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Assessment of weed species composition and species diversity in some fruit orchards

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Abstract

Fruits are often perennial crops and therefore can be invaded by weeds at many different times of the year because of their varied life-cycle. Thus a weed survey was conducted in some fruit orchards containing guava/soursop, mango, irvingia and plantain/banana at the National Horticultural Research Institute (NIHORT) Ibadan in 2009 cropping season to determine weed species composition and species diversity. Weeds were sampled from each fruit orchard with a 0.5m × 0.5m wooden quadrat, identified to species level, counted and recorded. Data collected were used to calculate relative frequency, relative density and importance relative value for each species. Result shows that 45 weed species were encountered in all the fruit orchards and mango orchard had the highest species diversity (33 species) while the least was recorded in guava/soursop orchard (10 species). All these 10 species had their relative frequencies > 5% out of which *Ageratum conyzoides* > *Panicum maximum* > *Cyperus esculentus* > *Chromolaena odorata* > *Commelina erecta* are of ecological importance. Three weed species: *Ageratum conyzoides, Centrosema pubescens* and *Panicum maximum* associated with all the fruit orchards in all the locations and *T. procumbens* was the most abundant and most dominant species in guava/soursop, irvingia and plantain/banana orchards while *Echinocloa phyllopogon* followed the same trend in mango orchard. These weeds are low-growing plants and regular weeding before seed formation will help to reduce their abundance in these orchards so that they do not interfere with harvesting of these fruits.

Keyword: guava, soursop, plantain, irvingia, relative frequency, *Tridax procumbens*

1. Introduction

Fruits are high value crops with many health benefits and cooking uses. Mango fruit is nutritionally rich with unique flavor, fragrance and taste thus promoting health benefits to humans. Similarly, irvingia fruit is high in fibre, protein and health fats while the seed is used for both food and medicine and the stem produces hard wood for construction. In addition, guava fruit is one of the richest sources of vitamin C and large quantities of useful minerals like Phosphorus and Calcium while banana is usually used for food, beverages, medicines flavouring and silage [3].

Fruits are often perennial crops and therefore can be invaded by weeds at many different times of the year because of their varied life-cycle [4], thus, they are often the number one cultural problem faced by many growers. The presence of weeds in fruit orchards has been as a result of ecological management practices, soil characteristics and climatic and weather conditions [1, 2] while weed control methods such as cultural, mechanical and chemical can have a strong influence on weed species composition and density [10]. Weeds are undesirable on account of their competitive and allelopathic behavior as well as providing habitats for harmful organisms [12]. Aside the fact that weeds compete for water, light and nutrients they also reduce the quality of farm produce and consequently cause fruit damage thereby reducing market value. Excessive weed growth creates higher humidity in the foliage enhancing disease spread and inviting unwanted pests. Weeds further hamper fruit picking and make ripening uneven. About 30-40% of total fruit production cost is taken up by weed control indicating that weed management is a high cost factor in horticultural production [8]. *Commelina diffusa*, *Ageratum conyzoides, Euphorbia heterophylla* and *Cyperus rotundus* have been reported to be of abundance in banana orchard [10, 5]. Weeds have specific characteristics like deep root system and different modes of propagation (bulb, corn, rhizomes, stolons etc.) that help their survival. Such competitive characteristics enable them make use of large amount of resources within their habitat at the expense of the crops [12]. Earlier studies by these authors have shown that weed species with high Relative

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Importance Value (RIV) might compete better to reduce growth and yield of associated crop.

Although weeds are present in every orchard, there are wide variations in the species density [4] while species diversity has been reported to be higher in crop rotation than in monoculture [6]. Information gathered from weed survey will enable farmers to identify weeds present early in the season when they can cause yield losses and also to target the optimum timing for maximum control [4]. In addition, such information will provide a long-term record of weed emergence patterns and problems in fruit orchards which may be used for strategic weed management in fruit orchards. Therefore, this present study was conducted to report the current status of weed species composition, species diversity and their ecological characteristics in some fruit orchards in NIHORT.

