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ARTICLE

Weed Species Composition in Paddy Field of Usur Town, Bade Local Government, Yobe State, Nigeria

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ABSTRACT

Farmers are eager to know the various types of weeds in paddy fields. This will help in choosing the best weed management practice for effective weed control as well as reducing rice yield losses. The objectives of the study are to identify the weeds species affecting the rice field, to assess the composition of weeds species, to classify the weed species into different families, genera, species, common names, Hausa names, lifecycles, life forms, native/exotic species, propagation and uses, and to determine the dominant weed species. Random vegetation surveys were conducted. Weeds observed were photographed, and prepared as herbarium specimens. Standard key manuals and checklists were utilized for weed identification and later organized using the Angiosperm Phylogeny Group (APG) classification system. A total number of 72 plants species distributed within 16 families and 50 genera were inventoried. The annuals (66.67%) were the dominant weed followed by perennials (33.33%) while biennials were the least. The broad leaves were the dominant weed (44.61%) identified followed by Poaceae (27.7%) and Sedges (11.11%). Results obtained from this study could be useful in choosing the best management practice and in making a decision on the choice of herbicides and directing research towards improved weed control measures.

Keywords: Rice; Dominant weeds; Exotic species; Native species; Weed classification

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1. Introduction

A weed is a plant not valued for utility or beauty, but it is not a historically stable category because neither usefulness nor attractiveness is a stable category [1]. Weed is an unwanted and undesirable plant that interferes with a variety of human activities through the utilization of land and water resources. In agriculture, weed is grown in association with crops and snatches major parts of water, light, nutrients, space and carbon dioxide (CO_2) available to the crops, providing hosts and vectors for plant pathogens, giving them the opportunity to infect and degrade the quality of the desired plants. As a result of competition with the crop, the production of crops is affected. Therefore control of weeds is important in agriculture. According to Gerasimova & Mitova, weeds are a component of biological diversity in agricultural systems (agrobiodiversity) and one of the greatest limiting factors in efficient organic crop production [2]. The composition of weeds forms the base of the food chain for herbivores and other heterotrophs, supporting many species of pests and beneficial insects, particularly pollinators [3]. Similarly, farmland benefits from nutrient recycling, and several other soil conservation functions of diverse weed species in an ecosystem [4]. Studies on the floristic composition of weed communities and distribution of weed species provide weed biologists with the quantitative information that is necessary for designing weed management programs and provide baseline data for measuring changes in the weed flora in the future. Moreover, such studies are helpful in determining how a weed population changes over time in response to selective pressures due to field management practices [5].

The floristic composition and distribution of weeds within the crop fields depend on the cultural practices within the agricultural fields, crop type, tillage systems, soil type, moisture availability, location and season [6]. Weeds can also harbor plant pathogens and pests, spread infection in crop plants and thus degrade their quality [7]. Weeds have spaciously flourished all over the world imparting a tremendous cost on paddy production [8]. Nevertheless, weed management techniques on farmland vary based on several factors; changes in agronomic practices influence weed diversity as many of these practices such as tillage, crop rotation, and fertilization have a direct influence on the floristic composition and diversity, and density of weed communities [9].

Weeds have some characteristics, such as short seed dormancy, high seed germination rate, environmental plasticity, high seedling growth and reproductive capacity, short life cycle, self-compatibility, efficient and well-organized methods of seed dispersal, allelopathy and tolerance to abiotic and biotic stresses. Therefore, due to these reasons weeds are becoming dominant all over the world [10]. A weed is a native or introduced (alien) species that has a perceived negative ecological or economic effect on agricultural or natural systems. Climatic, edaphic and biotic factors prevailing in each of the agro-ecological regions influence the formation of vegetation in that area [10].

In Nigeria rice has become an important strategic and daily food crop. The potential land area for rice production is between 4.6 and 4.9 million ha [11]. However, only about 1.7 million hectares are presently cropped to rice. The main production ecologies for rice in Nigeria are rain-fed lowland, rain-fed upland, irrigated lowland, deep water boating and mangrove swamp [11]. Rice is grown under different ecological conditions as it is grown in upland, medium land and lowland with different cultural techniques through direct seedling, transplanting and system of rice intensification (SRI) under puddle conditions. Rain-fed lowland rice has the largest share of the rice area (50%) and rice production for small-scale farmers with farm holdings of less than one (1) hectare cultivate most of the rice produced in Nigeria. Rice production and productivity at the farm level are constrained by several factors, one of which is the problem of weeds [11].

Nigeria is currently the largest rice-producing country in Africa, this is a result of the efforts by

the current Government administration of (President Muhammad Buhari) he placed more emphasis on agrarian production which provides seeds, types of equipment, and chemicals for the control of weeds which increases the annual rice production from 5.5 million tons in 2015 to 5.8 million tons in 2017 [12]. In 2018, rice paddy production in Nigeria increased from 325,000 tons in 1969 to 6.81 million tons 2018 growing at an average annual rate of 8.76% [13]. Samba [14] stated that, poverty does not allow farmers to widely use the herbicide for weed control because of their high cost, therefore weed infestation is an important agronomic constraint, and successful weed control is essential for improving crop production. Rice yield losses caused by weeds depend on species composition, density and duration of infestation including the associated environmental conditions such as pH and salinity that may vary according to locations [15].

Weeds are considered to be one of the major biotic constraints in achieving higher crop productivity that cause a reduction of 10%-90% to grain yield. Weedy rice (*Oryza* spp.) is the most difficult weed control in rice, causing as much as 90% yield loss or abandonment of severely infested fields. Weeds are responsible for heavy yield losses in rice, to the extent of complete crop failure under severe infestation conditions in Usur, Bade Local Government Area (L.G.A.) Improvements in the productivity of crops can be achieved by combating problematic weeds associated with the agricultural fields. Therefore, it is of vital importance for every country to keep a record of the composition and distribution of its weeds, and identify whether they are native or exotic/introduced/aliens/invaders. Thus, there is an urgent need to carry out a study especially in Yobe State and Bade L.G.A. in particular where the flora is not well documented.

