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EFFECTS OF WEED CONTROL METHODS ON ITCH GRASS (ROTTBOELLIA COCHINCHINENSIS), GYAAZÁMÁÁ (auctt.) ON MAIZE PRODUCTION IN ZAMFARA STATE, NIGERIA

By Dr. SANI HAMZA

Zamfara Agricultural Development Project PMB 1020, Samara, Gusau Zamfara State

shgusau@yahoo.co.uk +2348138114920

Abstract

Weed is a limiting factor to crop production as it hinders the attainment of food security in sub Saharan Africa where hunger is a constant threat. Rottboellia cochinchinensis is tropical weed that usually emerges towards the end maturing of most cereal crops. But with use of some pre and post emergence herbicide Rottboellia cochinchinensis is now emerging early on farms competing with produced corn crops. The study aimed to compare the method in control of Rottboellia cochinchinensis on corn field in Zamfara state. Fifty (50) farmers were selected for the study in four selected local governments out of fourteen local governments in the state. Based on the survey conducted in the maize growing areas it was found that the maize production in these areas suffers greatly due to weed problem, which offers many limitations to crops. The result of the study revealed that there are emergence of rotteboelia cochenchinensis after chemical herbicides spray at the mean of 3.8 and its Severances of Itch grass was also found to be high up to 3.2 and 0.645 standard deviation the effectiveness of post emergence herbicide was found low at 2.16 mean value and standard deviation 0.473 while mechanical weed control furnish continuous and effective weed control at 2.44 mean value lower to that of chemical weed control, thus unyielding emergence of rottboellia cochinchinensis was found to be high at mean

value 3.8 and standard deviation 0.408 but occur towards the end rainy season. The study suggests that weed control mechanisms should embrace better understanding of weed biology as tool in weed control.

Key words: chemical weed control, Effects, Herbicides, Maize, Rottboellia Cochinchinensis mechanical weed control**.**

1.0 INTRODUCTION:

Maize production in Zamfara state is faced by Many factors responsible for the low yields most critical appears to be the weed growth competing with crop for nutrients, water, sunlight and space. Environmental variables; such as dry spell, drought, depleted soil by wind and water erosion, deforestation, desertification and other Environmental and Social Impact are contributing factors that hinders the productivity of maize production in many parts of the tropical environments of the world [11]. The two ecological zone of Zamfara the northern guinea savanna and southern Sudan savanna offer best fertile soil for maize production. Increase in weed competing with our crops cost a lot of cultivation, which lowers value of land, and reduces the returns of corn producers. Soil a very important factor and an exceptional resource, continues to face threats from erosion, which poses a great danger to agricultural production [1].Corn-based cropping systems in the Zamfara are not heavily dependent on herbicide but with introduction of zero tillage in the dense grass land the use of herbicide started to become widely in maize cultivation. Post emergence herbicides (gramazone and glyphosate) Pre-emergence herbicides like atrazine, Metolachlor, were the first chemical introduce to the farmers, the constant use of these herbicides resulted in an increasing number of herbicide-resistant weeds.

2.0 Problem statement

Maize production in Zamfara state had remarkably increased with the use of herbicides in weed control there have been large field expansion for its production in almost new expanded farming areas from 2004. The traditional methods of weed control by hand weeding and inter culturing are becoming costly, tedious, labour intensive and time consuming. Hence, herbicides are being

increasingly used for weed control. However, one of the obstacles to obtain greater productivity from the fields is the control of resistance weeds Rottboellia cochinchinensis also known as Itch grass, is a vigorous and can produce 16,000 seeds [11], It is an aggressive species, with wide distribution that can cause crop loss or even abandonment of agricultural lands Poor resource farmers in tropical areas devote substantial amounts of time and inputs to control itch grass in subsistence crops [5], [16] similarly, Zamfara corn fields are continuously affected by severe early emergence of this Stubborn weed that is competitive heavily for nutrients with maize and sorghum. The presence of weeds Rottboellia cochinchinensis, in crop fields also has an indirect economic impact. Weeds are secondary hosts to insect crop pests. The quality of a harvested crop (fodder, seeds, etc.) will be reduced, and sometimes the whole production even has to be discarded if it is mixed with weed debris or seeds In view of the danger posed by corn weed (Rottboellia cochinchinensis), and the difficulties encountered on our farmers' fields. This is one of the reasons that necessitate this study to find out the lasting solution for our maize farmers. The finding would be of paramount importance and useful to chemical companies, project implementers, Policy Makers farmers and Students.