2. Materials and Methods

The survey was conducted in the wet season of 2009 at the National Horticultural Research Institute (NIHORT), Ibadan (Latitude 7° 23□ and 7° 25□N and Longitude 3° 50□ and 3° 52□E). Four (4) fruit orchards (Guava/soursop, Irvingia, Mango and Plantain/banana,) planted in different locations within the Institute were surveyed using the quantitative methods of Thomas [7]. An 'M' pattern was systematically walked in each orchard from the edge and five 0.5m × 0.5m quadrats were taken from each of the orchards except Mango orchard where 9 quadrats were taken because the plantation size was larger than five hectares. Weeds within each quadrat were uprooted, sorted into species and weed types, identified, counted and recorded. Data collected were subjected to ecological analysis to determine the relative frequency, relative density and relative importance value of these species. Only weeds that occurred at ≥ 5% were considered as being common [9].

3. Results

A total number of 49 weed species belonging to 20 families were encountered during the survey in 2009 cropping season out of which 34 were broadleaves, 15 were grasses and there were no segdes. Family *Poaceae* had the highest species (16) followed by *Asteraceae* (7), *Euphorbiaceae* (5), *Amaranthaceae*, *Fabaceae*, *Commelinaceae* and *Malvaceae* had 2 each while the rest families had 1species each (Table 1). Mango orchard recorded the highest species diversity (33) followed in descending order by irvingia, plantain/banana and guava/soursop orchards (20, 12 and 10 weeds respectively).

Three weeds species: *Ageratum conyzoides, C. pubescens* and *P. maximun* associated with all the fruit orchards at their different locations (Table 2). All the 10 weed species that occurred in guava/soursop orchard had their RF > 5% with the highest in *P. maximum* (23.52%) while *C. odorata* (11.76%), *A. conyzoides, A. gangetica, C. pubescens C. erecta C. benghalensis C. esculentus, D. scorpiurus* and *I. triloba* (5.88% each) followed in descending order. Ten (10) of the weed species encountered in irvingia orchard occurred at RF ≥ 5% with *A. compressus* being the most frequent (17.5%). Others following in descending order were *A. conyzoides* and *M. villosus* (12.5% each); *C. mucunoides* and *C. esculentus* both at 7.5% each; *B. deflexa, C. benghalensis, M. alternifolius, P. maximum, P. obiculare* (5%) each (Table 2). In mango orchard, 8 weed species had their RF ≥ 5% and *A. gangetica* emerged the most frequent (10%), *C. odorata, E. phyllopogon* and *M. villosus* had 6.67% each while *C. ferruginea, I. triloba, P. amarus* and *S. cayenensis* had 5% each (Table 2). Six weed species occurred at RF ≥ 5% in plantain/banana orchard, *T. procumbens* was the most frequent (RF = 18.18%) followed by *D. scorpiurus, S. africanum* (13.64% each); *C. rotundus, P. amarus and P. obiculare* (9% each).

The Relative Densities (RD) of the various weed species are shown in (Table 3). Four weed species were recorded in guava/soursop orchard with RD ≥ 5% and *A. conyzoides* (50.51%) emerged the most abundant followed by *C. esculentus* (12.12%), *P. obiculare* (9.09%) and *C. erecta* (6.06%) in descending order. In irvingia orchard, only 2 weed species had their RD ≥ 5% and *A. conyzoides* (50.46%) followed the same trend as in guava/soursop orchard while *M. villosus* abundance was 36.12%. Six species had their RD ≥ 5% in mango orchard with the highest in *E. phyllopogon* (8.84%) while *C. odorata* (7%), *A. conyzoides* (6.1%), *S. acuta* (5.79%), *A. hispidium* (5.4%) and *A. gangetica* (5.18%) followed in descending order. In plantain/banana plot, *T. procunmbens* recorded the highest RD (31.52%) followed by *D. scorpiurus* (17.39%), *P. obiculare* (14.13%), *P. maximum* and *S. africanum* (7.61%) each, *C. odorata* and *M. alternifolius* (6.52%) each (Table 3)

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Table 1: Weed species composition of NIHORT fruit orchards in 2009 cropping season, Ibadan, Nigeria.