The aim of this study is to determine the weed species composition in the rice field of Usur, Bade L.G.A. Yobe State. The objectives of the study are to identify the weeds species affecting the rice field, to assess the composition of weeds species, to classify the weed species into different families, genera, species, common names, Hausa names, lifecycle, life forms, native/exotic species, propagation and uses, and to determine the dominant weed species.

2. Material and methods

2.1 Description of the study area

Bade L.G.A. lies along latitude 12° 50' N and longitude 10° 55' E with an altitude of 335 m above sea level. The experiment was conducted in the Usur village rice field about 6 kilometers from Bade L.G.A. headquarters, Gashu'a town. Bade Local Government Area is found in Yobe state which is the northeast geopolitical zone in Nigeria. It has an area of 809.661 km^2 with a population of 139,804 (NPC, 2010) (**Figure 1**).

Vegetation

The vegetation of the study area is sparse vegetation, and the major vegetation type is Sudan Savannah with scattered acacia trees. There is also an area of Sahel Savannah consisting of sandy soils and thorn scrub located far north [16]. The plants include short trees about 5-10 m e.g. *Anogeissus leiocarpa, Acacia seyel, Balanites aegyptica, Faidherbia albida* and grasses *Cenchus biflorus, Heteropogon contortus* [16,17].

Climate

The climate is characterized by high temperatures and seasonal rainfall. The mean minimum temperature ranges between 10 °C and 20 °C in December/January, while the mean maximum is about 34-40 °C in March/May [18].

Bade L.G.A. experienced an annual rainfall of 500 mm to 1000 mm, the mean rainfall is between 300-500 mm per annum and is unimodal and last mostly from June to September, while the dry season starts from October to May [18].

Soil

The soil of Usur, Bade L.G.A. is sandy loamy in texture, high in bulk density, low porosity and weak structure and very low in organic matter content. The physical properties are sand 619.43g kg^{-1}, silt 321.83g kg^{-1}, clay 58.73 kg^{-1}, texture content SL,

bulk density 1.64 mg·m^{-3} and porosity 38.33%, mean weight diameter 0.78 mm and soil organic matter 1.48 g·kg^{-1}, the soil of the area is lixisols [19].

2.2 Instrument/materials used

Garmin eTrex 10 Worldwide Handheld (GPS) Navigator Model No. 010-00970-00 (taking the position of land).

Plant press/newspapers (for collection of weed samples).

100 m tape (for measuring farm distance).

A4 paper/pencil (for taking data).

Hand trowel (for digging out weed roots).

Mapping stick.

2.3 Data collection

An area of 10 hectares of farmland was sampled.

The research method selected for the study is a random vegetation survey [20,21].

The weeds species sample was collected from the month of June to October, 2020. The first weed inventory was made in July 15 days after rice plant emergence and continued subsequently within a periodicity of 15-20 days until after harvest in October, 2020 [20,21].

2.4 Identification of weed species

Botanical identification of weed species in rice fields was done using external morphological characteristics of plant parts involving fruits, flowers, leaves, and stem bark and sap were used for identification and also with the help of weed floras, manuals, and checklists [22,23].

The specimens were collected and compared with herbarium specimens of the Botany Department Gombe State University, Gombe where herbarium vouchers numbers were given for each specimen. All the weed specimens that were given herbarium voucher numbers were arranged alphabetically according to the distribution of the family.

The identified weed species were represented alphabetically according to their scientific names, genera, and families, common names and life forms and their uses. The life forms of plant species were recognized using Raunkiaer classification system [24]. A botanical weed composition was calculated using density data. Weed composition is the proportion (%) of various weeds species in relation to the total in a given area.

The identified voucher specimen was deposited in the herbarium of the Department of Botany, Gombe State University, Gombe.

2.5 Data analysis

Data analysis of collected and identified weeds (**Figure 1**) was organized according to the classification systems established in the Angiosperm Phylogeny Group III Guidelines (APG III, 2009) and African Plant Data Base [14].

The weed composition is the proportion (%) of various weed species in relation to the total in a given area.

$$\%\ Composition\ Spp.\ A = \frac{Number\ of\ Spp.A}{Totao\ number\ of\ individuals} \times 100 \quad (1)$$

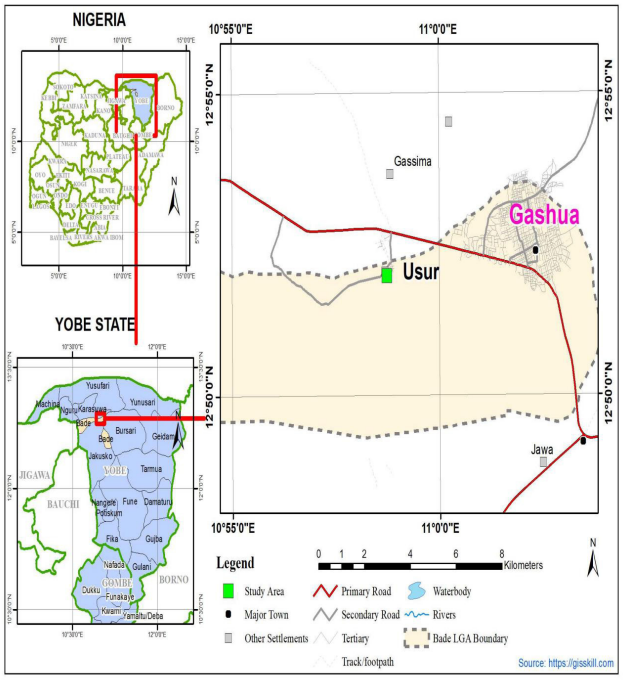

Figure 1. Map showing the study site in Usur.

Source: Field work 2020.

