

Weed Flora of a Maize/Cassava Intercrop under Integrated Weed Management in an Ecological Zone of Southern Guinea Savanna of Nigeria

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ABSTRACT

Weed flora of different management techniques under different cropping systems have been reported but no sufficient information on weed flora of integrated weed control method in maize/cassava intercrop in southern Guinea savanna of Nigeria. This study assessed the weed flora and relative frequencies of weeds in a maize/cassava intercrop under integrated weed management involving two pre-emergence herbicides (Primextra and Galex, each at 2.5 kg/ha alone or with one or two supplementary hoe-weeding, at 6 weeks after planting (WAP) or 6 and 12WAP, a hoe-weeded check (hoeing at 3, 6 and 12WAP) and a weedy control.

A total of 41 weed species belonging to 35 genera and 19 families comprising of Poaceae, Euphorbiaceae, Asteraceae, Rubiaceae, Cyperaceae among others were encountered in the experimental plots during 2002 and 2004 cropping seasons. The very abundant weed species included *Paspalum obiculare* Forst, *Digitaria horizontalis* Willd and *Brachiaria deflexa* (Schumach) while those with moderate abundance were *Bulbostylis arbotiva* (Steudel), *Cleome viscosa* L., *Croton lobatus* L., *Dactyloctenium aegyptium* (L) P. Beauv., *Tridax procumbens* L. and *Vernonia galamensis* (Cass.) Less. The remaining weed species had rare abundance. The relative frequency of the weed species was generally reduced under all the weed control treatments except *Paspalum obiculare* whose relative frequency was consistently high in all the assessment periods under all the weed control treatments.

INTRODUCTION

In Nigeria and in many other developing nations, intercropping has remained the traditional farming practice. It is a wide spread food crop production system in the humid and subhumid tropics of West Africa (ITA, 1981; Akobundu, 1980; Anuebunwa, 1991). Cassava/maize seems to be the most common crop combination preferred by small-scale farmers (Akobundu, 1980; Unamma and Ene, 1984; Unamma *et al.*, 1986). Okigbo and Greenland (1976) estimated that about 50% of the cassava grown in tropical Africa is intercropped with cereals, legumes, leafy vegetables and fruits as well as tree crops.

Weed seeds are abundant in cultivated fields and many species will germinate independent of the crop density, spatial arrangement and species (Akobundu, 1987). Both maize and cassava have been shown to be sensitive to weed infestation, maize in the first 4 weeks and cassava in the first 10-12 weeks after establishment (Onochie, 1975). It has been estimated that yields of crops can be reduced by between 60-90% in cases of poor weed management practices (Ogunremi, 2005). Uncontrolled weed growth causes yield loss of 40-60% in maize in the tropics (Akobundu, 1980). Yield components of cassava most affected by weeds are tuber number and weight. The most damaging effects of weeds were reported to occur during early canopy formation and when tuberization is taking place (Onochie, 1975). Whereas yield losses due to weeds is put at about 50% or more in the developing countries (Anon 1982), in Nigeria, yield losses due to weed interference vary between 40 and 100% depending, among other things, on type of crops, type of weeds and weed density (Fadayomi, 1991). Weed flora of different weed management techniques under different cropping systems have been reported (Ekelele, *et al.*, 2004) but no sufficient information on weed flora of integrated weed control method in maize/cassava intercrop in southern Guinea savanna of Nigeria. This study therefore investigated the weed flora of maize/cassava intercrop using integrated weed control methods.

