Evaluation of Pesticide Toxicity and Chemical Compounds Revealed in Soils of Sikasso and Segou (Mali)

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Abstract

The contaminants of the ground are potentially harmful agents and when they are released in this medium, their persistence becomes an important concern. Because of the expressed interest, a certain number of pesticides and important chemicals and their toxicity are described in this article. The studies went on the determination of the concentration, the lethal amount of the organochlorinated compounds, chemical organophosphates, carbamates and compounds. One summer recorded 3 pesticides in 5 samples of the grounds of Sikasso and Segou (Mali). Their concentration varies from 20 (atrazine) with 45 g/kg of ground. The lethal amounts of the revealed poisons variable from 338 for phthalates to 28.710 mg/kg for hexane (alkane) thus evaluate their impact on the food chain. Organophosphates and the carbamates (insecticidal) involve a reduction of 34.2% of the number of Cyprinus carpio of fresh water. The atrazine contaminates drinking water, but the diuron modifies the behavior and the reproduction of fish by deteriorating their system of olfactive perception of natural substances. Important mortalities of birds are noted around the corn fields of Bougouni treated by the carbofuran. The pesticides involve at the man a reduction in fruitfulness, an increase in the risk of miscarriage of premature birth, congenital malformations and cancers.

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Evaluation, Toxicity, Pesticides, Chemical Compounds, Soils of Sikasso and Segou

1. Introduction
Agrosystem pollution by pesticides from Mali and its impact on the balance of nature are a current problem. Very little work on soil pollution of Sikasso and Segou and toxic transfer arrangements through the food chain. These pesticides pose a serious public health problem for users who are most at risk, but also for local people. They cause biological effects in biological final consumer (human) cancer, birth defects, infertility, neurological problems or immune system and other.
Alongside these products are processed in different metabolites that may produce other repercussions on the human body. Most organic molecules are capable of forming “bound residues” in soils [1] [2].
The existence of bound residues poses the problem of their evolution, and in particular, that of their potential availability [3]. Some experiments have shown that bound residues can be used by plants or soil microorganisms, or physico-chemical changes of soil constituents [4]-[6]. During our experiments, special emphasis has been placed on determining the concentration of pesticide residues, chemicals, lethal doses of pesticides formulation.
The determination of lethal doses allows changes in legislation. It makes a salutary pressure as monitoring air, water, soil and prohibitions on the manufacture or distribution of products considered hazardous.
The studies overall objective is assessing the toxicity of pesticides and chemicals through the food chain. The specific objectives are:
—Identify and quantify pesticide residues in soil samples Bougouni (Sikasso) and Niono (Segou);
—Determine the lethal doses of certain chemical compounds in vivo;
—Evaluate their toxicity in rodents.

2. Methodology
2.1. Collection and Processing of Soil Samples
Soil samples harvesting Bougouni and Niono were made in cotton fields, maize and rice three times of the year covering the dry and rainy seasons.
Composite soil samples were collected at the 0 - 40 cm horizon according to the method described by Mathieu and Pieltain [7]. It was delineated the 10 m × 10 m areas in the middle of the field. At each passage thirteen (13) basic samples according to the diagonals and the sides are drawn inside the square and a composite sample is formed. The samples were brought to the laboratory and stored at −20°C until the actual analysis.

2.2. Determination of Pesticide Residues
Extraction of pesticide residues of 20 g of soil sample is carried out with 100 ml of hexane: isopropanol (75:25 V/V) in an Erlenmeyer flask of 125 ml. After decantation, 20 ml of the supernatant are stirred with 30 ml of distilled water in a separatory funnel. The organic phase is separated, dried over anhydrous sodium sulfate and then concentrated on rotary evaporator to 2 ml.
The extracts are preserved in the freezer has pillboxes −20°C until analysis. The determination of pesticide was carried out by gas chromatography using an HP 5890A chromatograph equipped with an HP-5 column or SIL19CB CP column and with an ECD detector, all controlled by a computer and an integrated Chem Station chromatograms processing software. The identification and quantification of pesticide molecules are carried through internal calibration standards.
The detection limit was 0.02 µg/l. A HPLC 1100 Series Agilent Technology equipped with a column Eclipse XDBC8 and an iodine array detector (DAD) allowed the analysis of organophosphate.