3. Results

The results indicated that a total number of seventy-two (72) weed species belonging to sixteen (16) families and fifty (50) genera were identified in the study area (**Table 1**). The study also shows the morphology of the weed species, Broadleaf (61.1%), Poaceae (27.8%) and Sedges (11.1%) (**Table 2**). The family that had the highest number of species was Poaceae (27.78%) and 14 genera followed by Asteraceae with 8 species (11.11%) and 6 genera and Cyperaceae with (8) species and 5 genera each. Malvaceae 7 (9.72%) species and 3 genera, Fabaceae had 6 species (8.33%) and 5 genera, Amaranthaceae 5 species (6.94%) and 3 genera, Rubiaceae 3 species (4.17%) and Lamiaceae 3 species (4.17%) each; Cleomaceae 2 species (2.78%), Commelinaceae 2 species (2.78%), Euphorbiaceae 2 species (2.78%) and Solanaceae 2 species (2.78%) each. The least numbers of species were Araceae 1 specie (1.39%), Onagraceae 1 specie (1.39%), Portulaceae 1 specie (1.39%) and Sphenocleaceae 1 specie (1.39%) each (**Table 3**). The weed's lifecycle shows annuals with 48 species representing 66.67% of the total weed species, therefore, representing the dominant weeds, perennials 24 (33.33%) and Biennial least (**Table 4**). The lifeform shows Therophytes 69 weeds species with (95.87%) as the dominant weeds, Geophytes 3 (4.17%) (**Table 5)**.

Table 2 shows the life forms as follows. Furthermore, 61.1% were reported to be Broadleaf, 27.8% were Poaceae and 11.1% were Sedges.

Table 3 shows the composition of identified weeds Poaceae had the highest value (27.78%) while Araceae, Onagraceae, Portulaceae and Sphenocleaceae had the lowest (1.39%) each.

Table 4 showed the composition of weed species based on life cycle (annual, biennial and perennial). These weeds were found in wet or dry lands (open fields, cultivated lands, abandoned opened fields. The annuals 48 (66.67%) are the dominant weeds followed by perennials 24 (33.33%). Biennial (0%) was the least.

These weeds were found in wet or dry lands (open fields), cultivated lands, and abandoned in open fields. The 69 Therophytes (95.87%) are the dominant weeds followed by 3 Geophytes (4.17%) (**Table 5)**.

4. Discussion

A total number of seventy-two (72) weed species belonging to sixteen (16) families and fifty (50) genera were recorded in the study area. A similar study was carried out by Radha and Manokari [26] in his study of a checklist of medicinally important weeds growing in the horticulture fields of Palayamkottai, Tirunelveli district, and Tamil Nadu where he obtained 41 weed species. The result obtained in this study was higher because of the differences in location and size of the study area. The study is not consistent with the works of Panda [10] who obtained two hundred and seventy-seven 277 species belonging to 198 genera and that of Ekeke et al. [21] who obtained a total of 322 weeds species belonging to 172 genera and 145 families. This is probably because of the differences in geographical location and soil types. The study also revealed the family that had the highest number of species was 20 Poaceae and this is consistent with the works of Panda [10] who also obtained Poaceae with the highest number of species (29). The study is also consistent with the works of Ekeke et al. [21] who obtained the Poaceae family as the highest species composition of 72 species. Samba [14] also reported that the Poaceae family was the most represented family with the highest species (24.2%); Poaceae are known to be the dominant family in most Sudan Savanna vegetation types due to their mode of dispersal. The success traits of poaceae result from their tolerance of grazing herbivory and fire, their varied means of reproduction and their versatility in photosynthesis. The growing point or meristem of poaceae lies at the base of each stem between the leaves so that regrowth is possible, poaceaes produce by seed through cross pollination and by two other methods, self-pollination and asexual reproduction. Poaceae display a variety of adaptations for the dispersal and establishment of seeds which posse's hair, spines and barbs on their spikelets.

Table 1. Weed species of rice in Usur Bade L.G.A Yobe State.

S/N	Family	Genus	Species	Common Names	Hausa Names	Life cycle	Native/ Exotic Spp	Life form	Prop.	Uses
1	Amaranthaceae (Broad-Leaves)	*Alternanthera*	*Alternanthera ficoidea* (L.)	Joseph coat	Chiyawan zomo	Perennial (P) herb, evergreen	E	T	Seed	Antiviral, tonic, hepatitis
2		*Alternanthera*	*Alternanthera sessilis* (Linn.) DC	Sessile joy	Mai kai dubuu	Perennial (P) herb, creeping	E	T	Seed	Asthma, lung infection, liver disease, snake antidote, antiseptic, pile Leprosy, fever
3		*Amaranthus*	*Amaranthus graecizans* (L.)	Spreading pig weed	Namijin gaasayaa, Rukubu	Glabrous annual (A) herb	N	T	Seed	Inflammatory, scorpion stings, snake bites, edema, ulcer, diarrhe
4		*Amaranthus*	*Amaranthus spinosus (*Linn.)	Spiny pig weed	Namijin gaasayaa;	A robust erect herb annual (A)	E	T	Seed	Kidney.jaundice, antiviral microbial, worms antimalari-al, [25].
5		*Gomphrena*	*Gomphrena celosoides* Mart.	Prostrate globe Amaranth	Goga masi	Decumbent Perennial (P)	E	T	Seed	Infertility, liver disease, antifungal/ bacteria, dysmenorrhea, analgesic,
6	Araceae (Broad-Leaves)	*Peltandra*	*Peltandra virginica* (L.) Schott	Arrow-arum	Duuman rafi Gwaandaii	Emergent perennial (P)	E	G	Seed veg.	Stabilize sediment, toxic, cause kidney failure, bread making
7	Asteraceae (Broad-Leaves)	*Ageratum*	*Ageratum conyzoides* Linn	Chick weed	Bambani	Erect annual (A) herb	E	T	Seed	Burns wound, ulcer kidney, diarrhea, gonorrhea
8		*Blainvillea*	*Blainvillea gayana cass*	Blainvillea		Annual (A) herb	E	T	Seed	Malaria, headache