Materials and Methods

Each year, the experimental site was ploughed and harrowed, after which ridges which are approximately 1.3 m apart were made. The experiment consisted of eight main treatments and six sub treatments. The main treatments were made up of the application of two pre-emergence herbicides [Primextra and Galex, each at 2.5 kg a.i./ha alone or with one or two supplementary hoe weedings at 6 weeks after planting (WAP) or 6 and 12WAP], a hoe-weeded check (hoeing at 3, 6 and 12WAP) and a weedy control. The size of each main treatment was 280m² with 6 ridges of 6m long. Maize (var. DMRY) and cassava ('Okoyawo' a local var.) were planted after land preparation. The herbicide treatments were applied as pre-emergence sprays at the rate of 2.5 kg.a.i./ha, one day after planting of maize using a CP3 knapsack sprayer, fitted with a green deflector nozzle, which was calibrated to deliver a spray volume of 240L/ha.

Weed sampling was carried out at 6 and 12WAP in 2002 and at 6, 12, 20, 36, 44 and 48WAP in 2004 from each main treatment using wooden quadrats (0.5m²). Twelve throws were made per main treatment and weed species within each quadrat were uprooted, sorted into grasses and broad leaves and identified to the species level using a standard text by Akobundu and Agyakwa (1987). Thereafter, each weed species was counted and the value recorded to compute the Relative frequency.

RESULTS

A total of 41 weed species belonging to 19 families and 35 genera were found in the experimental plots during the 2002 and 2004 cropping seasons. The weed species consisted of 13 Poaceae, 5 Euphorbiaceae, 4 Asteraceae, 3 Rubiaceae and 2 Cyperaceae. The remaining families: Amaranthaceae, Commelinaceae, Nyctaginaceae, Papilionaceae, Portulacaceae, Cleomaceae, Leguminosae, Lamiaceae, Acanthaceae, Solanaceae, Malvaceae, Loganiaceae, Fabaceae and Tiliaceae had one (1) each (Table 1).

The very abundant weed species included *Paspalum obiculare*, *Digitaria horizontalis* and *Brachiaria deflexa* while those with moderate abundance were *Bulbostylis arbotiva*, *Cleome viscosa*, *Croton lobatus*, *Dactyloctenium aegyptium*, *Tridax procumbens* and *Vernonia galamensis*. The remaining weed species had rare abundance. In both cropping seasons grasses were the predominant weeds in the experimental plots. Broadleaved weeds were, however, more abundant in 2004 than in 2002, while sedges were very few in both cropping seasons.

Table 1. Weed species composition of the experimental plots in 2002 and 2004, at Ilorin, Nigeria.

Weed species	Growth form	Abundance		Family
		2002	2004	
<i>Andropogon gayanus</i> Kunth.	PG	-	+	Poaceae
<i>Boerhavia diffusa</i> L.	PBL	-	+	Nyctaginaceae
<i>Brachiaria deflexa</i> (Schumach)	AG	+	+++	Poaceae
<i>Brachiaria jubata</i> Stapf	AG	-	+	Poaceae
<i>Brachiaria lata</i> (Schum) C.E.	AG	-	+	Poaceae
Hubbard <i>Bulbostylis arbotiva</i> (Steudel)	AG	++	++	Poaceae
<i>Celosia sp</i>	ABL	+	+	Amaranthaceae
<i>Cleome viscosa</i> L.	ABL	++	+	Cleomaceae
<i>Commelina benghalensis</i> L.	PBL	+	+	Comelinaceae
<i>Croton lobatus</i> L.	ABL	++	+	Euphorbiaceae
<i>Cyperus rotundus</i> L.	PS	+	+	Cyperaceae
<i>Dactyloctenium aegyptium</i> (L) P. Beauv.	AG	++	++	Poaceae
<i>Digitaria horizontalis</i> Willd	AG	+++	+	Poaceae
<i>Euphorbia heterophylla</i> L.	ABL	+	+	Euphorbiaceae
<i>Euphorbia hirta</i> L.	ABL	+	+	Euphorbiaceae
<i>Euphorbia hyssopifolia</i> Linn.	ABL	+	+	Euphorbiaceae
<i>Hyptis suaveolens</i> Poit	AB	-	+	Lamiaceae
<i>Imperata cylindrica</i> (L) Rauschel	PG	+	+	Poaceae
<i>Indigofera hirsute</i> Linn.	ABL	-	+	Papilionaceae
<i>Marisus alternifolius</i>	PS	-	+	Cyperaceae

Table 3. Relative frequencies of weed species encountered in plots the main treatment at 12WAP in 2002 at Ilorin, Nigeria.

