Gashua Journal of Irrigation and Desertification Studies
Available online at www.gjidsfugashua.org.ng
Volume 2, Issue 2

INCIDENCES AND SEVERITY OF WEED SPECIES IN MAIZE/COWPEA INTERCROP AT SAMARU NORTHERN GUINEA SAVANNA OF NIGERIA

Shinggu, C. P. and Gani, M.

Department of Crop Production and Protection
Federal University Wukari
Corresponding author:chibiyasp@yahoo.com

Abstract

Experiments were conducted on maize/cowpea intercrop at the Research Farm of the Institute for Agricultural Research, Ahmadu Bello University Zaria, (11^0 11^1 N 38^0 E) in the Northern Guinea Savanna of Nigeria. Samples of weeds were collected to assess the occurrence and severity of noxious weeds and other broad leaved weeds. *Eragrotis ciliaris***,** *Eleusineindica* and *Rottboelliaco chinchinesi*s were widely spread in the three years of the study (2010, 2011 and 2012). The incidences were generally higher in 2012 in all cases. *Striga gesneroides, Alectra vogelii* and *Cuscuta australis* were found in all the blocks and they increased on yearly bases. Generally, across board, weed infestation increased on yearly bases.

Keywords: Noxious Weeds, Incidences and Severity

INTRODUCTION

The invasion of noxious weeds has become a threat to research activities on the Research Farm of the Institute for Agricultural Research, Ahmadu Bello University Zaria.The weeds species cut across all the group of weeds which include grasses, parasitic weeds and broad leaved weeds. The grass weeds *Eragrotisciliaris, Eleusine indica* and *Rottboelia cochinchinensis*and *cuscuta* infest all types of crops they are not host specific, while *Alectra vogelli* and *Striga gesneroides* attack only leguminous crops host specific. With the exception of *Alectra vogeli, Striga gesneroides and Cuscuta* these weeds are among the 18 most serious weeds from a world-wide perspective on the bases of their distribution and prevalence in crops. *Striga* has a wide range of adaption and infest cereals crops. In addition to competition for growth resources, *Cynodondactylon* have allelophatic properties, which affects the associated crop in the field (Horowitz and Friedman, 1971). These weeds cause substantial yield losses in various crops and their control result in the increase in the cost of crop production. *Alectra* is more prevalent in the Sudan and Northern Guinea Savanna zones (Aggarwal, 1985, Emechebe *et al.,* 1991*). Striga gesneroides* and *Alectra vogelii* have been reported to cause from 80% yield loss to total crop failure in cowpea (Lagoke, 1989 and Atokple *et al.*,1991).Cuscuta (Dodder) is a member of the Cuscutaceae family. It is a holoparasite, devoid of Chlorophyll (Dean, 1942). A single plant of dodder is capable of

producing branches, whose total length can be up to 0.8km (Dean, 1942). Kuijt (1969) reported that Cuscuta is only second to mistletoes in parasitism. Invasion of the study plots by Cuscuta is a new development (2000-2002). In view of the threat to research activities by noxious, it has become necessary to assess the level of occurrence (incidences) and severity (frequency) of the various weeds.

MATERIALS AND METHOD

Field studies were carried out from August and early November cropping seasons of 2009 to 2012, to evaluate the occurrence (incidences) and frequency (severity) of noxious, broad leaved and parasitic weeds at the Research farm of the Institute for Agricultural Research, Ahmadu Bello University Zaria. A farm of about 18 m² was divided into 3 blocks. The field was planted with Maize and Cowpea as intercrop for a period of 3 years. The occurrence of weeds in each block was assessed by identifying the block infested with a given weed species irrespective of the level of infestation. The percentage of the number of plots infested by a given weed species in each field was computed and reported as weed incidences, weed severity assessment was done by careful inspection of the individual block, and the severity (frequency) of infestation by each weed species was scored using assessment scale of 1-9 for parasitic weed and 1 – 5 for stubborn weeds. Where scale (1) represented no weed cover and scale (5 and 9) complete weed cover by a species. In this case, the scoring was done at 5 randomly selected locations within each block.

RESULTS AND DISCUSSION

Table 1 shows the major weed species found in the experimental field. There was a steady increase of all the weeds found in the field on a yearly base.

