,04 to 0, 08 mg/kg for children until bronchospasms disappear.

5.4.3 SEEDS AND PESTICIDES USE

Increase in peanuts farming yield is a Senegal Government major issue within its new agricultural policy. It has therefore been decided to widen the list of farmers benefiting of seeds and pesticides distribution. So, heads of households as well as heads of concession benefited during the 2000/2001 campaign. As a consequence, the quantity of available and circulating pesticides doubled and even tripled in each concession.

Farmers decorticate peanut before sowing. The whole household works at it using hands and mouth. Peanut may have been treated a few months ahead but in some concessions they may have been treated again before decortication. Then sowing starts. Farmers use a sowing-machine to scatter peanut seeds on the ground. They proceed as follows: they put a certain amount of the product in the sowing-machine, which is then filled with peanut seeds. The sowing machine is pulled by traction animals and pushed on shifts by the different persons involved in the job: generally young boys strong enough to handle the sowing-machine. Persons are exposed to product by inhalation and contact when they put it in containers or mix it with grains, as no protection measures (gloves or masks) are taken. People handling the powder are said to inhale much product when filling the seeder, depending on the direction of the wind. Sowing takes from 5 to 10 days, depending on the land to cultivate, from May to July.

Many persons benefiting of the distribution of seeds, did not farm for different reasons: they ate the seeds, they had not enough people to work in the fields, seeds were not of good quality etc. Most of them then sold the pesticides to their neighbours or increased the product quantity on the cultivated land.

It is important to point out that some villages did not have enough time to update the list of beneficiaries or did it too late. Consequently, a few farmers did not receive either seeds or pesticides, as it is the case for certain villages around Tankon (Goutou Demba Ba, Goutou Demba Diop and Goutou Samba Diallo), where no cases of the disease were reported.

5.4.4 POWDERS

During the survey, several members of the household were questioned by the team on the use of pesticides. The product is often called by farmers “the powder”. It is called pink powder or blue powder, depending on the trade mark, the firm producing it and the year of production. For instance, this year they would talk about the blue powder referring to Spinox, produced by SPIA and distributed together with seeds in 2000; in 1999 about the red powder to refer to Granox produced by SENCHIM which had the contract in 1999.

According to information given by SONACOS, undelivered pesticides are distributed to the first farmers that come to collect the seeds at the beginning of the following season, as it was the case in 1999/2000 when the Granox left over from the previous year was distributed first.

Tests on four samples of these two products (Granox and Spinox) made by Wolf Laboratories in Paris, did not show any irregularity in the products’ active substances. Comparative analysis of the two formulations confirms the two products having the same chromatographic profile. No other active substance was revealed, which could be analysed by gaseous chromatography.

These products seem to be used in many other way then they were initially meant for. They were used on hair to kill fleas, on walls to kill termites, under mattresses to kill bugs, just to mention a few. Although handling of the product is stated to be forbidden to women (pregnant) and children, the team could observe that the product in the huts was accessible and that it was mainly used by women.

6 DISCUSSION

The following conclusion can be drawn from what has been observed so far. The fact that cases are grouped in the same concession according to certain age ranges, rather than randomly distributed in villages, suggests that the sources of contamination are inside the concession. Furthermore, contact with an ill person is not a risk factor. Hypothesis of infectious causes can be rejected, as those living close to the ill person (wife and children) have not been affected by the disease. Again, there are no cases among children, and very few among women.

The distribution by age and sex eliminates contamination through basic food. Meals in the concessions are prepared for the whole family and in the same conditions for everybody. Similarly, water in different containers (canaris) comes from the same spring. All these observations confirm the hypothesis of intoxication. The fact that controls used more medicines than cases during the period observed, does not support the possibility of medicament intoxication.