Weed species	Prim alone	Prim +1Hw	Prim +2Hw	Galex alone	Galex +1Hw	Galex +2Hw	3Hw	Weedy
1.Brachiaria deflexa Schumach	33.3	11.1	16.7	55.6	16.7	16.7	5.6	5.6
2.Bulbostalis arbotiva Steudel	11.1	33.3	33.3	11.1	5.6	27.7	44.4	0
3.Celosia sp	0	0	0	0	5.6	0	0	0
4.Commelina benghalensis L.	0	5.6	0	0	0	5.6	5.6	0
5.Cleome viscosa L.	33.3	5.6	11.1	33.3	22.2	11.1	16.7	5.6
6.Croton lobatus L.	0	5.6	0	33.3	0	0	16.7	5.6
7.Cyperus rotundus L.	0	0	0	5.6	0	0	0	0
8.Dactyloctenium aegyptium (L) P. Beauv.	27.8	5.6	22.2	33.3	44.4	0	16.7	16.7
9.Digitaria horizontalis Willd	77.7	88.8	88.8	94.4	94.4	94.4	88.8	88.8
10.Euphorbia heterophylla L.	0	0	0	11.1	22.2	0	5.6	5.6
11.Euphorbia lyssofolia Linn	5.6	0	0	0	0	0	0	0
12.Imperata cylindrical (L) Rauschel	0	0	0	0	5.6	0	0	0
13.Mitracarpus villosus (Sw) Dc	16.7	16.7	0	44.4	5.6	22.2	0	5.6
14.Oldenlandia herbacea (L) Roxb	0	0	11.2	16.7	0	5.6	0	16.7
15.Paspalum obiculare Forst	61.1	38.9	61.1	72.2	44.4	38.9	38.9	38.9
16.Pennisetum violaceum (Lam.) L. Rich	5.6	0	5.6	5.6	0	0	0	0
17.Physalis angulata Linn	0	0	0	5.6	0	0	0	0
18.Rhynchelythrum repens (Wild.) E. Hubbard	0	0	0	5.6	22.2	5.6	0	11.2
19.Spigellia antheimia Linn	5.6	0	0	0	0	0	0	5.6
20.Tridax procumbens L.	11.1	5.6	5.6	38.9	11.1	0	11.1	16.7

Table 4. Relative frequencies of weed species encountered in the main treatment plots at 6WAP in 2004 at Ilorin, Nigeria.

Weed species	Prim alone	Prim +1Hw	Prim +2Hw	Galex alone	Galex +1Hw	Galex +2Hw	3Hw	Weedy
1.Brachiaria deflexa Schumach	33.3	55.6	38.9	16.7	33.3	44.4	16.7	16.7
2. Brachiaria alata (Schum) C. E. Hubbard	0	0	0	5.6	0	0	0	0
3.Bulbostylis arbotiva Steudel	27.7	38.8	27.8	50.0	72.2	66.7	72.2	72.2
4.Commelina benghalensis L.	11.1	5.6	0	11.2	0	5.6	0	0
5. Croton lobatus L.	5.6	0	0	5.6	0	22.2	5.6	5.6
6.Cyperus rotundus L.	5.6	0	0	0	5.6	0	11.1	0
7.Dactyloctenium aegyptium (L) P. Beauv.	0	0	0	0	0	0	0	5.6
8.Digitaria horizontalis Willd	55.6	33.3	61.1	55.6	72.2	50	22.2	44.4
9.Euphorbia heterophylla L.	5.6	11.1	5.6	11.1	11.1	0	0	16.7
10.Hyptis suaveolens Poit	0	0	0	0	0	0	0	5.6
11.Indigofera hirsute Linn.	0	5.6	0	5.6	0	5.6	0	0
12.Mitracarpus villosus (SW) DC	5.6	0	0	5.6	0	0	0	0
13.Oldenlandia herbacea L. Roxb	5.6	0	5.6	5.6	11.1	33.3	5.6	11.1
14.Paspalum obiculare Forst	72.0	61.1	33.3	55.6	27.8	27.8	50.0	44.4
15.Portulaca oleracea Linn	0	0	0	5.6	0	0	0	0
16.Rhynchelythrum repens (Wild)	5.6	11.1	5.6	11.1	5.6	0	16.7	5.6
17. Sida acuta Burum F.	0	0	0	0	5.6	0	0	0
18. Tephrosia sp	0	0	0	5.6	0	0	0	0
19.Tridax procumbens L.	22.2	55.6	27.8	66.7	44.4	38.9	22.2	22.2
20.Vernonia galamensis (Cass.) Less	27.8	5.6	11.1	33.3	22.2	11.1	11.1	27.7