2.0 Literature review:

Itch grass has adverse effects on livestock and humans. If the weed growth is advanced, workers in some areas refuse to go into the fields for weeding, because the fiber-glass-like needles in the area of the leaf sheath can penetrate hands and clothing and result in painful infections. In Ceylon it is considered to be dangerous for stock because the stiff hairs may lacerate the animals' mouths and intestines [5].

3.0 Materials and Methods

3.1 Methodology

Zamfara State is located between latitude $10^{0}40^{1}$N – $13^{0}40^{1}$N and longitudes $4^{0}30^{1}$E – $7^{0}06^{1}$E. The state has an estimated area of about 38,000km^{2}, about 50% of which is cultivated. The rains usually commence in May/June and end in September/October. The effective rainy season in the study area is restricted to July to mid-September [17].The ecology, which can be divided into Sahel, Sudan and Northern Guinea Savannah. The Sahel vegetation is found in northern-most fringes near the border with Republic of Niger. The mean annual rainfall ranges between 969

mm and 1,086 mm. Relative humidity varies between 24% in January and rises to 85% in September. The mean annual temperature also varies between 29^0C and 37^0C [20].The Sudan Savannah covers most of the northern and central parts of the State and is the predominant ecology of Zamfara State. The average annual precipitation in the Sudan region is between 550 and 900mm, while the growing period ranges between 90 to 165 days, southern end of the state is typically Northern Guinea Savannah ecology, characterized by annual precipitation of more than 900mm and growing period of 150 days or more([19], [9]).

3.2 Sampling Procedure

This study was carried out in maize farming areas of Zamfara state with farmers who used from the period of from 2004. Sample of 50 farmers that both practice chemical and mechanical weed control were selected. Two different weed control activities were used to analyze their effect on corn production using descriptive statistics. The data on weed emergence after herbicides application and mechanical tillage, the yield effect, plant physical growth, effectiveness of chemical control on the weed, effect on human health, were imperilled to analysis of coding, observation notes, field notes, and conversation with staff and farmers in the study area.

3.2.1 Sources of Data: Data were collected from both primary and secondary sources. Primary data were collected by means of a structured interview schedule, developed and used for gathering relevant information from the farmers. The instrument was administered to the respondents with the assistance of the extension agents who interact directly with the farmers at the local level. Secondary information was obtained from ZADP, ZACAREP, and IAR/ABU, Zaria.

Table 1: Soil physico-chemical characteristics at the selected site in the Savanna agroecological zone of zamfarastate Nigeria.

LG A	Tsafe	Gusau	Maru	Bukkuyum
Mean annual rainfall	550-900mm	550-900mm	550-900mm	550-900mm
Geology	High plain	Granite	Plateau	High plain

	Inselberg		Crystalline	Inselberg
Soil	Loamy-Clay	Loamy, Sandy loam	Loamy-clay	Loamy, Sandy loam
Natural vegetation	Sudan savannah	Sudan savannah	Sudan savannah	Sudan savannah
Population	266,008	383,162	291,900	211,633

Source: [15],[20].

Geology, the state is characterized by very old igneous and metmori rocks, formed during the Precambrian paleo; state era. Two rocks types are found granites meta sediments. The granite (including undifferentiated granites), gneisses and migmatites are lively resistant to erosion, but when weather they result to poor soils. The Meta sediments, neral the other hand, consist of phyllites, quartzise and meta sconglomerates. Although to meta sediments are also resistant to erosion, weathered, they give rise to more fertile soils account of the fact that the schists are rich in a magnesium minerals. In the general, the relief of the state bears relationship to its geology. The state land surfa is made up of mainly the plains (being part local the Hausa plains of northern Nigeria([15], [20]).