2.3. Determination of Chemical Compounds
Sample analysis was performed according to EPA Method 8040, 8061, 8080, 8081 (US Environmental Protect
30 g of the soil sample are ground with a porcelain mortar and then sieved to 1 mm. It is placed in a cuvette ultrashort wave containing 20 ml of dichloromethane for 10 minutes to obtain the extract. The extract is concentrated until a volume of 1 ml, then the internal sampling standard was placed (naphthalene, phenanthrene, and chrysene) and then carried out the actual analysis.

2.4. Determination of Lethal Doses

Older white mice 30 days of starting treatment with the commercial products were used. Young animals were used because of their sensitivity to certain commercial products. We tested the commercial products containing more than 50% of active material, at a degree of purity greater than 98%. Insolubles in water are dissolved in neutral oil and olive inject subcutaneously in mice or rats using a needle 0.8 mm in diameter.

The weight of the commercial product gradually introduced into the mice is 5 or 10 or 15 g to observe the death of 50% of the population for 48 or 72 hours of incubation. The toxicity of chemicals is based on the value of their LD₅₀. The LD₅₀ is the lethal dose to 50% of the tested animal population die. The harmful effects may be greater in humans than projected in the determination of the LD₅₀ [8] [9].

3. Results and Discussion

Three (3) Pesticides (atrazine, carbofuran, endosulfan) were found in five (5) soil samples of Sikasso and Segou (Table 1). Their concentration varies from 0.006 mg/kg for endosulfan (ground floor 4 and 5) to 0.014 mg/kg to atrazine floor 1, floor 2 and floor 3). These values are less than or equal to the maximum residue limit set at 0.01 mg/kg for atrazine. The results of the experiment on the common freshwater carp have shown that organophosphates and carbamates (insecticides) cause a decrease of 34.2% in the number of *Cyprinus carpio*.

These results mirror those obtained by Gruber [10]. A high concentration of carbofuran or diazinon and chlorfenvinphos kills elderly carp a year after four hours of exposure, whereas low concentrations result in neurological disorders.

Previous work provided an update on the modification of the activity of digestive enzymes (lipase, alphachymotrypsine and carboxypeptidases) in carp by pyrethroids and methidation. A concentration of 20 µg/l of atrazine (pesticide used for maize) was recorded in drinking water Bougouni. This concentration is 10 times greater than that permitted for drinking water (2 µg/l) [11]. Diuron changes the behavior and reproduction of fish olfactory perception altering their system of natural substances [12]. Parathion is toxic in mice *in utero* and causes 15% mortality among them. The same killing effect occurs in birds subjected to elevated concentrations. Important bird mortalities are recognized around the corn fields treated with carbofuran. Organochlorine pesticides have varying effects on endocrine functions, fertility and the immune system of birds and mammals [13]. Some work have confirmed the decrease in reproduction, growth and increased risk of hyperthyroidism in mammals by pesticides [14] [15]. Many experiments corroborate the decline in fertility, increased risk of miscarriage, premature deliveries, birth defects, cancer, damage to DNA and accumulation of pesticides in human’s milk [16]-[19].

**Figure 1** is chromatograms of chemical compounds found in soils Bougouni and Niono.

Chromatograms correspond to the detection time of the chemical compounds (acenaphthene and tetrahydro-naphthalene) according to their concentration in soils Bougouni and Niono.