At 12WAP, 28 weed species were recorded in the various weed control treatments (Table 5). Again, *P. obiculare* had the highest relative frequency of 94 – 100% in all the weed control treatments. *Brachiaria deflexa*, *B. arbotiva*, *D. aegyptium*, *D. horizontalis*, and *Tridax procumbens* had relative frequencies of

27.7 – 88.8%. Others with low relative frequencies of 5.6 – 44.4% included *B. jubata*, *C. benghalensis*, *C. rotundus*, *E. heterophylla*, *M. villosus*, *O. herbacea*, *S. anthelmia*, *V. galamensis*, *V. cinerea*, *A. gayanus*, *C. ciliata*, *C. lobatus*, *E. hirta*, *I. cylindrica*, *Mariscus* sp., *P. hirsuta*, *P. violaceum*, *P. angulata*, *R. repens* and *Vernonia perottetti*.

At 20WAP, the number of weed species encountered had reduced to 18 but *P. obiculare* still had the highest relative frequency of (44.4 – 66.7%) followed by *O. herbacea*, *T. procumbens*, *D. horizontalis*, *V. galamensis*, *M. villosus* with relative frequencies of 11.1 - 55.6%. The other weed species occurred at low relative frequencies of 5.6 – 16.7%. These included *B. deflexa*, *C. benghalensis*, *C. ciliata*, *C. rotundus*, *Monecma ciliatum*, *R. repens*, *Stylosanthes* sp., *Tephrosia bracteolata*, *Triumfetta cordifolia*, *D. aegyptium*, *Hyptis suaveolens* and *I. cylindrica* (Table 6). The relative frequency of occurrence of the weed species was generally reduced under all the weed control treatments.

Table 5. Relative frequencies of weed species encountered in the main treatment plots at 12WAP in 2004 at Ilorin, Nigeria.

