

## Effect of Continuous Application of Herbicide on Soil and Environment with Crop Protection Machinery in Southern Adamawa State.

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**ABSTRACT:-** This project summarizes information on field studies of detrimental effect of herbicide on soil and environmental pollution. A modern technology utilizing optimum management of herbicide as a tool for weed control has become a reality to increase yield and quality of Agricultural product. An extensive field survey with current knowledge and extrapolation in Southern Adamawa State had unveiled the systematic effect of herbicide on soil, environment and farm workers. Herbicide applied on soil at recommended levels rarely had negative effect on ground water contamination and fresh source of drinking water, leached and washed by rain or precipitation. Acute decrease of vegetable species fish and bird rely on. Devastation of microorganism and activities of biomass. Dependant on herbicide is 18% of farmers population in Southern Adamawa state. While sales and demand of herbicide is increasing geometrically as a chemical hoe for weed control. Impact on farm workers and operators with related cases of 35 acute poisoning 50 deaths and 57 contacted diseases from 2001 – 2011. It was observed in the field study that drift in wind beyond the un-intended targets effects people nearly, collection on their skin, food and supply breath into lungs, causing heart pain, ulcer, cancer, eye problem, nervous disorder, respiratory condition and some human breast milk.

**Keywords:-** Environment, Herbicide, Machinery. Soil,

### I. INTRODUCTION

Rapid technological advancement in new millennium had made herbicide a reality; agricultural scientist and chemical industries in invention of herbicide had speedily increase yield and quality of agricultural product for local consumption and raw material for agro industries.

For the purpose of this project, the southern Adamawa State as a case study had been inter pretend as a geographical region occupied; Demsa, Ganye, Guyuk, mayo/Belwa, lamurde, Numan, Shellen and Toungo.

The field study will examine the detrimental effect of herbicide on soil and environment pollution. Herbicides, also commonly known as weed killers, are pesticide used to kill unwanted plants.

About 70% of herbicides are used in USA as an agricultural pesticide. By and large, herbicide is widely use in agriculture and landscape management.

World health organization estimated that at least 3 million cases of acute poisoning and 20,000 death occurs annually due to exposure to pesticide (Orhii 2010).

Orhii (2010) report that there is a rapid annual increase in sales, use and dependence of pesticide in developing countries.

Herbicides have widely variable toxicity. The acute toxicity due to exposure had lead to long-term problems and a range of health effect from skin rashes to death.

The pathway of attack can be transported via surface run off and leaching to contaminate distant water source. Herbicides decompose rapidly in soil via soil micro bid, hence inhibiting the activities of micro organism in the soil. The field study in this project will focus on biological environment to evaluate accurate effect of pesticide on non photosynthesis micro-organism, invertebrates, birds and fish.

Herbicides have caused significant drop in bird population by decreasing vegetation which bird rely and had linked to decline in seed eating species. Most of the chemicals used ;in pesticide are persisted soil determinant which adversely effect soil conservation and impact may endure for decades.

Without continuous application of agro-chemical; it results in higher soil quality, more organic matter and allows higher water retention. This helps increase yield for farm in drought. Hence, the effect of pesticide on environment include:-

- i. A research performed at OAK National Laboratory (2000) showed that condition of pesticide run off effect fish and shell fish in gulf of Mexico each year

- ii. World watch (2000) reported farmers in China experience toxic chemical contaminating ground water on every inhabited continent, endangering the world most valuable supply of fresh water.
- iii. A study published in the journal of agricultural and food chemistry (2000) showed DDT, chlordane and some other organic chlorine pesticide keep showing up in lettuce, carrots, potato and vegetables planted in a garden heavily treated with chlordane 38 years earlier.
- iv. The indiscriminate use of crop protection machinery had contributed adverse effect on environment by careless and unprofessional handling of equipment.
- v. Drift beyond the intended spray site is even more likely harmful when, sprayed by large equipment such as tractor, and air craft. Operator directly inhaled fumes, come direct contact with dust, gas and vapor.

### 1.1 Scope And Limitation

The scope is an extensive study to investigation effect and continuous application Of herbicide on soil and environmental pollution with crop protection machinery in Southern Adamawa State. Its limited to nine Local Governments Areas to extensively carryout field study in a randomly selected sample of farmers for investigating the effect of herbicide on soil and environmental pollution.

### 1.2 Objectives Of The Project

The objectives which should be taken into consideration include:-

- (i) The effects of herbicide on soil (micro organism organic matter and vegetable bird and fish rely on).
- (ii) Environmental pollution of pesticide on human health and ecological areas.
- (iii) Careless and unprofessional handling of crop protection machinery.
- (iv) Guide lines for future safe use of pesticides on soil and environment.
- (v)

## II. METHOD

The research methodology focuses on the effect of continuous application of herbicide on soil and environmental pollution with crop protection machinery in southern Adamawa State./

The main source of information used for the case study was questionnaires. It was distributed to farmers in study zone. In a situation where some farmers could not read or write, oral interview was conducted to collect first hand information from farmers/stakeholders in a randomly selected villages and towns.

