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Influence of Shading On Association of Weed with Groundnut in a Savanna Dry Farm Land of Sokoto State, Nigeria

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ABSTRACT
This study investigates the association between weeds and groundnut grown in the Savanna dry land under shade. Six plots were used for the study which was aimed at understanding weed crop interaction as regards to the nature of weeds as they interfere with groundnut production system in the Sudan Savanna. From the plots, *Borreria radiate* and *Corcherus tridens* dominated the whole plots. Weed emerging early in the plots with higher percentage of occurrence are *Digitaria debilis* and *Calotropis procera* with 40% and 33.33% respectively, percentage species of weed emerging lately were *Achyranthes aspera* (53%), *Dactyloctenum aegytum* (13.48%) The percentage germination of groundnut was also determined which ranged from 132 to 172. It was observed that yield in crops under all experimental plots were generally low. The shading effect reduced weed infestation by reducing germination, growth and development of the weeds. Farmers should adopt the weed-free and the closest spacing treatments.
Keyword: *Groundnut, yield, weeds, Savanna and Dry land.*

INTRODUCTION
Groundnut (*Arachis hypogaea*) is a day neutral, leguminous annual herbaceous oil seed crop [1]. Groundnut is an important food crop of the world and also a source of income for farmers. Groundnut is grown on 26.4 million hectares worldwide with a total production of 36.1 million metric tons, and an average productivity of 1.4 metric tons [2]. Groundnut cultivation is influenced by a number of factors such as climatic factors, edaphic (soil factors) and biological factors such as pests and diseases and agronomic factors such as spacing and weed management.

Weeds may be regarded as any plant or vegetation except fungi that interferes with mans objectives. They are unwanted biological are exclusively associated with man and his activities. Weeding accounted for a major part of farming activities and so are were worried that developing an effective method of weed control, weeding less human effort /labour would lead to employment. Weeds science started as weeds control strategies rather than understanding of weeds in relation to the ecosystem and how weeds affect crops. Akobundu and Youdeowei [3, 4] indicated that weeds acted as hosts to pests and harbor many fungal, viral and bacterial diseases. IITA [5] showed that uncontrolled weeds reduced yields of semi prostrate and erect crops by 68% and 78% respectively. Akobundu [3] reported that all crops are sensitive to early weed interference and should be cleared within the first two to three weeks after planting. Proper spacing ensures adequate ventilation, reduces competition among plants for space and nutrients, and reduces transmission of diseases, facilitates weeding and movement in the farm and also reduces overcrowding and, therefore, allows interception of radiation by plant canopies. Garko [6] observed that between 64% and 69% of pods failed to reach maturity in early sowings at high density, irrespective of field location. Generally, correct timing of weeding and proper spacing is imperative in the determination of yield in groundnut cultivation.

There has been little published information available on weed infestation period with maintaining optimum plant population in cropping systems in this environment. The present study was, therefore, focused to investigate the types of weed competing with groundnut in shading plots, yield of groundnut plant and estimate potential weed performance in cropped plots

MATERIALS AND METHODS
The Study area
The study was carried out at the dry land farm of Usmanu Danfodiyo University, Sokoto is located between latitude 13.02'N and longitude 5.25'E at altitude of 351m above the sea level [7]. The climate of the area is of the Sudan savanna type characterized by long dry season between the month of October to May and short unimodal rainy season between May to October. The mean annual rainfall lies between 600-700mm. The mean maximum and minimum temperature are 40^{o}C and 15^{o}C respectively. Also the mean relative temperature varies from 5% in February to 70-90% in August or at the peak of rainy season [7].

Most perennial trees shade their leaves and barks during the dry season periods. The area covered by full herbaceous plants (grass and forb) and shrub grow during the rainy season. The soil basement complex is characterized by weakly developed profiles which aid normal agricultural practices. The sand content was high and silt and clay were low [8].

Sampling Procedure
Two approaches were employed field and laboratory investigation on the occurrence, composition and effects of weeds in the growth and yield of groundnut (*Arachishypogea*) the method include.