Weed species	Prim alone	Prim +1Hw	Prim +2Hw	Galex alone	Galex + 1Hw	Galex + 2Hw	3Hw	Weedy
1. <i>Andropogon gayanus</i> Kunth	5.6	0	0	0	0	0	0	0
2. <i>Brachiaria deflexa</i> Schumach	72.2	61.1	66.7	72.2	55.6	88.8	66.7	55.6
3. <i>Brachiaria jubata</i> Stapf	0	5.6	0	27.8	5.6	0	0	0
4. <i>Bulbostylis arbotiva</i> Steudel	61.1	38.9	61.1	55.6	16.7	66.7	50	55.6
5. <i>Cleome viscosa</i> L.	0	0	0	5.6	0	0	0	0
6. <i>Commelina benghalensis</i> L.	16.7	5.6	5.6	16.7	0	0	0	0
7. <i>Croton lobatus</i> L.	5.6	0	0	5.6	0	0	5.6	11.1
8. <i>Cyperus rotundus</i> L.	16.7	33.3	5.6	11.1	11.1	0	27.8	22.2
9. <i>Dactyloctenium aegyptium</i> (L) P. Beauv	44.4	33.3	50.0	44.4	33.3	11.1	55.6	22.2
10. <i>Digitaria horizontalis</i> Willd	66.7	61.1	61.1	61.1	72.2	50.0	72.2	38.9
11. <i>Euphorbia heterophylla</i> L.	11.2	0	0	5.6	0	0	0	22.2
12. <i>Euphorbia hirta</i> L.	0	0	0	11.2	0	0	0	0
13. <i>Hyptis suaveolens</i> Poit	5.6	0	0	5.6	0	0	0	5.6
14. <i>Imperata cylindrica</i> (L) Rauschel	5.6	0	0	5.6	0	5.6	0	5.6
15. <i>Mariscus</i> sp.	0	0	0	0	0	0	0	5.6
16. <i>Mitracarpus villosus</i> (SW) DC	11.1	0	16.7	16.7	11.1	5.6	11.1	44.4
17. <i>Oldenlandia herbacea</i> (L) Roxb	16.7	16.7	0	16.7	11.1	22.2	27.8	5.6
18. <i>Paspalum hirsuta</i> (Thumb.) K. Schum	0	0	0	5.6	0	0	0	5.6
19. <i>Paspalum obiculare</i> Forst	94.4	88.8	100	100	100	100	100	100
20. <i>Pennisetum violaceum</i> (Lam.) L. Rich	0	0	0	0	0	0	0	5.6
21. <i>Physalis angulata</i> Linn.	0	0	0	5.6	0	0	0	5.6
22. <i>Rhynchosyrum repens</i> (Wild) C. E. Hubbard	5.6	0	0	5.6	5.6	0	0	5.6
23. <i>Spermacoce verticillium</i> Linn	0	0	0	0	0	0	0	5.6
24. <i>Spigellia anthelmia</i> Linn	0	11.1	0	0	0	11.1	0	0
25. <i>Tridax procumbens</i> L.	65.6	44.4	38.9	50	88.8	33.3	27.7	56.5
26. <i>Vernonia cinerea</i> Linn	11.1	0	5.6	5.6	11.1	0	5.6	5.6
27. <i>Vernonia galamensis</i> (Cass.) Less	11.1	16.7	5.6	16.7	11.1	16.7	5.6	16.7
28. <i>Vernonia perottetti</i> Sch. Bip.	0	0	0	5.6	0	0	0	5.6

Table 6. Relative frequencies of weed species encountered in the main treatment plots at 20WAP in 2004 at Ilorin, Nigeria.

Weed species	Prim alone	Prim +1Hw	Prim +2Hw	Galex alone	Galex + 1Hw	Galex + 2Hw	3Hw	Weedy
1. <i>Brachiaria deflexa</i> Schumach	5.6	0	0	0	0	0	0	5.6
2. <i>Commelina benghalensis</i> L.	0	0	5.6	0	0	0	0	5.6
3. <i>Cleome viscosa</i> L.	0	5.6	0	0	0	0	0	0
4. <i>Cyperus rotundus</i> L.	0	0	0	0	0	11.1	0	0
5. <i>Dactyloctenium aegyptium</i> (L) P. Beauv.	0	5.6	11.1	5.6	0	0	16.7	0
6. <i>Digitaria horizontalis</i> Willd	22.2	11.1	27.8	27.8	0	0	22.2	38.9
7. <i>Hyptis suaveolens</i> Poit	0	0	0	0	0	0	0	16.7
8. <i>Imperata cylindrica</i> (L) Rauschel	0	0	0	5.6	0	0	0	0
9. <i>Mitracarpus villosus</i> (SW) DC	11.1	5.6	33.3	5.6	11.1	11.1	5.6	11.1