Soil sample analyzes have revealed a high concentration of phenol, nitrobenzene, methoxybenzene, hexa-decane-heptadecane and phthalates within five (5) samples of soil (Table 2). Parallel a high content of tri

| Pesticides   | Soil 1 mg/kg | Soil 2 mg/kg | Soil 3 mg/kg | Soil 4 mg/kg | Soil 5 mg/kg |
|--------------|--------------|--------------|--------------|--------------|--------------|
| Atrazine     | 0.014        | 0.014        | 0.014        | 0.010        | 0.010        |
| Carbofuran   | 0.009        | 0.008        | 0.009        | 0.007        | 0.007        |
| Endosulfan   | 0.009        | 0.008        | 0.009        | 0.006        | 0.006        |
Table 2. Results of chemical analyzes of soil Bougouni (Sikasso) and Niono (Segou).

| №  | Chemical compounds                      | Soil 1 µg/kg | Soil 2 µg/kg | Soil 3 µg/kg | Soil 4 µg/kg | Soil 5 µg/kg |
|----|----------------------------------------|--------------|--------------|--------------|--------------|--------------|
| 30 | Phenol                                 | 9.2          | 11           | 10           | 6.3          | 6.6          |
| 203| Vanillin                               | 0.0          | 17           | 8.9          | 0.0          | 131          |
| 61 | 4-Methylphenol                         | 3.2          | 43           | 0.0          | 0.0          | 0.0          |
| 235| 3,5-Bis(1,1-dimethyl)phenol            | 22           | 0.0          | 0.0          | 0.0          | 0.0          |
| 239| 4,6-Bis(1,1-dimethyl)-2 methylphenol   | 4.4          | 0.0          | 0.0          | 0.0          | 0.0          |
| 309| 2,4-Dibutyl-nitrophenol                | 0.0          | 5.6          | 11           | 2.8          | 14           |
| 68 | Nitrobenzene                           | 44           | 43           | 63           | 20           | 38           |
| 19 | Methoxybenzene                         | 248          | 230          | 324          | 480          | 438          |
| 74 | 1-Chloro-4-methoxybenzene              | 7.6          | 7.0          | 10           | 16           | 0.27         |
| 78 | 1-Chloro-2-methoxybenzene              | 14           | 14           | 20           | 23           | 0.0          |
| 147| 2,4-Dichloro-1-methoxybenzene          | 2.1          | 2.3          | 0.0          | 3.3          | 2.4          |
| 148| 2-Bromopropenylbenzene                | 5.2          | 0.0          | 0.0          | 0.0          | 0.0          |
| 158| 1-Bromo-2-(2-propenyl)benzene          | 1.2          | 1.6          | 1.4          | 0.0          | 0.0          |
| 223| 2,2-Dibromopropenylbenzene            | 3.2          | 273          | 45           | 2.1          | 0.0          |
| 109| Naphtalene                             | 13           | 10           | 12           | 26           | 21           |
| 153| 2-Methylnaphtalene                    | 6.8          | 7.0          | 7.6          | 13           | 11           |
| 162| 1-Methylnaphtalene                    | 15           | 15           | 17           | 24           | 21           |
| 194| Naphtalene, C2                        | 5.2          | 5.6          | 6.3          | 9.3          | 22           |
| 196| Naphtalene, C2                        | 7.6          | 8.6          | 9.5          | 4.1          | 33           |
| 204| Naphtalene, C2                        | 7.9          | 20           | 5.9          | 38           | 22           |
| 213| Naphtalene, C2                        | 5.5          | 5.7          | 4.3          | 42           | 22           |
| 221| Naphtalene, C2                        | 3.6          | 4.0          | 4.4          | 37           | 11           |
| 241| Naphtalene, C3                        | 0.3          | 5.0          | 5.2          | 7.4          | 10           |
| 243| Naphtalene, C3                        | 0.1          | 2.4          | 2.2          | 2.4          | 16           |
| 253| Naphtalene, C3                        | 7.5          | 2.0          | 9.1          | 18           | 18           |
| 259| Naphtalene, C3                        | 5.7          | 8.0          | 13           | 23           | 25           |
| 267| Naphtalene, C3                        | 4.5          | 9.1          | 12           | 29           | 22           |
| 304| 2,6-Diisopropynaphtalene              | 15           | 21           | 11           | 7.7          | 27           |
| 308| 2,6-Diisopropynaphtalene              | 22           | 119          | 59           | 15           | 34           |
| 324| 2,6-Diisopropynaphtalene              | 37           | 108          | 84           | 17           | 90           |
| 325| 2,7-Diisopropynaphtalene              | 40           | 0.0          | 0.0          | 18           | 52           |
| 331| 2,8-Diisopropynaphtalene              | 32           | 108          | 0.0          | 7.2          | 36           |
| 188| Acenaphtene                            | 11           | 10           | 12           | 62           | 31           |
| 272| Fluorene                               | 4.0          | 5.8          | 0.0          | 17           | 11           |
| 352| Phenanthrene                           | 37           | 40           | 37           | 94           | 64           |
354 Anthracene  4.4  4.1  3.6  13  5.2  
385 Methylphenanthrene  6.0  5.2  4.8  13  8.7  
389 Methylphenanthrene  7.0  5.9  6.1  17  10  
395 Methylphenanthrene  4.7  4.1  3.6  12  7.8  
396 Methylphenanthrene  5.9  4.4  3.7  13  7.5  
421 Phenanthrene, C2  3.1  0.0  0.0  0.0  0.0  
423 Phenanthrene, C2  1.6  0.0  0.0  0.0  0.0  
424 Phenanthrene, C2  0.7  0.0  0.0  0.0  0.0  
425 Phenanthrene, C2  0.4  0.0  0.0  0.0  0.0 
427 Fluoranthene  7.4  7.1  6.2  18  13  
436 Pyrene  4.9  7.3  4.8  15  9.6  