Weed species	*Growth Form*	*Families*
Asystasia gangetica (Linn.) T. Anders	ABL	*Acanthaceae*
Alternanthera brasiliana (L.) Kuntze	ABL	*Amaranthaceae*
Alchornea laxiflora (Benth.) Pax & K. Hoffin	PBL	*Euphorbiaceae*
Ageratum conyzoides L.	ABL	*Asteraceae*
Achanthospermun hispidium DC	ABL	*Asteraceae*
Aspilia latifolia	ABL	*Asteraceae*
Andropogon gayanus Kunth	AG	*Poaceae*
Axonopus compressus (SW.) P. Beauv.	AG	*Poaceae*
Boerhavia diffusa L.	ABL	*Nyctaginceae*
Brachiaria deflexa (Schumach.)C. E. Hubbard ex Robyns	AG	*Poaceae*
Chromolaena odorata (L.) R.M. Kings & Robinson	ABL	*Asteraceae*
Combretum hispidium Laws.	PBL	*Combretaceae*
Commelina benghalensis L.	ABL	*Commelinaceae*
Commelina diffusa Burm. F.	ABL	*Commelinaceae*
Calopogonium mucunoides Desv.	ABL	*Fabaceae*
Centrosema pubescens Benth.	ABL	*Fabaceae*
Cleome viscosa L.	ABL	*Cleomaceae*
Corchorus olitorius L.	ABL	*Tiliaceae*
Cnestis ferruginea DC	PBL	*Connaraceae*
Croton sp.	ABL	*Euphorbiaceae*
Dactyloctenium aegyptium (Linn.) P. Beauv.	AG	*Poaceae*
Digitaria horizontalis Willd.	AG	*Poaceae*
Desmodium scorpiurus (Sw.) Desv.	ABL	*Poaceae*
Echinocloa phyllopogon	AG	*Poaceae*
Euphorbia heterophylla Linn.	ABL	*Euphorbiaceae*
Euphorbia hirta Linn.	ABL	*Euphorbiaceae*
Gomphrena celosoides Mart.	ABL	*Amaranthaceae*
Imperata cylindrica (L.) Raeuschel	PG	*Poaceae*
Ipomoea triloba Linn.	ABL	*Convolvulaceae*
Laportea aestuans (Linn.) Chew.	ABL	*Urticaceae*
Leptochloa caerulescens Steud.	AG	*Poaceae*
Mitracarpus villosus (Sw.) Dc.	ABL	*Rubiaceae*
Paspalum obiculare Forst.	AG	*Poaceae*
Panicum maximum Jacq.	AG	*Poaceae*
Pennisetum violaceum (Lam.) L. Rich.	AG	*Poaceae*
Perotis indica (Linn)	AG	*Poaceae*
Phyllanthus amarus SCHUM. et Thonn.	ABL	*Euphorbiaceae*
Platostoma africanum P. Beauv.	ABL	*Lamiaceae*
Setaria barbata (Lam.) Kunth.	AG	*Poaceae*
Sclerotium africanum	ABL	*Asteraceae*
Sida acuta Burm f.	ABL	*Malvaceae*
Sida cordiflora	ABL	*Malvaceae*
Stachytarpheta cayennensis (L.C. Rich) Schuv.	PBL	*Verbenaceae*
Solanum torvum Swartz	PBL	*Solanaceae*
Sporobolus pyramidalis P.Beauv.	AG	*Poaceae*
Synedrella nodiflora Gaertn.	ABL	*Asteraceae*
Talinum triagulare (Jacq.)Willd.	ABL	*Portulacaceae*
Titonia diversifolia (Hemsl.) A. Gray	ABL	*Asteraceae*
Tridax procumbens L.	ABL	*Asteraceae*

Note: g = guava, pl = plantain

Table 2: Relative Frequencies (%) of weeds encountered in NIHORT fruit orchards in 2009 cropping season, Ibadan, Nigeria.