There was no difference between cases and controls regarding their participation in farm work. Nonetheless, distribution of sick cases in space and time shows that they were concentrated in the peanuts farming areas, soon after the beginning of the rainy season and during the season of agricultural labour, with a major peak in August, when all farmers started or ended sowing. It is important to underline that the absence of cases in winter, as in picture 3, supports the link between the first signs of the disease and winter ploughing when pesticides are available. All males and a significant number of women have been involved in this activity. Although for a certain number of women the contact has not been ascertained, the concentration of the sick cases among the age ranges and men most active during the sowing period may suggest that contamination is connected to peanuts farming. All cases and controls were farmers who had taken part in peanuts sowing. Most controls were less exposed because they were ill during the period of sowing.
Signs and symptoms suggest a carbamate poisoning and very likely from carbofuran. Cases had serious breathing problems, with hypersecretion, bradycardia, pulmonary oedema, which may explain the presence of other oedema. Some muscarinic effects, like hypotension, bradycardia, bronchus-constriction and dyspnea, and nicotinic effects, such as tachicardia, muscles cramps, were present in most cases. On the other hand, other effects of nicotine, like involuntary movements, psychological problems (anguish, nightmares), vestibular problems (giddiness and emesis) were often absent. It is to be regretted the insufficient registration system in health centres and posts of the region, where files were so badly kept that they limited all survey on the patients in public health facilities.

The question which still is partially open is why the epidemic developed in that area of the Kolda region and did not in other regions which also practice peanut farming. The Kolda region was the only one to increase yield and production while reducing cultivated land. Extra pesticides may have exposed a great density of people to intoxication.

7 CONCLUSIONS

It is very possible then that cases of disease in Kolda are connected to carbamate poisoning contained in the products distributed together with peanut seeds. Why this year? Hypothesis is that a greater number of beneficiaries brings an over-consumption of these products and consequently an over-exposure of people handling seeders, that is, young men as well as a small proportion of women working in the peanut fields. Furthermore, many new farmers not used to handling these products may have over-estimated the quantity of product necessary to fill the seeder. It is regrettable that the distribution policy of pesticide products, which surely hold poison hazards, is not accompanied by good information on hazards related to these products and on care needed in their use, mainly washing hands, wearing masks and gloves, and staying out of the direction of the wind.

8 RECOMMENDATIONS

The following recommendations are addressed to the Agricultural Ministry offices in charge of the distribution of inputs to farmers, to the National Service of Major Endemics and to the team of the health district of the Kolda region.

- To set up meetings to discuss the results of the investigation with the Minister of Health, with the Kolda Development Regional Committee, with the team of the Kolda region and to the people of the villages involved;
- To inform health personnel of the intoxication hazards caused by pesticides, in particular during agricultural labour, of the medical histories and of medicines to use when an intoxication occurs;
- To strengthen surveillance of intoxication from pesticide products used for both cash and food crops in the regions involved;
- To inform farmers on the way pesticides and insecticides products, distributed during the farming periods, should be used;
- To inform farmers of the hazards deriving from a different use of pesticides than that they were originally meant for;
- To warn beneficiaries of seeds of the necessity of safety equipment (masks and gloves), and the avoidance of direct contact with products and inhalation;
- To estimate the problems related to the recording of patients in health facilities in the Kolda region together with central Health facilities;
- To develop an active surveillance of cases of intoxication from phyto-sanitary products from April to October, in health centres in the areas of the epidemic under the supervision of Doctors specialised in major endemic diseases.

Tests: Blood yes no Date_____Obs.:_____
Urine yes no Date_____Obs.:_____

ANNEX
Survey questionnaire of the pathological occurrence of cases and controls
Unknown etiologic illness
Kolda region

Date:	District:	Village:
Case ☐	Code:	Control ☐ Code:

Identification case/control			
Name, Surname:			Date of birth:
Age:	Sex:	Address:	
Village of residence			District of residence:
Occupation 1:		Duration of this occupation:	
Occupation 2:		Duration of this occupation:	
Occupation 3:		Duration of this occupation:	