10. <i>Monechma ciliatum</i> Jacq	0	0	0	0	0	0	0	16.7
11. <i>Oldenlandia herbacea</i> (L) Roxb	55.6	50.0	27.7	38.9	44.4	44.4	16.7	38.9
12. <i>Paspalum obiculare</i> Forst	66.7	66.7	50.0	61.1	61.1	67.8	61.1	44.4
13. <i>Rhynchelythrum repens</i> (Wild.) C. E. Hubbard	0	0	5.6	5.6	5.6	0	0	22.2
14. <i>Stylosanthes</i> sp	0	0	5.6	0	0	0	0	11.1
15. <i>Tephrosia</i> sp	0	0	0	0	0	0	0	5.6
16. <i>Tridax procumbens</i> L.	50.0	33.3	50.0	33.3	38.9	44.4	27.8	27.8
17. <i>Triumfetta cordifolia</i> A. Rich	0	5.6	5.6	0	0	0	0	0
18. <i>Vernonia galamensis</i> (Cass) Less.	22.2	33.3	11.1	50.0	0	0	27.8	27.8

At 44WAP, 15 weed species were recorded under all the weed control treatments (Table 7). *Paspalum obiculare* had the highest relative frequency (88.8 –94.4%) followed by *T. procumbens* (11.2 – 65.6%), and *B. deflexa* (5.6 – 22.2%). Many of the other species that were recorded had low relative frequencies of 5.6 –16.7%. These weeds were *B. diffusa*, *E. heterophylla*, *E. hirta*, *C. benghalensis*, *C. lobatus*, *H. suaveolens*, *O. herbacea*, *P. indica*, *R. repens*, *Stylosanthes* sp. and *I. cylindrica*.

At 48WAP, 17 weed species were recorded in the weed control treatments (Table 8). *Paspalum obiculare* and *B. deflexa* occurred at fairly high relative frequencies of 33.3 – 66.7% and 16.7 – 66.7%, respectively while the rest of the weed species (*B. jubata*, *C. benghalensis*, *D. aegyptium*, *D. horizontalis*, *E. heterophylla*, *H. suaveolens*, *I. cylindrica*, *Phyllanthus amarus*, *R. repens* T. *bracteolata* and *E. hirta*) occurred at frequencies of 5.6 –33.4%.

Table 7. Relative frequencies of weed species encountered in the main treatment plots at 44WAP in 2004 at Ilorin, Nigeria.

Weed species	Prim alone	Prim +1Hw	Prim +2Hw	Galex alone	Galex + 1Hw	Galex + 2Hw	3Hw	Weedy
1. <i>Boerhavia diffusa</i> L.	0	0	0	0	5.6	0	0	0
2. <i>Brachiaria deflexa</i> (Schumach)	22.2	5.6	11.1	11.1	11.1	16.7	11.1	16.7
3. <i>Bulbostylis arbotiva</i> Steudel	11.1	0	0	0	0	5.6	0	5.6
4. <i>Commelina benghalensis</i> L.	5.6	5.6	0	0	0	0	0	0
5. <i>Croton lobatus</i> L.	5.6	0	0	0	0	0	0	0
6. <i>Euphorbia heterophylla</i> L.	0	5.6	0	0	0	0	0	0
7. <i>Euphorbia hirta</i> L.	0	0	0	0	0	5.6	0	0
8. <i>Hypis suaveolens</i> Poit	0	0	0	5.6	0	5.6	5.6	16.7
9. <i>Oldenlandia herbacea</i> (L) Roxb	0	0	0	0	0	0	11.2	0
10. <i>Paspalum obiculare</i> Forst	94.4	88.8	88.8	88.8	88.8	94.4	94.4	88.8
11. <i>Perotis indica</i> (Linn.)	0	0	0	11.2	0	0	0	0
12. <i>Rhynchelythrum repens</i> Wild C. E. Hubbard	0	0	0	0	0	0	0	5.6
13. <i>Stylosanthes</i> sp	0	0	0	0	0	0	0	5.6
14. <i>Tridax procumbens</i> L.	27.6	33.3	38.8	65.6	38.9	38.9	44.4	11.2
15. <i>Imperata cylindrica</i> (L) Raueschel	0	5.6	0	11.2	0	5.6	11.2	11.2

Table 8. Relative frequencies of weed species encountered in the main treatment plots at 48WAP in 2004 at Ilorin, Nigeria.