Biphenyls
236 Biphenyl  0.2  0.0  2.6  3.2  0.0  
195 p-Hydroxybiphenyl  4.6  0.0  0.0  2.3  0.0  
244 o-Hydroxybiphenyl  0.4  8.1  0.78 0.0  0.0  
299 1,1'-Biphenyl, C4  2.2  0.0  0.0  1.2  0.0  
309 1,1'-Biphenyl, C4  0.0  0.0  0.0  1.6  0.0  

Alkylbenzenes
1 Benzene, C2  6.0  3.0  1.8  9.1  9.6  
11 Benzene, C2  1.4  1.9  3.0  6.2  5.2  
33 Benzene, C3  1.2  5.7  2.5  2.5  4.1  
39 Benzene, C4  11  11  1.2  16  9.9  
46 Benzene, C4  12  1.6  2.9  9.2  0.85  
53 Benzene, C4  0.9  7.5  32  4.3  6.1  
76 Benzene, C4  0.0  2.4  3.23 8.5  3.5  
79 Benzene, C4  160  0.4  31  1.5  0.13  
89 Benzene, C5  2.9  11  30  2.1  21  
95 Benzene, C5  15  1.5  0.50  0.58  0.38  
115 Benzene, C6  2.5  0.32  2.6  35  7.1  
120 Benzene, C6  27  2.8  34  34  28  
123 Benzene, C6  1.6  17  4.0  4.4  28  
124 Benzene, C6  2.2  2.3  1.7  1.0  3.2 
129 Benzene, C6  5.3  4.6  5.0  3.2  3.9  
138 Hexylbenzene  1000 1400 1020 633 695 
142 Alkylbenzene  0.4  5.2  0.10  3.0  8.4 
151 Alkylbenzene  0.6  45  0.49  5.1  12  
247 Alkylbenzene  12  19  11  8.0  0.03  
279 Alkylbenzene  2.4  28  8.9  6.3  0.0  
284 Alkylbenzene  2.9  35  26  1.5  0.0  
320 Alkylbenzene  1.5  6.6  27  7.8  0.0
### Alkylbenzene

| Alkylbenzene | 0.7 | 6.4 | 0.01 | 7.7 | 0.0 |
|--------------|-----|-----|------|-----|-----|
| 353          | 1.0 | 8.0 | 60   | 1.5 | 0.0 |
| 355          | 3.1 | 54  | 1.1  | 11  | 0.0 |
| 361          | 1.7 | 4.6 | 3.5  | 1.1 | 0.0 |
| 367          | 215 | 10  | 0.0  | 3.0 | 0.0 |
| 378          | 2.9 | 6.6 | 0.0  | 2.2 | 0.0 |