2. Medical information (to be filled in for cases only)

Date the disease started:			date of visit:
Signs & Symptoms	**Present** Yes	No	**Starting date** **Description**
Fever	☐	☐	
Shivering	☐	☐	
Sweating	☐	☐	
Stress dyspnea	☐	☐	1 ☐ 2 ☐ 3 ☐
Oedema	☐	☐	Pot: ☐ Site:
Thoracic pains	☐	☐	Site:
Tachicardia	☐	☐	
Cough	☐	☐	Dry ☐ Mucous ☐
Rhinitis	☐	☐	
Abdomen pains	☐	☐	Site:
Diarrhoea	☐	☐	
Vomiting	☐	☐	
Hemorrhage	☐	☐	Site:
Jaundice	☐	☐	
Modif. of urine flow	☐	☐	Polyuria ☐ Oliguria ☐ Anuria ☐
Modif. urine aspect	☐	☐	Troubles ☐ Red ☐
Agitation	☐	☐	
Dizziness	☐	☐	
Convulsion	☐	☐	

Date the illness ended (duration of the illness)				
Clinical examination (latest investigation)				
Date:				
General condition:	Control ☐	Recovered ☐	Convalescent ☐	Deceased ☐
Temperature: C	TA:	Pulse	Breath frequency	
Mucous membrane:	Well coloured ☐	Pale ☐	Icteric ☐	

Clinical examination, present and previous consultations				
Date				
General conditions:	Control ☐	Recovered ☐	Convalescent ☐	Deceased ☐
Fever: C	TA	Pulse	Breath frequency	
Mucous membrane:	Well coloured ☐	Pale ☐	Icteric ☐	
Date:				
General conditions:	Control ☐	Recovered ☐	Convalescent ☐	Deceased ☐
Fever: C	TA	Pulse	Breath frequency	
Mucous membrane:	Well coloured ☐	Pale ☐	Icteric ☐	

Biological analysis made during illness

Tests	**Yes**	**No**	**Date**	**Test**	**Results**

Clinical observations:

3. Pathological antecedents

Number of medical cases in the last 6 months					
N	Name of disease	Date it showed	Duration of disease	Treatment	Length of treatment
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
Medicines taken in the last 6 months (traditional or modern):					

11. Nicotinism and other habits

The case/control smokes/used to smoke tobacco (cigarettes, cigars)?			Yes ☐	No ☐
Brand:	Daily quantity	Duration of consumption		
Case/Control smokes/used to smoke traditional grass or others?			Yes ☐	No ☐
Grass name:	Daily quantity:	Consumption length:		
	Samples taken?		Yes ☐	No ☐
Grass name:	Daily quantity:	Consumption length:		
	Samples taken?		Yes ☐	No ☐
Grass name:	daily quantity:	Consumption length:		
	Samples taken?		Yes ☐	No ☐
Visit to forests	Yes ☐	Frequency:		
Classified?	No ☐	Reasons:		
Consumption of alcohol	Yes ☐	Amount:		
	No ☐	What type:		

12. Contacts

Are there other cases in the concession?		Yes ☐	No ☐	How many?		
Degree of relationship:	Father ☐	Mother ☐	Wife ☐	Son/daughter ☐	Other ☐	
Kind of contact	**Eat same food**			**Drink same water**		
	Morning	Yes ☐	No ☐	Morning	Yes ☐	No ☐
	Noon	Yes ☐	No ☐	Noon	Yes ☐	No ☐
	Evening	Yes ☐	No ☐	Evening	Yes ☐	No ☐
	Sleep			**Work together**		
	Same hut	Yes ☐	No ☐	Morning	Yes ☐	No ☐
	Same bed	Yes ☐	No ☐	Evening	Yes ☐	No ☐
	Other contacts:					
Kind of contact	**Eat same food**			**Drink same water**		
	Morning	Yes ☐	No ☐	Morning	Yes ☐	No ☐
	Noon	Yes ☐	No ☐	Noon	Yes ☐	No ☐
	Evening	Yes ☐	No ☐	Evening	Yes ☐	No ☐
	Sleep			**Drink**		
	Same hut	Yes ☐	No ☐	Morning	Yes ☐	No ☐
	Same bed	Yes ☐	No ☐	Evening	Yes ☐	No ☐
	Other contacts:					
	Eat the same food					
Kind of contact	Morning	Yes ☐	No ☐	Morning	Yes ☐	No ☐
	Noon	Yes ☐	No ☐	Noon	Yes ☐	No ☐
	Evening	Yes ☐	No ☐	Evening	Yes ☐	No ☐
	Sleep			**Work together**		
	Same hut	Yes ☐	No ☐	Morning	Yes ☐	No ☐
	Same bed	Yes ☐	No ☐	Evening	Yes ☐	No ☐
	Other contacts:					