Field Investigation
The materials used in the field were pick axe, trowel, measuring tape, meter rule and polythene bags. In the field, twelve plots were marked out. Six were in an open field and the other six were in shade. Each plot measured 3 meter and was divided into 12 rows. On each row, three viable groundnut seeds were sown in fifteen holes of 20cm interval, making a total of 540 seeds per plot.

The characteristics of the different plots are as follows: Plot 1, there was no weeding both before and after sowing plot -2, was weeded two weeks after planting and every three week, thereafter up to harvesting. Plot -4, was weeded once before planting. Plot -6, was weeded twice, once before planting, two weeks after planting and every three weeks up to harvest.

Weeding was carried by uprooting all weeds that emerged in the plots. The treatments given to the plots in the open field were

repeated in the plot under shade. The seeds planted in the shade, were shaded by neem tree of *Azadirachta indica*. The experiment last for 11 weeks after sowing.

Plant Identification

Weeds occurring in all plots were identified to species and counted. The identification was verified by comparison with the herbarium specimens at the Usmanu Danfodiyo University, Sokoto. The identification of the weeds was in accordance with [4].

Emergence of Seeds Sown

The number of groundnut plants emerged from the seeds sown in each sample plot were counted and recorded as it appeared. Seed yield and biomass were determined by weighing on a meter balance. The dry weight sample was obtained by oven at 70^{o}C for 48 hours.

RESULTS

Weed species associated with groundnut crop in dry land farm

Thirty eight (38) weed species belonging to twenty flowering plants families were encountered on the farm. Eleven (11) species belonging to three flowering plant families were found to be monocotyledons while the remaining 27 weed species belonging to 17 flowering plant families were dicotyledons. Among the dicotyledons there are seedlings of tree species *Azadirachta indica* and *Psidium guajava*. *Amaranthus spinosus* had the highest occurrence (787), followed by the *Azadirachta indica* (489). The weeds that few number of occurrence were the *Sida cordifiola* (3).

Early and Late Emergence of Weed Species in the Plots

The result of the determination of early and late stage development of the weeds in the shade plots is presented in Table 1. The number and percentage of weeds that emerged early between first to fifth week are given in Table 2. Three species emerged early in shade plots; *Digitaria deblis* (40.00%) followed by *Calotropis procera* (33.33%). The lowest percentage emergence was recorded for *Pennisetum* spp (2%) in the sun plots and *Psidium guajava* (26.66%) in the shade plots. Only one *species Calotropis procera*, *Digitaria deblis* and *Psidium guajava* appeared early only in the shade.

The number and percentage of weed species that emerged late between the sixth week and eleventh week are given in Table 2. Those plots with high percentage are *Achyranthes aspera* (53.77%) and *Dactyloctenum aegyptum* (13.48%). Certain weeds species were found to be common to both early and late emergence and they were separated as the common weed species. Those from the shade are *Amaranthus spinosus* (29.04%) and *Borreria radiate* (20.66%).

Table 1: Number and percentage of weeds emerging early in the shade plots of groundnuts in dry land farm at UDUS

Weed species	No	Percentage (%)
Calotropis procera	10	33.33
Digitaria debilis	12	40.00
Psidium guajava	8	26.00

Table 2: Number and percentage of weed species emerging late in the shade plots of groundnuts in dry land farm at UDUS

Weed species	No.	Percentage (%)
Achyranthes aspera	299	53.77
Alysicarpus vaginalis	38	6.83
Acroceras amplectans	17	3.05
Eragrostis tenella	23	4.13
Crotalaria spp	16	2.87
Cassia obstusifolia	10	1.79
Dactyloctenum aegyptum	75	13.48
Tridax procumbens	33	5.93
Phyllanthus amarus	21	3.77
Sesamum indicum	5	0.89
Pennisetum polystachion	19	3.41

Germination of Groundnut Seeds in Shade Plots

The result of the percentage germination of groundnut plant per plot sampled is presented in **Table 3**. The percentage germination in the shade it had a highest percentage of 29.63% from plot 5 and lower percentage of 10.92% from plot 4.