4.0 Results

Table 1 socio-economic characteristics of the respondents

variables	Category	Frequency	percentage
Age	<30	5	10
	31-40	35	70
	41-50	3	6
	>50	2	4
sex	Male	45	90
	Female	5	10
Farm location	Bukkuyum	12	24
	Gusau	12	24
	Maru	14	28
	Tsafe	12	24
Farm size	1 5	40	90
	6 10	3	6
	11 15	2	4
Farming exp.	1 5	5	10
	6 10	40	80
	11 15	5	10

	Mean	2	
	Std. Deviation	0.452	
Type of weed	mechanical	25	50
control	Chemical	25	50

Sources: field data survey, 2019

The chemical weed control (CWC)methods applied significantly affected the degree of early emergence of itch grass on the maize crop table below illustrated that heavy and early emergence of rotteboelia cochenchinensis in corn field occurs more than in mechanically weed control fields. Emergence of rotteboelia cochenchinensis was observed after chemical herbicides spray at the mean 0f 3.8, traditional the occurrence this type of weed are toward end of rainy season but early emergence of this weed was found to be after chemical weed control this correlated with repot of [2] that such weeds have ability to grow well in habitats disturbed by human activity. They are plants that are growing where someone does not want them, and often that is in areas that have been disturbed or altered intentionally. Weeds grow especially well in gardens, cropped fields, golf courses, and similar places. Their ability to grow in habitats that have been disturbed by man makes them a kind of ecological Red Cross: They rush right into disturbed places to restore the land.

Not all weeds possess every single characteristic that is considered undesirable, but in addition to growing in disturbed habitats, all have at least some of the following characteristics [2]:

- Weeds resist control, including resistance to herbicides.
- Environmental plasticity.
- Weeds are ubiquitous. They exist everywhere that we practice agriculture.

Severances of Itch grass was also found to be high with this method of weed control where the stands was up to 3.2 and 0.645 standard deviation majority of the farmers had acknowledge the severe appearance and competition of the Itch grass growth this tallies with the report that farmers acknowledge its rapid growth and yield-reducing effects as the most detrimental characteristics of itch grass and recognize the large amount of seed it produces([16] [7]). The

appearance Itch grass occurs at growing stage of maize and sorghum crops different from its usual tradition appearance as late season weeds in the Sudan savanna but with the use of atrazine, and metolachlor, on corn field. Rottboelia cochinchinensis was the most dominant among all other species .this is an agreement with [13] that, metolachlor and atrazine do not control R. cochinchinensis its germination and emergence from soil depths of 15 cm probably contributes to the poor control with pre-emergence (PRE) herbicides.

Maize is the one of the most sensitive crop to weed competition and loss of grain yield and Rottboelia cochinchinensis is weed that are the same in appearance, Competition between crop and weed is most severe when the competing plants have similar vegetative habits and demand upon same resource. [18]. these weeds share certain characteristics, including the following:

1. Long seed life in soil

2. Quick emergence

3. Ability to survive and prosper under the disturbed conditions of a cropped field

4. Rapid early growth

5. No special environmental requirements for seed germination

Weeds are usually defined primarily by where they are and how that makes someone feel about them. The fact that they may have shared characteristics means we may be able to define and classify them based on what their genotype enables them to do.

Table 2: effect of chemical weed control on itchgrss emergence

variable	mean	std. dev.	min.	max
used chemical weed control	3.4	0.5	3	4
post emergence herbicide	2.28	0.678	2	4
pre-emergence herbicide	3.44	0.583	2	4
observed emergence of IRC	3.8	0.408	3	4
Severances of IRC	3.2	0.645	2	4
Effectiveness of IRC control by use of post emergence	2.16	0.473	2	4

herbicide

Sources: field data survey,2019

Not all weeds possess every single characteristic that is considered undesirable, but in addition to growing in disturbed habitats, all have at least some of the following characteristics [2]:

- Environmental plasticity
- Weeds resist detrimental environmental factors. Most crop seeds rot if they do not germinate shortly after planting.
- Weed seeds exhibit several kinds of dormancy or dispersal in time to escape the rigors of the environment and germinate when conditions are most favorable for survival.
- If a weed is cross-pollinated, pollination is accomplished by non specialized flower visitors or by wind.
- Dual modes of reproduction. Most weeds are angiosperms and reproduce by seed. Many also reproduce vegetativelly (e.g., Canada thistle, field bindweed, leafy spurge, quackgrass).