Do/did case/control know somebody who died of the illness described?		N	**Name**	**Address**
		1.		
	Yes ☐	2.		
		3.		
		4.		
	No ☐	5.		
		6.		
		7.		
		8.		

Has/have case/control been in contact with this person in the last 6 months?	**N order**	**Yes**	**No**	**Number of contacts**	**Kind of contacts**
	1.				
	2.				
	3.				
	4.				
	5.				
	6.				
	7.				
	8.				

13. Travels

Has/have the case/control travelled in the last 6 months?	Yes ☐	No ☐
Place	**Date**	**How long**

14. Toxicology

Are there in the concession chemical products like pesticides, herbicides, insecticides, antifungal, etc.? Yes ☐ No ☐					
Commercial name and active substance	Does or did the sick handle these chemical products?	Do other persons in the house handle these products?	What use is made of these products?	What month and how often are these products used?	Where are these Products bought or obtained?
	Yes ☐ No ☐	Yes ☐ No ☐ If yes, degree of relationship			
	Yes ☐ No ☐	Yes ☐ No ☐ Is yes, degree of relationship			
	Yes ☐ No ☐	Yes ☐ No ☐ If yes, degree of relationship			
	Yes ☐ No ☐	Yes ☐ No ☐ If yes, degree of relationship			
	Yes ☐ No ☐	Yes ☐ No ☐ If yes, degree of relationship			
	Yes ☐ No ☐	Yes ☐ No ☐ If yes, degree of relationship			
7. Where is food stored?	8. Where are chemical products stored?			9. Do you use one or more of these chemical products to preserve food? Yes ☐ Which one?_____ No ☐	

15. Urine test

Proteinury	**Presence** ☐	**Absence** ☐	**Obs.:**
Hemtury	**Presence** ☐	**Absence** ☐	**Obs.:**
Glycosury	**Presence** ☐	**Absence** ☐	**Obs.:**

Annex 2: Epidemiological research of cases of an illness of unknown aetiology Medical Region of Kolda

Date:______/______/______ District:______________________ Medical training:______________________________ Service:__________________________________

Date of Consult Ation	**No register**	**Name, Surname**	**Age**	**Sex**	**Address (Quarter, place)**	**Date Disease started**	**Signs and symptoms**	**Reported?**	**Hospitalisation**	**Death**
				M ☐ F ☐			Oedemas: Limbs ☐ Face ☐ Dyspnea ☐ Thorax pains ☐ Other proofs ☐	No ☐ Yes ☐ Date:__________ Place:____________	No ☐ Yes ☐ Date:_________ Place:___________ Length:_________	Yes ☐ Date:
				M ☐ F ☐			Oedemas: Limbs ☐ Face ☐ Dyspnea ☐ Thorax pains ☐ Other proofs ☐	No ☐ Yes ☐ Date:__________ Place:____________	No ☐ Yes ☐ Date:_________ Place:___________ Length:_________	Yes ☐ Date:
				M ☐ F ☐			Oedemas: Limbs ☐ Face ☐ Dyspnea ☐ Thorax pains ☐ Other proofs ☐	No ☐ Yes ☐ Date:__________ Place:____________	No ☐ Yes ☐ Date:_________ Place:___________ Length:_________	Yes ☐ Date:
				M ☐ F ☐			Oedemas: Limbs ☐ Face ☐ Dyspnea ☐ Thorax pain ☐ Other proofs ☐	No ☐ Yes ☐ Date:__________ Place:____________	No ☐ Yes ☐ Date:_________ Place:___________ Length:_________	Yes ☐ Date:
				M ☐ F ☐			Oedemas: Limbs ☐ Face ☐ Dyspnea ☐ Thorax pain ☐ Other proofs ☐	No ☐ Yes ☐ Date:__________ Place:____________	No ☐ Yes ☐ Date:_________ Place:___________ Length:_________	Yes ☐ Date:

Annex 3Scheme for interviews to suppliers/
Sellers of agricultural products and chemical products[*]

Date:	District:	Village:
8.1.1.1 Identification of supplier/seller/trader		
Name, Surname	Name of company/Institution	
Business address:		
Village of residence:	District of residence:	
Information required:		
Kind of product commercialised Name of products commercialised Origin of products commercialised Buyer of commercialised products (profile, origin, etc.)		

[*] DPV Plant Protection Office; Head Office for stock/farming; Service for Agriculture; Sodefitex; market

ANNEX III - Letter from CropLife International

Avenue Louise 143 - B-1050 - Brussels - Belgium
TEL +32 2 542 04 10 FAX +32 2 542 04 19 www.croplife.org

January 18, 2002

Interim Secretariat for the Rotterdam Convention
Plant Protection Service
Plant Production and Protection Service
FAO
Viale delle Terme di Caracalla
00100 Rome, Italy

Gentlemen;

Subject: Addendum to Senegal Notification for Granox TBC and Spinox T

On behalf of CropLife International, I am pleased to provide the Interim Secretariat with additional information relating to the Senegal notification on a severely hazardous pesticide formulation and in accordance with Annex III Part 2 of the Rotterdam Convention. CropLife International and its member organizations are providing this information to assist the ICRC in a thorough science-based evaluation of this first notification for a severely hazardous pesticide formulation.

We noted that the information posted on the PIC website for the Senegal Notification (UNEP/FAO/PIC/ICRC.3/17.Add.1) included a hazard ranking evaluation of the Granox TBC and Spinox T performed using oral toxicity information for the individual active ingredients (Annex II p. 5 and 6). In our earlier comments of January 9, 2002, we pointed out that the primary route of exposure appears to be the dermal route, based upon the information contained in the individual incident reports. Therefore we conducted a hazard evaluation for dermal exposure using the posted toxicity information and WHO Methods (b) and (c). We feel that the weighting formula in Method (c) is most appropriate for this mixture. We used Extoxnet data from within the Review for consistency between test species and information source.

Method (b); Carbofuran and thiram each have dermal LD_{50} values greater than 1000mg/Kg in rabbits. In this case for a solid formulation containing 32% active ingredient the expected median lethal dose would be in excess of 320 mg/Kg, which corresponds to WHO **Class II**.

Method (c); Application of the weighting formula to dermal toxicity values in rabbits, we determined the solid three-way mixture corresponds to WHO hazard **Class III** for dermal exposure.

$$(15\%/>1000\text{mg/Kg})_{\text{thiram}} + (10\%/>1000\text{mg/Kg})_{\text{carbofuran}} + (7\%/>5000\text{mg/Kg}^*)_{\text{benomyl}} = 100/T_m \qquad T_m = >3787\text{mg/Kg}$$

* value based upon 50%WP benomyl formulation exceeding 10,000mg/Kg.

As we pointed out in our January 9, 2002 letter, the incidents are not consistent with symptoms of acute exposure to the active ingredients and therefore it is questionable whether an acute hazard assessment is appropriate. It is clear from the incident reports that intoxication occurred days to months following a short-term use of these products. Therefore, we encourage the ICRC to consider whether the acute hazard classification and delayed onset of symptoms are consistent and whether the notification qualifies under the Rotterdam Convention for a severely hazardous pesticide formulation.

CropLife International is grateful for the opportunity to provide these additional views on the Senegal notification and is prepared to assist the ICRC with additional information as may be available.

Sincerely,

Michael A. Morelli, Ph,D,
Chair, PIC Project Team
CropLife International

cc: C. Verschueren - CropLife International
M Laget – UCB Group
P Pritchard – Uniroyal/Crompton Corp
L Hershberger – Dupont Crop Protection
J Becker – FMC Corp
C Barnes – US EPA

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