### Alkanes

| 2,4-Dimethylhexane | 6.1 | 0.0 | 4.6 | 0.63 | 4.2 |
| 69                | 15  | 12  | 19  | 80   | 47  |
| 77                | 2.2 | 2.5 | 0.0 | 3.0  | 6.1 |
| 105               | 76  | 0.0 | 72  | 57   | 197 |
| 113               | 5.5 | 5.6 | 0.0 | 11   | 8.4 |
| 141               | 2.7 | 7.4 | 0.0 | 3.3  | 7.6 |
| 146               | 30  | 36  | 37  | 47   | 38  |
| 154               | 14  | 8.3 | 12  | 18   | 12  |
| 157               | 5.6 | 11.8| 9.2 | 2.5  | 0.73|
| 168               | 2.2 | 170 | 23  | 1.8  | 10  |
| 171               | 33  | 26  | 49  | 16   | 44  |
| 180               | 23  | 35  | 20  | 6.5  | 13  |
| 186               | 96  | 263 | 242 | 73   | 18  |
| 209               | 25  | 45  | 40  | 4.1  | 93  |
| 210               | 1.0 | 16  | 16  | 62   |
| 214               | 3.3 | 11  | 13  | 105  |
| 226               | 48  | 159 | 165 | 33   | 364|
| 230               | 13  | 40  | 40  | 11   | 71  |
| 251               | 87  | 41  | 31  | 5.1  | 21  |
| 254               | 12  | 11  | 8.1 | 15   |
| 257               | 23  | 36  | 92  | 10   | 33  |
| 264               | 14  | 22  | 23  | 16   | 300 |
| 268               | 70  | 250 | 204 | 40   | 440 |
| 278               | 1.4 | 11  | 87  | 3.4  | 90  |
| 281               | 35  | 105 | 212 | 4.1  | 111 |
| 293               | 10  | 60  | 88  | 26   | 48  |
| 303               | 49  | 309 | 18  | 48   | 316 |
| 306               | 135 | 24  | 142 | 3.6  | 217 |
| 322               | 19  | 37  | 69  | 15   | 18  |
| 335               | 26  | 110 | 4.9 | 11   | 322 |
| 341               | 77  | 147 | 170 | 26   | 400 |
| 344               | 66  | 135 | 100 | 22   | 161 |
| 362               | 6.6 | 30  | 3.10| 3.5  | 92  |
| No. | Compound                  | C   | H   | O   | N   | MW  |
|-----|---------------------------|-----|-----|-----|-----|-----|
| 370 | Alkane                    | 36  | 5.5 | 16  | 3.8 | 33  |
| 398 | Octadecane                | 35  | 47  | 5   | 7.5 | 216 |
| 403 | Alkane                    | 1.2 | 41  | 8.47| 3.6 | 79  |
| 412 | Alkane                    | 4.9 | 24  | 38  | 1.8 | 61  |
| 422 | Alkane                    | 24  | 36  | 22  | 1.7 | 33  |
| 437 | Alkane                    | 13  | 4.2 | 43  | 2.9 | 40  |
| 442 | Alkane                    | 12  | 50  | 30  | 4.5 | 229 |
| 456 | Alkane                    | 20  | 53  | 53  | 0.33| 111 |
| 487 | Alkane                    | 11  | 86  | 39  | 44  | 50  |
| 462 | Alkane                    | 19  | 71  | 38  | 11  | 24  |
| 468 | Alkane                    | 12  | 54  | 55  | 9.2 | 95  |
| 474 | Alkane                    | 17  | 91  | 131 | 8.1 | 134 |
| 484 | Alkane                    | 27  | 159 | 47  | 1.2 | 12  |
| 486 | Alkane                    | 6.5 | 77  | 33  | 13  | 70  |
| 489 | Alkane                    | 33  | 39  | 17  | 11  | 145 |
| 494 | Alkane                    | 18  | 47  | 20  | 14  | 100 |

### Thiophenes

| No. | Compound                  | C   | H   | O   | N   | MW  |
|-----|---------------------------|-----|-----|-----|-----|-----|
| 197 | 3,6-Dimethylbenzo[b]thiophene | 0.9 | 6.15| 24  | 0.0 | 10  |
| 343 | Dibenzo thiophene          | 1.5 | 0.0 | 0.0 | 0.0 | 2.4 |