Table 3: Germination of seeds of *Arachis 2ypogeal* per plot in dry land farm at UDUS

Plot NO.	No of Seed Sown	Emergence in shade	Percentage
1	540	74	13.70
2	540	102	18.89
3	540	112	20.74
4	540	59	10.92
5	540	160	29.63
6	540	141	26.11

Effect of Weeds on Groundnut Yield

The yield of groundnut in the shade plots are presented in Table 4. The highest dry weight was 396.6 grams in Plot 6 and the lowest yield of 177.3 grams observed in Plot 4.

Table 4: Seed yield of *Arachis hypogea* grown in the shade plots in dry land farm at UDUS

Plot No	Shade Yield (g/m^2)
1	195.8
2	210.9
3	333.7
4	177.3
5	211.1
6	396.6

DISCUSSION

From the investigation, thirty- eight (38) weed species belonging to twenty (20) flowering plant families were found occurring in the Savannah dry land farm of Usmanu Danfodiyo University, Sokoto. Some of these weeds appear as soon as rain star and can be described as the early emergence weeds such as *Calotropis procera*, Tephrosia *bracteolate*, *Cenchrus biflorus*, *Zornia latifolia*, *Pennisetum spp*, *Sida cordifolia*, *Pennisetum pediceqtum*, *Acroceras amplectans*, *Digitaria deblis* and *Psidium guajava*. Some weeds take quite a long time after the rainy season before they appear like *Borreria radiate*, *Achyranthes aspera*, *Corchorus tridens* and *Hibiscus sadariffa* while some disappeared very quickly as soon as the rain stop like *Indigofera hirsuta* and *Sida cordifolia*.

From the density of weeds encountered in the farm, it is clear tha five species namely Borreria radiate, *Amaranthus spinosus*, *Corchorus tridens*, *Azadirachta indica* and *Achyranthes aspera* constitute almost 78% of entire weed community in the farm. The university dry land is cultivated once in a year during the rainy season of June to October, and is then left cleared until another rainy season begins. From the analysis of the dry weight of groundnut yield under shade due to weed interface, there is evidence that composition of the weed species community in the

shade were not uniform. This means there is possible sub grouping within the community into isolate units on the samples plots.

The ability to grow rapidly and develop canopy cover is important for successful competition for light. In the absence of light the shaded crop is unable to produce its need of assimilates in the plant which eventually reduces root/shoot ratio of the crop, and in turn reduces the crops ability to absorb water and nutrients from the soil [9] which would enable it to compete effectively with weeds in the shaded area. Shading effect probably reduced weed infestation due to the reduction in light recycling the plants in shade plots which probably reduced germination and adversely affect growth and development of the weed and crop yield. That was why weed population in the shaded area is fewer than those in the sunshine area.

The consistently higher seedling emergence in the stirred plots, is in agreement of weeds seeds [6, 10]. For example, in plots 2.3 5 and 6 were weeding was done after planting, the soil become soft, loose and aerated which are necessary conditions for seed germination and thus indicates that weeding at regular interval enhances germination, growth yield and low weed infestation of groundnut crops than in non- weeded plots. Competition with weeds during the first days or weeks after crop emergence is critical for crop performance. For example in Plot 4, where weeding was only done before planting, and left with weeds up to harvesting period, there is low crop yield probably due to high competitive ability for nutrients, water space and light by the weeds than the crops especially for photosynthetic activities and other metabolic processes [9]. Also, there is marked indication of stunted growth habit, leaf discoloration and defoliation of groundnut crops as a result of high incidence of weed species composition on some of the sample plots.

CONCLUSION

It has been observed that yield in crops under all the experimental plots, were generally low. The highest groundnut yield recorded in the plots that were weeded during the experiments was due to high light availability to the crops and the weeding process that reduced weed infestation at regular intervals and thereby reducing competition for food, water, space and air between the crops and weeds. In the study thirty- eight (38) weed species associated with groundnut crop in the University dry land farm, were identified. Soil analysis must be carried out to determine the soil pH while pests and diseases should also be controlled. Therefore, it is advisable for the farmers or the growers of groundnut to do their first weeding 2-3weeks after planting in order to get optimum yield.

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