  While most roots are in the top foot of soil, Canada thistle roots routinely penetrate 3 to 6 feet and field bindweed roots have been recorded over 10 feet deep.
- Perennials have brittleness in lower stem nodes or in rhizomes and roots, and, if severed, vegetative organs will quickly regenerate a whole plant.
- Weeds are ubiquitous. They exist everywhere that we practice agriculture.
- Weeds resist control, including resistance to herbicides.

The result of the study on table 3 revealed that Mechanical weed control (MWC) gives continuous and effective weed control though the result indicated 2.44 mean value lower to that of chemical weed control. Mechanical weed control or manual weed control is a practical and efficient method of eliminating weeds in cropped and non-cropped lands. It is very effective against annual and biennial weeds. However the indicated low effectiveness of 1.88 mean values which means the rate and time of unavailability of manual labour required on large field cost in increase of weed plant growth this in consistent with the report by [3] that role of herbicides is significant preposition herbicides not only control the weed timely and effectively but also offer great scope for minimizing the cost of weed control. Similarly from table 3 shows that 1.2 mean

value and 0.408 standard deviation mechanical weed control which doesn't enhance or facilitate the emergence of rottboelia cochinchinensis but rather reduce the continues development of its growth by illuminating it before it flower and seeds this agreed with [10] whom found that mechanical cultivation of maize consisting in of inter-row and earthing up twice, was more effective than a herbicide. In addition atrazine is an herbicide registered in united states and also use in Nigeria for control of broadleaf weeds and some grassy weds. It is currently used on corn, sorghum, sugarcane. Many atrazine-tolerant mutations have begun to appear in weeds and this tolerance is predominately based on detoxifying atrazine by binding it to glutathione, a mechanism in naturally atrazine-tolerant corn [6].

Table 3 effectiveness of mechanical weed control

variables	mean	std,dev	min.	max.
used mechanical weed control	2.44	0.651	2	4
effectiveness of mech. W.C	1.88	0.44	1	3
observed IRC after M.W.C	1.2	0.408	1	2
Severances of IRC emergence after mech.weed control	3.8	0.408	3	4

Sources: field data survey ,2019

Tough emergence of rottboellia cochinchinensis was found to be high at mean value 3.8 and standard deviation 0.408 but occur towards the end cultivation of maize crop which at that does not have impact on crop growth and performance. Competition of weeds with crops plants depends on their stage of growth development and species, abundance of nutrients in the habitat, cultivation techniques and the crop they are growing in ([8],[14],[4]).

Conclusion:

The introduction of herbicides in the state has led to increase in crop yield, farm expansion and reduce drudgery among farmers; Integrated weed management is however found effective way and effective to weed control, alternative control measures involves a combination of cultural, mechanical, biological, genetic, and chemical methods for an effective and economical weed control that reduces weed interference with the crop while maintaining acceptable crop yields

Recommendation:

The results of this study lead to make these recommendations. Farmers should use integrated weed management Mechanical weed control or manual weed control is a practical and efficient method of eliminating weeds but rate and time of unavailability of manual labour required on large field cost in increase of weed plant growth. While use of maize selective pre emergence herbicide (atrazine, & Metolachlor) is significant not only control the weed timely and effectively, however induce early emergence of stubborn weeds thus combination of integrated weed control becomes necessary. The study also recommend the herbicide chemical companies and researchers intensify effort to produce maize selective herbicides through weed control mechanisms of better understanding weed biology as a tool of weed control.

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