The questionnaires were both close and open ended. In the close ended, the farmer/stakeholder were given alternative choice of answer while the open ended questionnaire, farmers were allowed to expressed their views freely.

Other sources of information are from technical reports, internet system, oral questions and journals.

### 2.1 Population and Sample Size

The population of the study area are farmers, the areas under study was stratified in five Local Government Areas, Ganye, Jada, Mayo, Numan, Toungo, which was considered geographically to represent southern Adamawa State, randomly selected for effective coverage of southern Adamawa State, detail is shown in Table 3.1.1

**Table 2.1.1 Number of farmers and sample size**

S/No	Local Government Area	No. Of Questionnaires Distribution	No. Of Questionnaires Retrieved
1	Ganye	25	24
2	Jada	25	25
3	Mayo	15	15
4	Numan	20	21
5	Toungo	15	13
	<b>TOTAL</b>	<b>100</b>	<b>98</b>

Source: Field survey 2012

Hence, hundred copies of questionnaires were distributed and out of these numbers 98 questionnaires (98%) were dully filled and retrieved for data analysis.

### 2.2 Method of Data Analysis

Tabulation and simple percentages were employed for the analysis. Inference and conclusion were drawn based on the percentages.

### 2.3 Problem Encountered

In distribution of questionnaires a lot of problems were encountered, which include, wrong answers to the administered questionnaires by a farmers and misconception of the main purpose of field study.

In addition, some farmers are not willing to give adequate information and misinterpretation of the questionnaire to the farmers who cannot read and write.

### III. RESULT AND DISCUSSION

The qualitative data collected from field survey and interpreting of results are discussed in this chapter. Data were tabulated and general trend were analyzed.

Qualitative estimates of the effect of herbicide on soil and environmental pollution was presented in four references from the data base.

#### 3.1 Herbicide as management tool for weed control

##### 3.1.1 Procurement of herbicide

Source	Number of respondent	Percentage
Marked	71	72.0%
Reg. company	20	20.5%
Stakeholder	5	5.5%
Government	2	2.5%
<b>Total</b>	<b>98</b>	<b>100</b>

Source: Field Survey (2012)

TABLE 4.1.1 showed the procurement of herbicide. Out of 98 responded, 72% purchase their herbicide directly from open market. This shows that farmers are not purchasing pesticide from registered companies and government agents. There is possibility of adulteration of herbicide, which may affect its efficacy.

##### 3.1.2 Duration of Exposure to Herbicide

Duration (Years)	Number of respondent	Percentage (100%)
1 - 5	48	50.0
6 - 10	28	29.0
Above 10	22	21.0
<b>Total</b>	<b>98</b>	<b>100</b>

Source: field Survey 2012

The qualitative analysis indicated that majority of farmers were exposed to herbicide for duration of 1 – 5 years. The exposure to herbicide from 2001 – 2011 lead to problems of contacted diseases, acute poisoning and death of farm workers in southern Adamawa State.

##### 3.1.3 Impact of Herbicide on Farm Workers (2001 – 2011)

Problems	Total Number of Farmers
Contacted disease	57
Poison	35
Death rate	50

Ill health and contacted disease is owing to continuously exposure to spray gas and fume from crop protection machinery. Drift beyond intended spray site is more likely harmful when spray by large equipment such as boom spray and air craft. Drift affect people by collecting on their skin, food and supply breathe ion their ways.

Field survey and study 2012 unveiled most of contacted disease farmers are complaining include, heart pain, skin rash, eyes problems, nervous disorder and respiratory condition.

Field report and studies have showed that herbicide is in human breast milk.

##### 3.1.4 Dependant on Herbicide as Chemical Hoe for Weed Control

Area (ha)	Number of respondent	Percentage 100%
1- 2	46	47
3 -5	24	24.5
6 - 10	7	6.5
Above 10	23	24
<b>Total</b>	<b>98</b>	<b>100</b>

Source: field Survey 2012

Field studies in table 4.1.4 showed the dependant of herbicide as a chemical hoe for weed control is gradually increasing, the sales and demand of herbicide is 46% of farmers population in southern Adamawa State. Report unveiled continuous use of herbicide is 81% of the farmer population. If precaution is not taken for future years it may leads to negative effect on soil, environment, ecosystem and ill health of farm workers.

## 3.1.5 Effect Of Herbicide On Soil

Group	No. Of responded		Percentage 100%
	Effect category %		
	Negative Effect	No Effect	
Decline of micro organic activities	63	37	
Soil degradation	82	18	100
Reduction of water retention in soil	80	20	100
Impact may endure for decades and affect soil conservation	87	13	100
Continuous application decrease organic matter	85	15	100

Source: field survey 2012

TABLE 4.2 field studies have showed that herbicide is sensitive chemical in soil. It build up toxic effect and endure for decade, it reduces organic matter, water retention capacity, soil conservation and fertility.