Table 1 continued

S/N	Family	Genus	Species	Common Names	Hausa Names	Life cycle	Native/ Exotic Spp	Life form	Prop.	Uses
9		*Chrysanthemum*	*Chrysanthemum indicum* Linn.	African wild daisy	Rariyar kasa	Erect perennial (P) herb	E	T	Seed	Blood tonic, migraine, antibacterial, hypertension
10		*Eclipta*	*Eclipta alba* (L.)	False daisy	Rimin sauro	Erect, herb prostrate annual (A)	E	T	Seed/ veg.	Eye, Hair problems, dental Leprosy, Worm, Anemia
11		*Eclipta*	*Eclipta prostata* L.	False daisy	Rimin sauro	Erect herb prostrate annual (A)	E	T	Seed/ veg.	Catarrh, convulsion, elephantiasis,
12		*Lactuca*	*Lactuca virosa* L.	Wild lettuce	Nonokwarai	Annual (A) herb	E	T	Seed	Infertility, yaws, arthritis, skin disease sedative, analgesic
13		*Vernonia*	*Vernonia ambigua* Kotschy&peyr	Iron weed	Taba-Taba or Tattaba	Erect Annual (A) herb	N	T	Seed	Anti-inflammatory, schistosomiasis anti-plasmodia anticancer
14		*Vernonia*	*Vernonia perrottettii* Sch. Bip. Ex. Walp	Iron weed	Burzu	Erect (A) annual herb	N	T	Seed	Anti-inflammatory, antimicrobial, bilharzia, Anticancer
15	Cleomaceae (Broad-leaves)	*Cleome*	*Cleome gynandra* Linn.	African cabbage	Gaasayaa	Erect branched annual (A)	N	T	Seed	It cures Fevers, rheumatism, & pile scorpion bite, headache
16		*Cleome*	*Cleome viscosa* Linn.	Spider flower	Diyar-unguwa gasiyaa	Erect herb annual (A) sticky	N	T	Seed	Wounds and ulcers, ear disease, liver, pimples, inflammation, .

Table 1 continued

S/N	Family	Genus	Species	Common Names	Hausa Names	Life cycle	Native/ Exotic Spp	Life form	Prop.	Uses
17	Commelinaceae (Broad-Leaves)	*Commelina*	*Commelina benghalensis* (L.)	Wondering jew	Balaasa; Balaasaana;Bulabula;	Creeping stem herb annual (A)	N	T	Seed/ Veg.	Fever, rabies leprosy, ophthalmic, epilepsy, snake bites, burns.
18		*Commelina*	*Commelina diffusa* Burm. F	Spreading day flower	Balaasa, Balaasaya	Prostrate herb, (P) climbing	N	T	Seed/ Veg.	Yellow fever, eyewash, oedema, gonorrhea, fodder
19	Cyperaceae (Sedges)	*Cyperus*.	*Cyperus esculentus* Linn.	Yellow nut-sedge	Ayaa	Perennial (P) herbs	N	G	Seed/ Veg.	Tonic, flatulence, diarrhea, dysentery, menstrual discharge
20		*Cyperus*	*Cyperus iria* Linn.	Rice field flatsedge	Aya-ayaa	Smooth tufted (A) Annual	N	T	Seed	Astringent, stimulant, stomachic
21		*Cyperus*	*Cyperus rotundus* Linn.	Nut grass	Ayaa-ayaa; Jiji; gwaigwaya	Smooth erect (P) perennial	N	G	Seed/ Veg.	Dysentery, epilepsy, fever, diabetes, inflammation, diarrhea,
22		*Fimbristylis*	*Fimbristylis dichotoma* (L.) Vahl	Forked fimbry	Geemun beeraa; Riidin tuujii	Erect tufted, (P) perennial	N	T	Seed/ Veg.	Anti-inflammatory, fever, antidiarrheal, dysentery,
23		*Kyllinga*	*Kyllinga erecta* Schumach.	Spike sedge	Ayaa-ayaa, Turare	Erect, robust (P) Perennial	N	G	Seed/ Veg.	Retain placenta, malaria, whooping cough,

Table 1 continued

S/N	Family	Genus	Species	Common Names	Hausa Names	Life cycle	Native/ Exotic Spp	Life form	Prop.	Uses
24		*Kyllinga*	*Kyllinga Squamulata* Thonn. ex Vahl	Kyllinga nemoralis	Ayaa-ayaa, Turare	Weak tufted (A) Annual	N	T	Seed	Analgesic, antimalarial, Roots as fumigant, whooping cough
25		*Rhychospora*	*Rhychospora corymbosa* (L.) Britton.	Golden beak sedge	Kudunduru iya	Robust (P) perennial	N	T	Seed	Abdominal pain, colic
26		*Schoenoplectus*	*Schoenoplectus senegalensis* (Steud.)	Bull rush	Gudun bijimi	Small tufted (A)	N	T	Seed	Use to stop bleeding, snake bite, abscesses
27	Euphorbiaceae (Broad-Leaves)	*Euphorbia*	*Euphorbia hirta* Linn.	Asthma plant	Nonon kurchiya	A hairy herb (A) annual	E	T	Seed	Asthma, cough, venereal disease, dysentery, diarrhea, stomachache.
28		*Phallantus*	*Phallantus amarus* Schum. &Thonn.	Gale of the wind	Geron-tsuntsayee	A Small annual (A) herbs	E	T	Seed	Antimicrobials, fever, skin disease, worms, diarrhea.
29	Fabaceae: Papilionoideae (Broad-Leaves)	*Aeschynomene*	*Aeschynomene indica* Linn.	Budda pea	Fidilin kanaawa	Sub-shrub erect (A) herb	N	T	Seed	Use as spermicide and charcoal are use as gun powder
30	Fabaceae: Caesalpiniodeae	*Chamaecrista*	*Chamaecrista* mimosoides (L.) Greene	Japaneese tea	Bakiskis, Balsama, Balasa, B.	Erect herb or low shrub (A)	N	T	Seed	Pain-killers, ear/ eye, diarrhea, dysentery, antidotes, paralysis, epilepsy, convulsions
31	Fabaceae: Papilionoideae	*Crotalaria*	*Crotalaria retusa* Linn.	Devil bean or Rattle weed	Birana	Erect, herb angular annual (A)	E	T	Seed	Skin disease scabies, fevers, colic, dysentery, flatulence, liver