### Phthalates

| No. | Compound                  | C   | H   | O   | N   | MW  |
|-----|---------------------------|-----|-----|-----|-----|-----|
| 212 | Dimethylphthalate         | 20  | 22  | 19  | 54  | 30  |
| 269 | Diethyl phthalate         | 1197| 710 | 489 | 102 | 846 |
| 366 | Diisobutylphthalate       | 549 | 1100| 1216| 148 | 150 |
| 380 | Phthalate                 | 32  | 2.5 | 0.0 | 0.0 | 47  |
| 394 | Dibutylphthalate          | 871 | 0.69| 1.8 | 125 | 1420|
| 441 | Phthalate                 | 2.7 | 2.7 | 0.0 | 0.0 | 56  |
| 465 | Bis (2-ethylhexyl)phthalate| 214 | 273 | 338 | 50  | 725 |

### Phosphates

| No. | Compound                  | C   | H   | O   | N   | MW  |
|-----|---------------------------|-----|-----|-----|-----|-----|
| 337 | Tri(2-chloroethyl)phosphate| 84  | 15  | 19  | 3.2 | 4.7 |
| 459 | Triphenylphosphate        | 5.6 | 0.0 | 0.0 | 0.0 | 0.0 |
| 464 | Cresyl diphenylphosphate  | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 |

### Other chemical compounds

| No. | Compound                  | C   | H   | O   | N   | MW  |
|-----|---------------------------|-----|-----|-----|-----|-----|
| 256 | Ethylparaben              | 6.5 | 30  | 0.0 | 2.1 | 234 |
| 10  | Styrene                   | 2.0 | 3.1 | 1.0 | 3.8 | 0.0 |
| 13  | Cyclohexanone             | 5.4 | 7.6 | 13  | 4.5 | 0.0 |
| 75  | Phenylethyl alcohol       | 0.8 | 1.4 | 0.0 | 0.0 | 0.0 |
| 287 | Benzophenone              | 21  | 60  | 50  | 9.2 | 31  |
| 27  | Benzaldehyde              | 37  | 46  | 48  | 47  | 40  |
| 48  | Benzyl alcohol            | 20  | 10  | 18  | 13  | 4.0 |
| 62  | Acetophenone              | 21  | 31  | 30  | 21  | 17  |
Continued

|   | Chemical Compound             | Soil 1 | Soil 2 | Soil 3 | Soil 4 | Soil 5 |
|---|-------------------------------|--------|--------|--------|--------|--------|
| 64 | Methylbenzaldehyde            | 0.6    | 1.6    | 0.0    | 0.0    | 0.0    |
| 67 | Dimethylbenzenemethanol       | 12     | 0.0    | 0.0    | 0.0    | 0.0    |
| 111| Methylsalicylate              | 12     | 50     | 0.0    | 0.0    | 0.0    |
| 124| 2-Phenoxyéthanol              | 0.0    | 55     | 0.0    | 0.0    | 0.0    |
| 126| Benzothiazole                 | 19     | 23     | 17     | 12     | 4.2    |
| 137| Caprolactam                   | 0.0    | 186    | 0.0    | 0.0    | 19     |
| 156| N,N-dibutylformamide          | 0.0    | 5.5    | 0.0    | 0.0    | 0.0    |
| 249| Dibenzofuran                  | 2.8    | 0.0    | 0.0    | 0.0    | 0.0    |
| 240| Diphenylether                 | 0.0    | 0.0    | 0.0    | 4.8    | 73     |
| 252| Diphenylmethane               | 0.0    | 0.0    | 1.3    | 0.0    | 0.0    |

Soil 1: fields of Salif Sangaré (Bougouni); Soil 2: fields of Yacouba Doumbia (Bougouni); Soil 3: fields of Sidiki Sangaré (Bougouni); Soil 4: Laminabougou, fields of Madou Diarra (Niono); Soil 5: Minimana, fields of Modibo Diarra (Niono).