Weed species	*G/soursop*	*Mango*	*Irvingia*	*Plantain/ banana*
Achanthospermun hispidium DC	-	1.67	-	-
Ageratum conyzoides L.	5.88	1.67	12.50	4.55
Alchornea laxiflora (Benth.) Pax & K. Hoffin	-	3.33	-	-
Alternanthera brasiliana (L.) Kuntze	-	1.67	-	-
Amaranthus spinosus Linn.	-	-	2.5	-
Aspilia latifolia	-	3.33	-	-
Asystasia gangetica (Linn.) T. Anders	5.88	10	-	-
Axonopus compressus (SW.) P. Beauv.	-	-	17.5	-
Boerhavia diffusa L.	-	1.67	-	-
Brachiaria deflexa (Schumach.)C. E. Hubbard ex Robyns	-	-	5.0	-
Calopogonium mucunoides Desv.	-	1.67	7.50	4.55
Centrosema pubescens Benth.	5.88	1.67	2.5	4.55
Chromolaena odorata (L.) R.M. Kings & Robinson	11.76	6.67	-	4.55
Combretum hispidium Laws.	-	3.33	-	-
Commelina benghalensis L.	5.88	1.67	5.0	-
Commelina diffusa Burm. F.	-	1.67	-	-
Commelina erecta L.	5.88	-	-	
Cleome viscosa L.	-	1.67	-	-
Cnestis ferruginea DC	-	5	-	-
Croton sp.	-	1.67	-	-
Cyperus esculentus Linn.	5.88	-	7.50	9.09
Dactyloctenium aegyptium (Linn.) P. Beauv.	-	-	2.5	-
Desmodium scorpiurus (Sw.) Desv.	5.88	-	-	13.64
Echinocloa phyllopogon	-	6.67	-	-
Euphorbia heterophylla L.	-	1.67	-	-
Euphorbia hirta L.	-	1.67	-	-
Imperata cylindrica L. Raeuschel	-	1.67		-
Ipomoea triloba Linn.	5.88	5	-	4.55
Laportea aestuans (Linn.) Chew.	-	-	-	-
Leptochloa caerulescens Steud.	-	-	2.5	-
Mariscus alternifolius Vahl	-	-	5.0	4.55
Mitracarpus villosus (Sw.) Dc.	-	6.67	12.5	-
Oldenlandia corymbosa (Linn.) Roxb.	-	-	2.5	-
Panicum maximum Jacq.	23.52	3.33	5.0	9.09
Paspalum obiculare Forst.	-	1.67	5.0	9.09
Pennisetum violaceum (Lam.) L. Rich.	-	-	2.5	-
Perotis indica (Linn.)	-	3.33	-	-
Phyllanthus amarus SCHUM. et Thonn.	-	5	2.5	-
Platostoma africanum P. Beauv.	-	1.67	2.5	-
Setaria barbata (Lam.) Kunth.	-	1.67	-	-
Sclerocarpus africanun	-	-	2.5	13.64
Sida acuta Burm f.	-	1.67	-	-
Spigelia anthelmia Linn.	-	-	2.5	-
Solanum torvum Swartz.	-	3.33	-	-
Stachytarpheta cayennensis (L.C. Rich) Schuv.	-	5	-	-
Talinum triagulare (Jacq.) Willd.	-	1.67	-	-
Titonia diverisfolia (Hemsl.) A. Gray	-	1.67	-	-
Tridax procumbens L.	-	-	-	18.18
TOTAL	10	12	20	33

Note: g = guava, pl = plantain

Table 3: Relative Densities (%) of weeds encountered in NIHORT fruits orchards in 2009 cropping season, Ibadan, Nigeria.