Incidences of Grasses, Broad Leaved and Parasitic Weeds

There was a wide spread occurrence of *Eragrotisciliaris* and *Rottboelliacochinchinensis* in all the blocks and in all the cropping seasons of 2010, 2011 and 2012 respectively (Table 2).

The incidence of *Eragrotis ciliaris Eleusine indica* and *Rottboelliacochinchinensis* was greater in 2012 raining seasons in all the blocks. In all cases, the weeds increased on a yearly base.

Among the broad leaved weeds, *Vernonea cinerea, Solenostemon monostachyus, Chromoleana odorataIpomoeaeriocarpa, Celosia laxa, Acanthuspermum hispidum* gave the highest incidence in 2012 followed by 2011 (Table1). Low incidence of *Strigagesneroides* and *Alectra vogelli* was observed in

2010 and 2011, while higher incidence was observed in 2012. *Alectra vogelli* was observed in all the blocks with a range of 5-60%, *Striga gesneroides* 5-25% cuscuta occurred in all the blocks of the field of study with a range of 5 – 48% in various blocks. Cuscuta was found on the field in all the years of study with steady increase in severity as the years go by.

Severity of Grasses, Broad Leave and Parasitic Weeds

The severity of *Eragrotis ciliaris* and *Rottboellia cochichinensis, Vernonia cinerea,Solenostemon monostachyus, Cuscuta odorata* and *Ipomoea eriocarpa*

ranged between 1.5 to 4.5 with the highest severity score occurring in 2012.

Eleusine indica, Chromolaena australis, Commelina benghelensis, Amaranthus spinosus, Ludwigia hypssopifolia and *celosia laxa* schum had low severity in 2010 and 2011 and moderate severity in 2012.

The blocks infected with *Alectra vogelii* and *Striga gesneoides* were generally of low severity except in 2012 where *Alectra vogelii* infestation was severe. Infestation by cuscuta was very severe in all the blocks except block 'C' in 2011 where the severity was up to 4.5 (Table 3)

In general there was a high infestation of noxious weeds in 2012. This could be attributed to the weed management practices adopted and the inherent characteristics of the weeds. The correct control measures provide only immediate remedy for the perceived problem but have no long term solution. Weeds like *Rottboelliaco chinchinensis* and parasitic weeds such as *Alectra vogelii* and *Striga gesneroides* need to be managed over an extended period of time to be able to eradicate or control them successfully. Individual culture, chemical or biological control methods would not solve all the weed problems, but may only exacerbate the problem caused by certain species (Kuijt, 1969). The weed factors responsible for the spread of noxious weeds include the production of large number of seeds as in the case of *Rottboellia*,*Striga gesnerioides* and *Alectra vogelii* (Aggarwal, 1985, Bebawi *et al*., 1984). This can be seen in Table 1 which shows the progressive increase in infestation of these weeds from the year 2010 to 2012. The seeds of *Striga* and *Alectra seeds* are very tiny, and are disseminated by wind, rain water, animals and Agricultural equipment (Emechebe *et al*,, 1983., Lagoke 1989). The seeds of *Striga, Alectra* and *Cuscuta* can survive in the intestinal tract of livestock and are spread through the faeces of animals that feed on the matured weed plants (Kuinjt, 1969, Aggarwal, 1985). Another factor responsible for the persistence of noxious weeds is seed dormancy. Seed of *Striga* and *Alectra* are said to remain viable in the soil for a period that range from 6 months to 20 years, depending on climatic condition of the area (Babawi *et al.*, 1984).

The infestation of broad leaved weeds like *Vernomia Cinerea, solenostemonmonostachyus, Ipomoea eriocarpa, Cassia obtbtusifolia, Crotolaria retusa, Hyptis lanceolata celosia laxa* schumand parasitic weeds like *striga* and *Alectra* were greater in 2011 and 2012 cropping seasons. *Rottboellia* weeds emerged late in the season but characterized by rapid growth and quick seed formation. This factor could be responsible for the wide spread of the species in the northern Guinea savanna zone of Nigeria. *Striga* and *Alectra* are root parasite that need root exudates from host plant to germinate (Parker, 1985). Cuscuta requires an existing plant to survive because it is a holoparasite (Dean, 1942). To get a meaningful result from research, serious attention must be given to noxious weeds species. The distribution and severity of *Striga* and *Alectra (*Table 3) should be taken with caution, because the situation is likely to get worst than the present observation since there is increase in weeds every year and since the weeds only emerge in the presence of host plant. Generally, the farm in question is likely to be destroyed by the increasing incidence of the weeds in the

rear future thus making the place not conducive for cropping. It is therefore, important that an integrated control approach be used to be able to achieve a lasting solution to noxious weeds infestation on the farm which will eventually reduce the cost of production and increase research efficiency. Cuscuta is also threatening seriously and since it parasitize on any plant, it is likely to be a very serious problem in the nearest future since the incidence and severity increase on a yearly bases as reflected in table