Table 1 continued

S/N	Family	Genus	Species	Common Names	Hausa Names	Life cycle	Native/ Exotic Spp	Life form	Prop.	Uses
32	Fabaceae: Papilionoideae	*Indigofera*	*Indigofera hirsuta* (L.)	Hairy indigo	Aniyar makomiya	Erect herb spreading annual (A)	N	T	Seed	Cough, analgesic, yaws, liver disorder, epilepsy, poison antidote, kidney &, opthalmia
33	Fabaceae: Caesalpiniodeae	*Senna*	*Senna obtusifolia* (L.) H.S. Irwin & Barneby	Sickle pod	Ubulo, Tafasa	Erect herb branched (A)	E	T	Seed	Skin disease infections, sores, ulcers, leprosy vomiting, snake bites, soup, arthritis, itching stomachache
34	Fabaceae Caesalpiniodeae	*Senna*	*Senna occidentalis* (L.) Link	Coffee weed	Tasba, Majamfari, Rai-doore	Perennial	E	T	Seed	Mental disorder,leprosy rheumatisms worms, hypertension , stomachache, dysentery, pains
35	Lamiaceae (Broad-Leaves)	*Leucas*	*Leucas martinicensis* (Jacq.) Ait. f.	Wild tea	Daidoyar gona, kanbarawo	Erect, herb aromatic annual (A)	N	T	Seed	Snake bite antidote, epilepsy
36		*Leucas*	*Leucas cephalotes* (Roth) Spreng.	Guma	Dandoyar gona, sarakuwar sauro	Stem erect herb annual (A)	E	T	Seed	Diabetes, fever, typhoid, filarial
37		*Ocimum*	*Ocimum gratissimum* Linn.	African basil	Daidoya, Daidoya ta gida	Erect round (P) Perennial	N	T	Seed	Stomachache, pains antiseptic, fever conjunctivitis, wounds, rheumatic
38	Malvaceae (Broad-leaves)	*Corchorus*	*Corchoru aestuans* (L.)	Mallow jute	Laalo	Erect, herb prostrate annual (A)	N	T	Seed	Used to treat pneumonia & stomach-ache

Table 1 continued

S/N	Family	Genus	Species	Common Names	Hausa Names	Life cycle	Native/ Exotic Spp	Life form	Prop.	Uses
39		*Corchorus*	*Corchorus olitorius* (L.)	Jews mallow	Laalo	An erect annual (A) herb	N	T	Seed	Liver disorder, aches, dysentery, fever, tumors.
40		*Corchorus*	*Corchorus tridens* (L.)	Jute mallow	Laalo	Erect herb branched annual (A)	N	T	Seed Stem, fibers	Fishing, antioxidant, therapeutic to stress.
41		*Sida*	*Sida cordifolia* (L.)	Flannel weed	Farar hankufa, kardafi	Erect sub- shrub (P) perennial	N	T	Seed	Asthma, diarrhea, tuberculosis,, cold, headaches, worm cough, gonorrhea, flu
42		*Sida*	*Sidarhombifolia*(L.)	Arrow leaf sida	Faskara saiwo	Erect, (P) ever-green perennial	N	T	Seed	leaves used to relieve headache. root is used to treat rheumatism.
43		*Sida*	*Sida acuta* Burm.f.	Wire weed	Garmani, kaka,namijin hankufa	Aerial, erect (P) perennial	N	T	Seed	Asthma, TB, Cold, flu, kidney,infection liver disease
44		*Waltheria*	*Waltheria indica* Linn.	Sleepy Morning	Hankufa	Several erect (P) perennial	E	T	Seed	Inflammation, malaria,
45	Onagraceae (Broad-Leaves)	*Ludwigia*	*Ludwigia hyssopifolia* (G. Don) Excell	Seed box	Lallen balbela	Erect, glabrous herb (A)	E	T	Seed	Jaundice, flatulence, dysentery diarrhea, syphilis,
46	Poaceae (Grass)	*Brachiaria*	*Brachiaria falcifera* (Trin.). Stapf	Signal grass	Garaji, Makarin fako	Tufted herb perennial (P)	E	T	Seed	It add positive input beef and milk in animals (oral interview)
47		*Brachiaria*	*Brachiaria lata* (Schumach) C.E.Hubbard	Signal grass	Guraji Aluwar kwadi;	Loosely grass (A) annual	N	T	Seed	Seed as famine food fodder is palatable for animals,

Table 1 continued

S/N	Family	Genus	Species	Common Names	Hausa Names	Life cycle	Native/ Exotic Spp	Life form	Prop.	Uses
48		*Cenchrus*	*Cenchrus biflorus* Roxb.	Hedgehog grass	Karangiya	grass (A) annual	N	T	Seed	Anti-asthmatic, roots is antioxidant, anticancer,
49		*Chloris*	*Chloris pilosa* Schumach.	Finger grass	Kafar fakara Tafan gauraka	Tapering & erect annual (A)	N	T	Seed	rheumatism, antibacterial, treat skin disorder, cure diabetes
50		*Cynodon*	*Cynodon dactylon (*Linn.) pers.	Bahamas grass [23]	Kirikirii, Taja-maza	Glabrous grass (P) perennial	N	T	Seed/ Veg.	Skin disease, Nose bleeds (haemorrhage) fainting, food poison. menstrual bleeding
51		*Dactyloctenium*	*Dactyloctenium aegyptium*(L.) P. Beauv.	Crow foot grass	Gude-Gude, kutuku	Tufted creeping grass (A)	N	T	Seed	decoction to remedy lumbago, childbirth dysentery
52		*Digitaria*	*Digitaria horizantalis* Wild	Crab grass	Karanin dawaki	Prostrate, tuft annual (A)	N	T	Seed	Anti diabetic, antibiotic, anti thyroid, antioxidant, forage/ fodder
53		*Echinochloa*	*Echinochloa colona* Linn. Link	Jungle rice	Sabe	Tufted, erect annual (A)	N	T	Seed	Spleen problem, wound healing, antioxidant and antimicrobial
54		*Echinochloa*	*Echinochloa crusgali* (L.) P. Beauv	Barnyard grass	Sabe	Robust, tufted annual (A)	E	T	Seed	spleen troubles cancer and wounds, tonic
55		*Eleusine*	*Eleusine indica* (L.) Gaertn.	Goose grass	Tuujii	Tufted annual (A)	N	T	Seed	anti-dysenteric, diarrhea, menstruation, ringworm,