Weed species	*g/soursop*	*mango*	*Irvingia*	*pl/banana*
Achanthospermun hispidium DC	-	5.49	-	-
Ageratum conyzoides L.	50.51	6.1	50.46	1.09
Alchornea laxiflora (Benth.) Pax & K. Hoffin	-	1.53	-	-
Alternanthera brasiliana (L.) Kuntze	-	1.83		-
Amaranthus spinosus L.	-		0.34	-
Aspilia latifolia	-	1.52	-	-
Asystasia gangetica (Linn.) T. Anders	1.01	5.18	-	-
Axonopus compressus (SW.) P. Beauv.	-	-	1.19	-
Boerhavia diffusa L.	-	0.51	-	-
Brachiaria deflexa (Schumach.)C. E. Hubbard ex Robyns	-	-	1.53	-
Calopogonium mucunoides Desv.	-	2.13	0.85	1.09
Centrosema pubescens Benth.	1.01	3.05	0.34	2.17
Chromolaena odorata (L.) R.M. Kings & Robinson	3.03	7.01	-	6.52
Combretum hispidium Laws.	-	1.22	-	-
Commelina benghalensis L.	1.01	0.31	1.02	-
Commelina diffusa Burm. F.		0.31	-	-
Commelina erecta L.	6.06	-	-	-
Cleome viscosa L.	-	1.52	-	-
Cnestis ferruginea DC	-	0.92	-	-
Croton sp.	-	8.84	-	-
Cyperus esculentus Linn.	12.12	-	1.36	3.26
Dactyloctenium aegyptium (Linn.) P. Beauv.		-	0.17	
Desmodium scorpiurus (Sw.) Desv.	3.03	-	-	17.39
Digitaria horizontalis Willd.	-	-	-	1.09
Echinocloa phyllopogon	-	8.84	-	-
Euphorbia heterophylla Linn.	-	1.83	-	-
Euphorbia hirta Linn.	-	0.31	-	-
Gomphrena celosoides Mart.	-	-	-	-
Imperata cylindrica (L.) Raeuschel	-	0.92	-	-
Ipomoea triloba Linn.	1.01	1.52	-	-
Laportea aestuans (Linn.) Chew.	-	-	-	-
Leptochloa caerulescens Steud.	-	-	0.17	-
Mariscus alternifolius Vahl	-	-	0.85	6.52
Mitracarpus villosus (Sw.) Dc.	-	3.96	36.12	-
Oldenlandia corymbosa (Linn.) Roxb.	-	-	0.34	-
Panicum maximum Jacq.	9.09	0.61	1.7	7.51
Paspalum obiculare Forst.	-	0.31	0.34	14.13
Perotis indica (Linn)	-	0.92		-
Pennisetum violaceum (Lam.) L. Rich.	-	-	0.34	-
Phyllanthus amarus SCHUM. et Thonn.	-	1.83	0.34	-
Platostoma africanum P. Beauv.	-	0.31	0.34	-
Sclerocarpus africanun	-	-	0.17	7.61
Setaria barbata (Lam.) Kunth.	-	2.74	-	-
Sida acuta Burm f.	-	5.79	-	-
Sida cordiflora Linn.	-	-	-	-
Stachytarpheta cayennensis (L.C. Rich) Schuv.	-	4.88	-	-
Solanum torvum Swartz.	-	3.35	-	-
Spigelia anthelmia Linn.	-	-	0.51	-
Sporobolus pyramidalis P. Beauv.	-	-	-	-
Synedrella nodiflora Gaertn	-	-	-	-
Talinum triagulare (Jacq.) Willd.	-	0.31	-	-
Titonia diversifolia (Hems.) A. Gray	-	0.31	-	-
Tridax procumbens L.	-	-	0.68	31.52

Note: g = guava, pl = plantain

Table 4: Relative Importance Value (%) of weeds encountered in NIHORT fruits orchards in 2009 cropping season, Ibadan, Nigeria.