The activity of biomass is drastically affected in the soil. Field observation unveiled that earth worm cast and burrowing micro organism have been destroyed and disappeared completely due to continuous use of herbicide.

Table 4.3 Effect Herbicide on Environment

Group	Percentage of responded		
	Effect Category %		
	Negative Effect		Total 100%
Variable toxicity to mammal and fish	98	2	100
Source of fresh water and under ground water contamination	56	44	100
Decrease of vegetable bird and fish rely on.	83	13	100

Source: Field Survey 2012

In 1992 field study published on effect of herbicide in journal of bio-science, reported over 67 million bird die each year of pesticide explosive on USA farms.

Health effect and environmental pollution had become wide spread in southern Adamawa State. The possibility of under ground water contamination, when rain or precipitation washed herbicide into "water way" or "drainage" including drinking water.

Field study report showed that there is critical decrease of vegetables in rural areas, in which farmers rely on and species of grass bird and fish rely on.

## 3.1.6 Impact on crop Protection Machinery Operators

Types of operators	Number of respondent	Percentage
Professional	22	22.5
Un professional	23	23.5
Not trained	43	44.0

<b>Others</b>	<b>10</b>	<b>9.0</b>
<b>Total</b>	<b>98</b>	<b>100</b>

**Source: Field Survey 2012**

TABLE 4.4 shows the impact on operators, in which 44% of farmers involved in spraying herbicide are not trained operators.

Owing to their close contact and exposure, operators and farm workers are especially vulnerable to health effect on herbicide, field study reported by environmental protection agency (EPA) that 10,000 – 20,000 related incident each year.

Out of 27 most common pesticide identified by US. Environmental protection agency (EPA) 15 are considered with additional link to nervous disorder and respiratory condition.

Operators come directly to inhale fume or direct contact with dust, gas, vapor or spray mix – beyond the intended spray site is even more harmful, when spray by large equipment such as tractor and air craft.

Negative effect include killing of fruits and vegetables on large scale. Fumigation have been linked to loss other agricultural resources in southern Adamawa State such as death of fish in rivers, stream and ponds as well as livestock grazing on sprayed fields.

#### IV. CONCLUSION

Herbicide as a management tool for weed control optimum production practices had been a reality to increased yield and quality of Agriculture product.

Globally world health organization estimates that at least 3 million cases of acute poisoning and 20,000 deaths occur annually due to exposure to pesticide (Orhii, 2010).

In view of report from field survey in southern Adamawa State 2012 had leads to problem of procurement and continuous exposure to herbicide. The qualitative and tabulated report of data base, interpreted has detrimental effect on soil and environmental pollution.

Most of the farmers are complaining of contacted diseases, acute poisoning and health. Ill health and contacted disease include ulcer, heart pain, skin rashes respiratory condition and eyes problem. The handling of toxic chemicals has sensitive effect on soil. Field study unveiled acute decrease in bio-mass, organic matter soil degradation, low average of precipitation and water retention in the soil.

The result further states that there is a rapid and increase in sales and depending on herbicide in southern Adamawa State. In view with the result of field survey 2012, environmental pollution had detrimental effect on vegetable tables, and species of grasses bird and fish rely on.

Contamination of under ground water when rain or precipitation is washed herbicide into rivers, ponds through water ways and drainage.

There is acute devastation of bird, fish, ecosystem and decrease in vegetables they rely on.

In addition, the drift can affect people nearby, collect on their skin and food materials. Operators come directly to inhale fume, dust, gas and vapor or spray mix.

Negative effect include killing fruit and vegetable on large scale, fumigation like “fog” has been linked to losses of agricultural resources, such as fish, bird and live stock.

Therefore, the effect of herbicide on soil and environmental pollution can cause problem on soil, and environment in future years in southern Adamawa State.

The following recommendation and suggestion will decrease the detrimental effect and safeguard the use of agro-chemicals.

##### 4.1 Recommendation

- i. Sales and use of herbicide must be legible to read the hazard and precaution for handling.
- ii. Herbicide registered with NAFDAC and recommended for use.
- iii. All chemical should store away from food stuff to prevent accidental ingestion and contamination.
- iv. Washing of sprayers and empty containers should be avoided in rivers, streams and near source of drinking water.
- v. Use of personal protective equipment should be encouraged, reduce rate of in inhaling fumes, gas dust and spray vapor.
- vi. Improved public enlightenment company’s by out market to market sensitization and educates marketers as on the danger of retail banned and sub standard products.
- vii. Procurement of an anti-counter-feiting agro – chemical factory equipment from USA base company by Federal Ministry of Agriculture and Water Resources.
- viii. Inspection of imported herbicide at all ports of entry to ensure compliance with requirement.
- ix.

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