Table 1 continued

S/N	Family	Genus	Species	Common Names	Hausa Names	Life cycle	Native/ Exotic Spp	Life form	Prop.	Uses
56		*Eragrostis*	*Eragrostis ciliaris* (L) R.Br.	Love grass	Tsintsiiyaa, Komayya	Tufted (A) loosely	N	T	Seed	Wounds, stomach pain, whitlows, broom, forage
57		*Eragrostis*	*Eragrostis tenella* (Linn.) P. Beauv.	Japaneese love grass	Tsintsiiyaa, Kamayya.	Delicate tufted annual (A)	N	T	Seed	Rheumatic pain, antioxidant, grains nutritious, forage
58		*Eragrostis*	*Eragrostis tremula* Hochst. ex Steud.	Annual love grass	Burburwa, Hansta-hansa, Komyya	A loosely tufted (A) annual	N	T	Seed	Recover memory lost, forage
59		*Heteropogon*	*Heteropogon contortus* (L.)	Spear grass	Silka, Tsika	Tufted, (P) perennial	N	T	Seed	Blood relax for horse, cure measles, arthritis
60		*Paspalum*	*Paspalum scrobiculatum* (Linn.)	Kodo millet	Tumbin jaki	tufted (P) Perennial	N	T	Seed	Cure pile, menstrual
61		*Pennisetum*	*Pennisetum pedicellatum* Trin.	Desho grass, kyasuwa	Daura, kaafii-riimii, Hura	Erect jointed (A) Annual	N	T	Seed	Treat mumps, wounds, stop bleeding, fodder
62		*Pennisetum*	*Pennisetum polystachion* (L.) Schult	Foxtail, Feathery pennisetum	Hura, kaafii-riimii	Tufted grass (A) annual	E	T	Seed	Heal cuts & wounds, conjunctivitis, earache, analgesic [23]
63		*Polypogon*	*Polypogon monspeliensis* (L.) Desf.	Annual beard grass	Gamba	Erect annual (A)	E	T	Seed	Epilepsy
64		*Oryza*	*Oryza barthii* A. Chev	African wild rice	Shinkafar –tafki, Lallaki	Erect to semi-erect annual (A)	N	T	Seed	Breeding of cultivated rice, grazing, thatching, famine food, anticancer
65		*Oryza*	*Oryza longistaminata* A. chev&Roehr	Wild rice	Shinkafar kwadi	Robust, erect (P) perennial	N	T	Seed Veg.	Grazing and thatching, famine food, anticancer

Table 1 continued

S/N	Family	Genus	Species	Common Names	Hausa Names	Life cycle	Native/ Exotic Spp	Life form	Prop.	Uses
66	Portulaceae (Broad-Leaves)	*Portulaca*	*Portulaca oleracea* Linn.	Duck weed	Baabaa-jibjii; Halsen saniya;	Erect, prostrate stem (P)	N	T	Seed/ Veg.	Ear, syphilis, abscesses, boils, Jaundice, diabetes, Urinary disorder
67	Rubiaceae (Broad-Leaves)	*Oldenlandia*	*Oldenlandia corymbosa* Linn.	Diamond flower	Raatsa-hanji	Glabrous, erect herb annual (A)	N	T	Seed	Depression stomachache fever, viral infection appendicitis
68		*Oldenlandia*	*Oldenlandia herbacea* Linn. Roxb.	Diamond flower	Raawaya Raatsa-hanji	Much- branched erect (A)	N	T	Seed	ulcer, rheumatic fever, swelling, asthma
69		*Spermacoce*	*Spermocoe stachydea* (DC.) Hutch. &Dalz	False button weed	Alkamar tururuwa	Erect, robust (A) Annual	N	T	Seed	Kidneys, diuretics, menstrual, veneral diseases, conjunctivitis,
70	Solanaceae (Broad-Leaves)	*Physalis*	*Physalis angulate* Linn.	Goose berry	Lababuje, Tomatir kaji	Erect herb branch annual (A)	E	T	Seed	Analgesic,diarrhea, menstrua disorder asthma, vomiting,
71		*Solanum*	*Solanum nigrum* (L.)	Black night shade	Gautan kudi	Soft wooded herb (A)	E	T	Seed	Indigestion, piles
72	Sphenocleaceae (Broad-Leaves)	*Sphenoclea*	*Sphenoclea zeylanica* Gaertn.	Goose weed	Yadiya	Erect herb hairless (A)	N	T	Seed	Ulcer, Antimicrobial, stings of animals

Key: M-Monocotyledon, D-Dicotyledon, T-Therophyte, Geo-Geophyte, S-Sedges, G-Grass, B-Broad leaf,

A- Annual, Bi- Biennial, P-Perennial, L.F.- Lifeform, N-Native, E-Exotic, Spp-Species.

Table 2. The composition of identified weed species based on morphology.

Morphology	Number of species	Percentage Composition (%)
Grasses	20	27.78%
Sedges	8	11.11%
Broad leaf	44	61.11%
Total	72	100%

Table 3. The composition of identified weeds species based on family.

Family	No's of Genus	% of Genus	No's of species	% of speci
Amaranthaceae	3	6%	5	6.94%
Araceae	1	2%	1	1.39%
Asteraceae	6	12%	8	11.11%
Cleomaceae	1	2%	2	2.78%
Commelinaceae	1	2%	2	2.78%
Cyperaceae	5	10%	8	11.11%
Euphorbiaceae	2	4%	2	2.78%
Fabaceae	5	10%	6	8.33%
Lamiaceae	2	4%	3	4.17%
Malvaceae	3	6%	7	9.72%
Onagraceae	1	2%	1	1.39%
Poaceae	14	28%	20	27.78%
Portulaceae	1	2%	1	1.39%
Rubiaceae	2	4%	3	4.17%
Solanaceae	2	4%	2	2.78%
Sphenocleaceae	1	2%	1	1.39%
Total	50	100%	72	100%

Table 4. The composition of weed species based on life cycle (annual, biennial, and perennials).