Weed species	*g/soursop*	*Mango*	*irvingia*	*pl/banana*
Achanthospermun hispidium DC	-	3.58	-	-
Ageratum conyzoides L.	28.19	3.89	13.47	2.82
Alchornea laxiflora (Benth.) Pax & K. Hoffin	-	2.44	-	-
Alternanthera brasiliana (L.) Kuntze	-	1.75	-	-
Amaranthus spinosus Linn.	-	-	1.42	-
Andropogon gayanus Kunth.	-	-	-	-
Aspilia latifolia	-	2.43	-	-
Asystasia gangetica (Linn.) T. Anders	3.45	7.59	-	-
Axonopus compressus (SW.) P. Beauv.	-	-	9.34	-
Boerhavia diffusa L.	-	1.14	-	-
Brachiaria deflexa (Schumach.)C. E. Hubbard ex Robyns	-	-	3.26	-
Calopogonium mucunoides Desv.	-	0.99	4.17	2.82
Centrosema pubescens Benth.	3.45	1.19	1.42	3.36
Chromolaena odorata (L.) R.M. Kings & Robinson	7.39	6.84	-	5.54
Combretum hispidium Laws.	-	2.28	-	-
Commelina benghalensis L.	3.45	0.99	3.01	-
Commelina diffusa Burm. F.	-	-	-	-
Commelina erecta L.	5.97	-	-	-
Cleome viscosa L.	-	2.36	-	-
Corchorus olitorius L.	-	-	-	-
Cnestis ferruginea DC	-	1.59	-	-
Croton sp.	-	2.96	-	-
Cyperus esculentus Linn.	9	-	4.43	6.18
Dactyloctenium aegyptium	-	-	1.33	-
Desmodium scorpiurus (Sw.) Desv.	4.46	-	-	15.25
Digitaria horizontalis Willd.	-	-	-	-
Echinocloa phyllopogon	-	7.76	-	-
Eleusine indica Gaertn.	-	-	-	-
Euphorbia heterophylla Linn.	-	1.75	-	-
Euphorbia hirta Linn.	-	0.99	-	-
Gomphrena celosoides Mart.	-	-	-	-
Imperata cylindrica (L.) Raeuschel	-	1.29	-	-
Ipomoea triloba Linn.	3.45	3.26	-	2.82
Leptochloa caerulescens Steud.	-	-	1.33	-
Laportea aestuans (Linn.) Chew.	-	-	-	-
Mariscus alternifolius Vahl	-	-	2.92	-
Mitracarpus villosus (Sw.) Dc.	-	5.34	24.31	5.54
Oldenlandia corymbosa (Linn.) Roxb.	-	-	1.42	-
Panicum maximum Jacq.	16.31	1.97	3.35	8.35
Paspalum obiculare Forst.	-	0.99	2.67	11.61
Perotis indica (Linn)	-	2.13	-	-
Pennisetum violaceum	-	-	1.42	-
Phyllanthus amarus SCHUM. et Thonn.	-	3.22	1.42	-
Platostoma africanum P. Beauv.	-	0.99	1.42	-
Sclerocarpus africanun	-	-	1.33	10.63
Setaria barbata (Lam.) Kunth.	-	2.21	-	-
Sida acuta Burm f.	-	3.69	-	-
Sida cordiflora	-	-	-	-
Stachytarpheta cayennensis (L.C. Rich) Schuv.	-	4.94	-	-
Solanum sp.	-	3.34	-	-
Spigelia anthelmia	-	-	1.50	-
Sporobolus pyramidalis	-	-	-	-
Synedrella nodiflora	-	-	-	-
Talinum triagulare	-	1.02	-	-
Tithonia diversifolia (Hems.) A. Gray	-	1.02	-	-
Tridax procumbens L.	-	-	1.59	24.85