Weed species	Prim alone	Prim +1Hw	Prim +2Hw	Galex alone	Galex + 1Hw	Galex + 2Hw	3Hw	Weedy
1. <i>Andropogon gayanus</i> Kunth	5.6	5.6	0	0	0	0	5.6	11.1
2. <i>Boerhavia diffusa</i> L.	0	0	0	0	0	0	0	5.6
3. <i>Brachiaria deflexa</i> Schumach	27.8	33.3	16.7	66.7	44.4	33.3	38.9	33.3
4. <i>Brachiaria jubata</i> Stapf	33.3	22.2	27.8	16.7	27.8	33.4	33.4	17.4
5. <i>Commelina benghalensis</i> L.	11.2	5.6	0	0	0	0	0	0
6. <i>Dactyloctenium aegyptium</i> (L) P. Beauv.	0	5.6	5.6	11.1	27.8	11.1	16.7	33.3
7. <i>Digitaria horizontalis</i> Willd	5.6	5.6	5.6	5.6	16.7	5.6	5.6	27.8
8. <i>Euphorbia heterophylla</i> L.	0	0	0	0	0	0	0	5.6
9. <i>Hypis suaveolens</i> Poit	5.6	0	0	0	5.6	0	5.6	33.3
10. <i>Imperata cylindrica</i> (L) Raueschel	0	5.6	0	0	0	0	0	0
11. <i>Paspalum obiculare</i> Forst	55.6	66.7	61.1	55.6	66.7	66.7	55.6	33.3
12. <i>Phyllanthus amarus</i> Schum & Thonn	0	0	0	0	0	0	5.6	0
13. <i>Rhynchelythrum repens</i> (Wild) C. E. Hubbard	0	0	0	0	0	0	5.6	0
14. <i>Sida acuta</i> Barrun	0	0	0	0	0	5.6	0	0
15. <i>Tephrosia</i> sp	11.2	0	0	0	0	0	0	0

16. <i>Tridax procumbens</i> L.	33.3	22.2	11.1	33.3	27.7	17.4	11.1	33.3
17. <i>Euphorbia hirta</i> L.	0	11.2	0	0	0	5.6	0	0

DISCUSSION

The weed flora for both years were of great species diversity and richness as was reported by Olofintoye and Fadayomi, 2005 and Olorunmaiye and Olorunmaiye, 2007. Weed species common to all the weed control treatments were: Grasses – *B. deflexa*, *B. arbotiva*, *D. horizontalis* and *P. obiculare* for both years though *D. horizontalis* was much more prominent in 2002 and *P. obiculare* in 2004. In addition to 2004, broadleaved weeds: *T. procumbens* and *V. galamensis* were abundant along with the grasses. Out of all these weeds mentioned in the weed control treatments, *P. obiculare* seems to be difficult to control by these integrated weed control treatments as its relative frequency was consistently high in all the assessment periods. Earlier study by Akobundu (1987) has shown that *P. obiculare* being an annual grass can behave as a perennial grass if given enough moisture. In this present study, it regenerated easily from the old stump and became much more prominent than others at 44WAP where its relative frequency ranged between 88.8% - 94.4% and at cassava harvest with 33.3 – 66.7%. Akobundu (1987), observed that *P. obiculare* and *D. horizontalis* have tendency to grow densely around economic plants and are adapted to overcrowding hence they are able to compete better with crops because of the numerical superiority they have over weeds.

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