Family	No. Spp	Annual	Biennial	Perennial
Amaranthaceae	5	√ √	0	√ √ √
Araceae	1	0	0	√
Asteraceae	8	√ √ √ √ √ √	0	√
Cleomaceae	2	√√	0	0
Commelinaceae	2	√	0	√
Cyperaceae	8	√	0	√ √ √ √ √ √
Euphorbiaceae	2	√ √	0	0
Fabaceae	6	√ √ √ √	0	√
Lamiaceae	3	√ √	0	√
Malvaceae	7	√ √ √	0	√ √ √
Onagraceae	1	√	0	0
Poaceae	20	√√√√√√√√√√√√	0	√ √ √ √√
Portulaceae	1	√	0	0
Rubiaceae	3	√ √ √	0	0
Solanaceae	2	√ √	0	0
Sphenocleaceae	1	√	0	0
Total	50	48 (66.67%)	00	24 (33.33%)

Table 5. The composition of identified weeds species based on life form.

	Family Name	**Geophytes**	**Therophytes**
1	Amaranthaceae	0	5
2	Araceae	1	0
3	Asteraceae	0	8
4	Cleomaceae	0	2
5	Commelinaceae	0	2
6	Cyperaceae	2	6
7	Euphorbiaceae	0	2
8	Fabaceae	0	6
9	Lamiaceae	0	3
10	Malvaceae	0	7
11	Onagraceae	0	1
12	Poaceae	0	20
13	Portulaceae	0	1
14	Rubiaceae	0	3
15	Solanaceae	0	2
16	Sphenocleaceae	0	1
Total		03 (4.17%)	69 (95.83%)

Broadleaves (61.1%), Sedges (11.1%) and Poaceae (27.7%) were obtained from the study area. The result was consistent with the works of Unaeze et al. [27] who also obtained Broadleaves with a maximum number (61.50%). A study has also shown that the more diverse the land use system, the more diverse the weed community with less dominant and troublesome species. This however suggests that the farming and bush clearing activities within the study area have contributed to the presence of the different types of weed species present in the area and thus is evident as most of the weed species in the study area are found in wetlands.

Annuals were the dominant weeds identified in the study area. This is because many of the weeds in the rice-growing areas have annual growth periods. The annual weed seeds are capable of germination under unsuitable conditions and are able to complete their life cycle from seed to seed during the growing season. A study has shown that the release of arable land after harvesting the rice leads to the re-growth of weeds, which in turn increases seed banks and buds in the soil and begins to grow in the subsequent crop seasons. The work is consistency with that of Panda [10] who obtained annual weeds species over Perennial species in Odisha, India. The dominance of annuals probably indicates that they grow in disturbed areas and stable environments. Similarly our study is in a disturbed area which in turn leads to a dominance of annuals.

The dominant lifeform in the present study was 69 Therophytes (95.83%) and the lowest was 3 Geophytes (4.17%). Therophytes are any plant that survives unfavorable seasons in the form of seeds only. They are typically found in deserts and other arid regions. The highest lifeform value was recorded on Poaceae (20) weed species. The therophytes are annual weeds that complete their life cycle in a short period when conditions are favourable and survive harsh conditions as seeds. Therophytes could also be attributed to the short life cycles that enable them to cope with the unstable conditions of agricultural habitats. In addition, therophytes allocate much of their resources to the reproductive structures and produce flowers early in their life cycle to ensure some seed production even in a year when the growing season is cut short due to the application of weed management techniques; also therophytes are able to set seeds without a pollinating agent. This is consistent with the work of Samba [14] on his work taxonomic

diversity and abundance of weed flora in upland rice fields of the southern groundnut Basin, Senegal. The weed flora is largely dominated by therophytes which include 95% of the recorded species; According to Bourgeois et al. [28] therophytes were the mostly weeds because of some adaptability among the higher specific leaf area, earlier and longer flowering, sunny and dry environment. The study is also consistent with the works of Gomaa [29] in his work Floristic Composition of Weed Vegetation in Citrus Orchards in Aljouf Region, Kingdom of Saudi Arabia which stated that therophytes represented the dominant lifeform (66.7%) of the total flora followed by Geophyte (12.1%). Geophytes are plants typically with underground storage organs, where the plants hold energy and water. Geophytes also include plants with tubers, corms or rhizomes. Geophytes also include plants with bulbs, tubers, corms or rhizomes usually found in Cyperaceace. The Geophytes were the second life form in the Usur rice field of the current study area. Geophyte such as *Cyperus esculentus, Kyllinga erecta, Peltandra virginica* are well adapted to agricultural systems because they are able to resume growth from underground perennating organs after the destruction of their above vegetative shoots resulting from weed management methods [29].

The result also revealed that many of the weeds are used as traditional medicine, food, fodder, and other purposes (**Table 1**). Many of the weeds were used as food such as *Amaranthus spinosus, Portulaca oleraceae, Cassia obtusifolia, Corchorus aestuans, Corchorus olitorius, Corchorus tridens, Alternanthera sessilis, Chrysanthemum indicum.* Although many farmers are not aware of the value of these plants as sources of food, this is similar to the works of Panda [10] who also obtained *Amaranthus Amaranthus sessilis, spinosus, Portulaca oleracea* plants were used as sources of food. Other types of weed example are *Alternanthera spp, Brachiaria falcifera, Brachiaria lata, Eragrostis ciliaris, Echinochloa crusgali, Chloris pilosa, Digitaria horizantalis, Dactyloctenium aegyptinum, Cenchrus biflorus, Pennisetum pediculatum, Pennisetum polystachion, Paspalum scrobiculatm* were used as forage/fodder for animals. They provide sources of nutrition; this is consistent with the works of Abba, et al. [30] in their study of Herbaceous species diversity in Kanawa forest reserves, Gombe State, Nigeria where they also mentioned the use of *Chloris pilosa, Digitaria horizantalis, Eragrostis ciliaris, Pennisetum pediculatum* as forage or fodder. It is also consistent with the works of Panda [10] who reported the use of *Echinochla crusgali, Alternanthera* spp. used for fodder.

The uses of weed in traditional medicine are well known. In the study area different weed species such as *Alternanthera sessilis, Ageratum conyzoides, Portulaca oleracea, Sida acuta, Cleome viscosa, Commelina benghalensis, Paspalum scrobiculatum, Eurphorbia hirta, Vernonia ambigua, Cassia occidentallis, Oldenlandia spp. Waltheria rhombifolia, Physalis angulata, Amaranthus ficoides, Amaranthus spinosus, Solanum nigrum, Eleusine indica, Corchorus olitorius Cenchrus biflorus, Corchrus aestuans, Corchorus tridens, Chloris pilosa, Portulacaoleracea, Ludwigia hyssopifolia*are are used to cure a different ailment.