Note: g = guava, pl = plantain

The Relative Importance Value (RIV) of the weed species is shown in Table 4. In guava/soursop orchard, 5 species were recorded as dominant weeds with *A. conyzoides* being the most dominant (RIV = 28.19%) followed by *P. maximum* (16.31%), *C. esculentus* (9%), *C. odorata* (7.39%) and *C. erecta* (5.97%). Only 3 weeds had RIV ≥ 5% in irvingia orchard, *A. conyzoides* was the most dominant with (31.47%) followed by *M. villosus* and *A. compressus* (24.31 and 19.35% respectively). Four weeds had RIV ≥ 5% in mango orchard with *E. phyllopogon* being the most dominant (7.76%). Others were *A. gangetica*, *C. odorata* and *M. villosus* (7.59, 6.84 and 5.34% respectively). Plantain/banana orchard had 8 weeds with RIV ≥ 5% and *T. procumbens* was the most dominant weed (24.85%) followed by *D. scorpiurus* (15.25%), *P. obiculare* (11.61%), *S. africanum* (10.63%), *P. maximum* (8.35%), *C. esculentus* (6.81%), *C. odorata* and *M. alternifolius* each at 5.54%.

4. Discussion

Family *Poaceae* emerged the most important family as it has the largest number of weed species encountered in the fruit orchards. This family contains 16 weed species across the fruit orchards surveyed and are capable of causing serious weed infestation in these orchards due to their large seed production. The greater number of species in a family has been reported to be as a result of better competitive ability emanating from aggressive growth, enormous seed production and efficient seed dispersal [12]. Three weeds species: *Ageratum conyzoides, Centrosema pubescens* and *Panicum maximun* associated with all the fruit orchards which suggests they are of ecological importance. *Ageratum conyzoides* and *P. maximum* are known to produce large quantities of seeds while *C. pubescens* is a perennial weed. *Asystasia gangetica* was the most frequent weed in mango orchard, *A. compressus* in irvingia orchard while *T. procumbens* was the most frequent in plantain/banana orchard. Similarly, *T. procumbens* was the most abundant and most dominant species in guava/soursop, irvingia and plantain/banana orchards while *E. phyllopogon* followed the same trend in mango orchard. The large seed production by this species as well as its spreading stems might have accounted for this abundance and dominance in these orchards. Earlier report by [11] has shown that weeds with high Relative Frequencies, Relative Densities and Importance Relative Values have the ability to compete better than other species. About 88% of the weeds encountered in these fruits orchards were annuals most of which are propagated by seed only. Mango orchard recorded the highest species richness (mostly broadleaves) and this may be due its longer year of establishment compared to other orchards coupled with little disturbance in terms of tillage and other farming activities. In addition, the high number of species under mango orchard further reveals that these weeds have become naturalized to withstand the shady conditions provided by the canopies of the mango orchard. All the 10 weeds encountered in guava/soursop orchard have high occurrence as their Relative Frequencies were >5%. However, only 5 of these species have high RIV as shown in the following descending order *A. conyzoides* > *P. maximum* > *C. esculentus* > *C. odorata* > *C. erecta* and these may probably be regarded as common weeds in guava/soursop orchard. This orchard is the youngest of the orchards as earlier mentioned and the canopies were not as covered as in mango or banana orchards. Generally, weeds are usually controlled in these orchards manually except in mango orchard where mechanical slashing is also employed in weed control because of its larger size. These methods would always encourage more tiller production especially for *P. maximum* which will go a long way in proliferating them. To acquire better yields in these fruit orchards, it is necessary to employ appropriate weed control methods.

5. Conclusion

From this study, there is variation in weed species composition of NIHORT fruit orchards in terms of number, weed type and diversity. Mango orchard was highest in species richness while guava/soursop orchard was the least. *Ageratum conyzoides, Centrosema pubescens* and *Panicum maximun* can be said to be of ecological importance as they associated with all the fruit orchards in their different locations. *Tridax procumbens* was the most abundant and most dominant weed in guava/soursop, irvingia and plantain/banana orchards while *E. phyllopogon* followed the same trend in mango orchard. These are low growing weeds and produce large quantity of seeds and are best controlled before seed setting.

6. References

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