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Table 1: Major Weed Species at the Experimental Site and their level of Infestation

WeedSpecies	***2010***	***2011***	***2012***
Grass weed			
*Eragrostis ciliaris (*Linn.)R.Br	X	XX	XXX
ELeusine indica Gaertn	X	XX	XXX
Rottboellia cochinchinensis(Lour)Clayton	X	XX	XXX
Broad Leaved Weeds			
*Vernonia cinerea (*Linn.)Less	X	XX	XXX
*Solenosteman monostachyus(*P.Beauv.	X	XX	XXX
Chromoleana oduratus	X	XX	XXX
Ipomoea eiopcarpa R.Br	X	XX	XXX
Cassia tura L.	X	XX	XXX
Crotolaria retusa Linn	X	XX	XXX
Commelina benghalensis L	X	XX	XXX
Hyptis Lanceolata Poir	X	XX	XXX
Acanthospermum hispidum DC	X	XX	XXX
Amaranthus spinosus Linn	X	XX	XXX
Luduwigia hypssopifolia (G.Don.)	X	XX	XXX
Celosia laxa Schum&Thonn	X	XX	XXX
Parasitic Weed			
Alectra vogelii Benth	X	XX	XXX
Cuscuta australis R.Br	X	XX	XXX
Striga gesneroides(Willd.) Vatke.	X	XX	xxx

X = 20-40%, XX = 40-60%, XXX = 60-100

TABLE 2 a: The Incident of stubborn Grass Weeds on the Field during the 2010 to 2012 Cropping Seasons at Samaru

	WEED INCIDENCE (%)								
BLOCK	***Eragrotis ciliaris***			***Eleusine indica***			***Rattboellia cochinchinensis***		
	2010	2011	2012	2010	2011	2012	2010	2011	2012
A	40	68	90	53	67	86	80	80	90
B	45	67	86	57	65	93	38	50	69
C	55	52	89	70	80	90	40	61	70

Table 2 b: the severity of stubborn grass Weeds on the field during the 2010to 2012 cropping seasons at Samaru

WEED SEVERITY SCORE									
Block	***Eragrotis ciliaris.***			***Eleusine indica.***			***Ratthoellia cochinchinensis.***		
	2010	2011	2012	2010	2011	2012	2010	2011	2012
A	3.5	1.7	2.1	2.5	1.5	4.5	2.9	2.9	2.1
B	1.5	1.5	4.5	1.8	1.5	2.4	1.8	3.5	2.6
C	2.7	2.5	2.1	4.0	2.9	2.1	3.5	2.5	4.0

Weed severity score using a scale of 1-5, where scale 1 represents no weeds and scale 5 represents complete ground cover by the given weed species

Table 3 a: The Incidence of Parasitic Weeds on the Field during the 2010 to 2012 Cropping Seasons at Samaru

Weed Incidence									
Block	***Alectra vogelii.***			***Striga gesnerioides.***			***Cuscuta australis***		
	2010	2011	2012	2010	2011	2012	2010	2011	2012
A	20	30	60	10	13	25	5	29	40
B	5	13	25	8	10	15	8	15	48
C	8	15	27	5	13	20	17	23	45

Table: 3 b Severity of Parasitic Weeds on the Field during the Cropping Seasons of 2010 to 2012 at Samaru

WEED SEVERITY									
BLOCK	***Alectra vogelli***			***Striga gesniroides***			***Cuscuta australis***		
	2010	2011	2012	2010	2011	2012	2010	2011	2012
A	2.0	3.0	6.0	0.5	8.0	7.0	1.0	2.2	0.9
B	1.0	8.0	0.7	0.5	0.5	0.8	0.5	0.8	1.0
C	0.5	0.8	2.2	1.0	8.0	2.2	4.5	0.7	1.0

Weed severity score using scale of 1-9, where 1 represent no weeds and scale 9 represents complete ground cover by the weed species.