Soil phosphate in the soil 1, propylparaben into the soil 2, 3 and 5 and benzaldehyde in soil 3 and 5. Their concentrations from 248 mg/kg for methoxybenzene (soil 1), 1400 mg/kg for hexylbenzene (soil 2) 1216 mg/kg for diisobutylphthalate (floor 3) and 555 mg/kg for tetradecane (ground 5). Among the pesticides and chemicals identified in the different soil types we can cite the case of atrazine, carbofuran, endosulfan, the alkylbenzene, hexane (Alkane), phthalates, benzaldehyde and phenol. Atrazine, carbofuran and endosulfan. They are dangerous or toxic to the environment, very toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment. The alkylbenzene causes poisoning of the liver, increased tumors following dermal exposure of long-term damage to the skin, while phthalates (plastic) are toxic, dangerous to the environment and cause reduced fertility, a reduction in fetal weight, an effect on the liver and kidneys.

Among them, appears the di-ethylhexyl phthalate which is a high priority chemical compounds according to the WHO Phenol is environmentally harmful, irritating to the respiratory tract, causing the risk of eye damage, risk of impaired fertility. It is toxic to fish from 0.1 mg/l. Many toxic substances in the Bougouni and Niono soil can contaminate waterways through runoff, hence the need to make agricultural soil bioremediation.

Unlike non injected registered mortality rates exceed 98% witnessed in animals receiving lethal doses of commercial products considered (Table 3). The lethal effect more pronounced in mice depends on the toxicity.
Table 3. Determination of lethal doses of chemical consists revealed in soil samples Bougouni (Sikasso) and Niono (Segou).

| №  | Chemicals     | LD$_{50}$ mg/kg | DJA mg/kg | Position in surrounding                                                                 |
|----|---------------|-----------------|-----------|--------------------------------------------------------------------------------------|
| 1  | Alkylbenzene  | 2000            | negative  | Intoxication liver, tumors Increased Following dermal exposure Long Term, DAMAGE caused to the skin. |
| 2  | Hexane (Alkane)| 28,710          | 5         | Respiratory tract irritation, risk of skin absorption, nausea, prolonged exposure causes effects on the central nervous system. |
| 3  | Phtalates     | 338             | From 50  | Toxic, dangerous to the environment, reduced fertility, reduced fetal weight, effect on the liver, kidneys. |
| 4  | Benzaldehyde  | 1430            | 0.40      | Harmful to the environment, harmful by inhalation and ingestion. Irritating to eyes and respiratory system. |
| 5  | Phenol        | 400             | 0.12      | Environmentally harmful, irritating to the respiratory tract, eye damage risk, risk of impaired fertility. |

and the dose of injected pesticide. The lethal dose ranges from 7.36 mg/kg for endosulfan to 28,710 mg/kg in hexane (Alkane). Low values of lethal doses of the three (3) pesticide demonstrate their environmental toxicity. Expressions lethal doses of five (5) considered chemical compounds are large, so they are less toxic to the environment (except for phthalates). The various malformations are observed in some animal tests low concentration of toxic. An acceptable daily intake (ADI) is the amount of a substance per kilogram of body weight, which could absorb a person, daily, throughout his life, without causing him health problems. It is expressed in milligrams per kilogram of body weight of the individual per day (mg/kg/day). The excipient and joints impurities have no significant effect on results.

5. Conclusions

1) Three (3) pesticides are found in soil samples Bougouni (Sikasso) and Niono (Segou). This is atrazine, carbofuran and endosulfan.
2) Most biocidal identified persist in soil, disperse to other environmental systems (air, water) and result in mammals and man. A decrease in fertility, of reproductive effects, DNA damage, and cancer alters cell metabolism, neural activity, liver function and others.
3) The various malformations are observed in biota low concentration of xenobiotics found in samples of soils considered.
4) The lethal effect manifesting low concentration of active ingredients in their formulation reflects significant toxicity in test animals (mammals). The same effect is found in rats, mice and rodents nesting in Bougouni corn fields treated with carbofuran.

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