Recently the beneficial aspect of weeds is being reported and was used for the treatment of various ailments. In the study area, *Aternanthera sessilis, Euporbia hirta* are used to treat Asthama. *Sida acuta, Ageratum conyzoides and Cassia occidentalis* are used to cure kidney disease; *Cassia occidentalis, Portulaca oleracea* are used to cure diabetes; *Alternanthera sessilis, Corchrus olitorius, Sida acuta* and *Eclipta prostate*are used to cure liver disease; *Physalis angulate, Paspalum scobiculaum, Cyperus esculentus, and Cynodon dactylon* are used to cure mentual disorder; *Commelina benghalensis, Eclipta alba, Cassia obtusifolia, Cassia occidentalis, Alternanthera sessilis* are used to cure leprosy; *Corchorus olitorius, Cleome viscosa, Commelina benghalensis, Alternanther sessilis* are used to cure fever others include *Sida cordifolia, Phallantus amarus* are used to cure diarrhea; *Euphorbia hirta, Ageratum conyzoides*are used to cure cut and woundhealing*; Leucas martinicensis, Commlina benghalensis, Alternanthera sessilis* are used to cure snake bite, *Phallantus amarus* cures diarrhea. The result findings are also

consistent with the works of Abiodun, et al. [31] in their study of Medicinal Weed Diversity and Ethno-medicinal weeds in Odigbo, Ondo State, Nigeria where they also mentioned the use of *Alternanthera sessilis* cure asthma; *Sida acuta, Cassia occidentalis* cure kidney diseases and diabetes; *Physalis angulate* cure menstrual disorder; *Cassia obtusifolia* and *Cassia occidentalis* cure leprosy. Also is consistent with the works of Abd El-Ghani [32] in their study of Traditional Plants of Nigeria: An Overview, where they also mentioned the used of *Ageratum conyzoides* are used to cure ulcer*, Euporbia hirta* cure asthma and *Eclipta prostate* cure liver disease. The research findings are also consistent with the works of Radha and Manokari [26] in their study of A Checklist of Medicinally Important Weeds grows in the Horticulture fields of Palayamkottai, Tirunelveli district, and Tamil Nadu, India where they also mentioned the used of *Euphorbia hirta* cure asthma; *Portulaca oleracea* cure diabetes; *Alternanthera sessilis, Commelina benghalensis,* and *Eclipta alba* cures leprosy; *Corchorus olitorius, Althernanthera sessilis, Cleome viscosa,* and *Commelina benghalensis* cures fever; *Sida cordifolia* cure diarrhea. It is also consistent with the works of Panda [10] on their study where they also mentioned the use of *Phallantus amarus* used to cure diarrhea.

For instance weeds like *Aeschynomene indica, Eragrotis ciliaris* and *Eragrotis tenella, pennisetum polystachion, Heteropogon contortus, Corchrus aestuans, Corchorus tridens* were used for various household purposes, likewise some of them like *Eragrotis tremula* were used for various rituals by an inhabitant of Usur, Bade L.G.A.

Invasive specie are non-native species that significantly modify or disrupt the ecosystem they colonized and outcome native species for food and habitats, which triggers population declines through natural migration or through human introduction.

5. Conclusions and recommendation

This study concluded that seventy-two weed species were identified belonging to sixteen families and fifty genera was recorded in the study area. The study also revealed the composition of the weeds, the family that had the highest number of weed species was Poaceae followed by Asteraceae and Cyperaceare, Malvaceae, and the lowest was Araceae, Onagraceae, Portulaca, and Sphenocleaceae respectively.

The life cycle shows annual weeds species were the dominant followed by Perennial and least Biennial.

The study also shows the life forms as follows. Furthermore, Broadleaf was reported to be the highest number followed by Poaceae and the least was Sedges. The research also recorded twenty-five exotic weed species and forty-seven native species which are dominant. The area is polluted by chemicals, which is the addition of any substance or any form of energy to the environment at a rate fast than it can be dispersed, diluted, decamped, recycled or stored in some harmless form attributes to biodiversity loss by creating health problems in exposed organisms. In some cases, exposure may occur in a dose high enough to kill outright or create reproductive problems that threaten the species' survival.

The findings reveal that, the composition of the life form shows therophytes had the highest value that dominates the weed species; the lowest value was recorded by Geophytes. The research also shows weed species reproduction is mostly reproduced by seed. The highest reproduction reproduces by seed were fifty-nine weeds and the least was vegetative reproduction thirteen. The result also shows the majority of the weed species were used for medicinal uses for curing different ailments such as ulcers, diabetes, hypertension, gonorrhea, skin diseases, kidney disease, leprosy, liver diseases, catarrh, menstrual disorder, burns, wound, etc. For example *Euphorbia hirta* cures asthma and lung infection; *Corchorus olitorius* cures fever and liver disease; *Alternanthera sessilis* cures leprosy; *Amaranthus spinosus* cure ulcer.

Phytosociological studies, further reveal the densely populated weed specie is *Cyperus rotundus,* the frequently populated weed specie is *Cyperus rotundus.* The weed species with the highest importance value index (IVI) is *Cyperus rotundus* and the

lowest value was recorded on *Cenchrus biflorus*. The phytosociological attributes could not be unconnected to their similarity in their families, morphology and development attributes. Most of the weed species with the highest density, frequency and abundance were of the poaceae family and sedges. These weeds have high fecundity producing hundreds of thousands of seeds during a single growing season and reproduce through vegetative propagules and seeds and have vegetative mimicry with crops in addition to long-time seed dormancy.

1) The study also recommends no single control tactic provides reason by control of *Cyperus species* an integrated approach that involves biological, cultural, chemical options will be most effective.

2) The study recommends further research should be conducted on the effect of weed on the growth and yield of rice in Usur, Bade L.G.A. Yobe State.

Conflict of Interest

There is no conflict of interest.

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