Response of Groundnut (*Arachis hypogaea* L.) Varieties to Varying Defoliation Intensities

MUKHTAR A.A.[1], FALAKI A. M., AHMAD A., JALIYA M.M., ABDULKARIM B.

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Abstract

Loss of foliage in crops could be due to leaf eating insect, diseases, grazing animals, foliage harvest by humans for consumption and green manuring. The level and intensity of this defoliation could have diverse effect on the crop. An experiment to study the response of groundnut varieties to defoliation intensities was conducted in the wet season of 2012. Treatments which consisted of four intensities of defoliation; No defoliation, (D_1), defoliating 10 plants/plot (D_2), defoliating 20 plants/plot (D_3) and defoliating 30 plants/plot (D_4), time of defoliation, 4 weeks after sowing (WAS) T_1 and 6WAS T_2 and two varieties SAMNUT 21 (V_1) and SAMNUT 23 (V_2) were laid out in a randomized complete block design (RCBD) and replicated three times. Result showed that number of pods/plant; pod yield/plot and haulm yield/plot were affected by time and intensity of defoliation. Similarly varieties differed significantly in their response to time and intensity of defoliation.

Introduction

Groundnut (*Arachis hypogaea* L.) is one of the most important legumes providing significant amounts of oil (50 to 65%, Boye-Goni *et al*., 1990) and proteins (25 to 35%, Anonymous 2002), livestock fodder and improves soil fertility. During production, crops may be damaged by hail, leaf feeders and defoliators, leaf diseases; besides loss in functional area due to wind, drought, grazing of animals, removal of leaves for fodder and as leafy vegetable etc. Degree of yield reduction is directly proportional to percentage of leaf area destroyed and varies depending upon variety, crop growth stage, population and intensity of foliage loss.

Groundnuts were least affected by plant defoliation; percentage reduction in yield being 59.7 79.0, and 86.4% in groundnut, cowpea and soybeans (Enyi, 1975). Knowledge of defoliation that causes slight yield reduction but provides significant advantage to quantity of fodder obtained either for livestock feeding or for green manure is of paramount importance.

Materials and Methods

The experiment was conducted at the Institute for Agricultural Research farm Samaru, Zaria, during the rainy season of 2012. The experiment was laid out in a randomized complete block design with three defoliation intensities and a control (0, 10%, 20% and 30%), two time intervals (4 weeks after sowing (WAS) and 6 WAS) and two groundnut varieties (SAMNUT 21 and SAMNUT 23), replicated three times. After thorough land preparation, groundnut seeds were sown in plots measuring 3m by 4m constituting the gross plot which had four ridges. The two inner ridges constituted the net plot. Weeds on the field were controlled by two hoe weeding at three and six week after sowing. Data was collected on number of days to 50% flowering, pod number, pod yield and haulm yield of groundnut and subjected to statistical analysis using SAS statistical software. Where significant, means were separated using Duncan multiple range test (DMRT) Duncan (1955).

Results

Increasing the defoliation intensity from 10 percent to 30 percent did not have significant effect on pod number per plant of groundnut (Table 1). Similarly pod number at the different sampling times was similar. The varieties used were not significantly different in their pod numbers. The number of days to 50% flowering was also not significantly different with respect to time and intensity of defoliation.

[1] Department of Agronomy, Faculty of Agriculture, Ahmadu Bello University Zaria, P.M.B 1044 Zaria, Nigeria. www.abu.edu.ng, yayaaishang95@gmail.com.

Table 1: Pod number per plant and days to 50% flowering of groundnut varieties as affected by time and intensities of defoliation at Samaru in 2012

Treatments	Pod number per plant	Days to 50% flowering
Defoliation intensities (%)		
0	20.0	80
10	21.0	82
20	19.0	82
30	21.0	81
Time (WAS)		
4	20.0	81
6	20.0	80
Variety		
Samnut 21	21.0	81
Samnut 23	20.0	82
Interactions		
DxT	NS	NS
DxV	NS	NS
TxV	NS	NS

The effect of defoliation on pod yield indicated a reduction in yield from 742.50g at 10% to 608.33g at 30%. (Table 2). The results show that pod yield was highest where only 10% of the leaves were removed. Samnut 23 produced more yield than Samnut 21. Haulm yield was not significantly different with respect to time and intensity of defoliation. There were no statistical differences between the varieties used with respect to haulm yield.

Table 2: Pod yield and haulm yield of groundnut varieties as affected by time and intensities of defoliation at Samaru in 2012

Treatments	Pod yield (g)	Haulm yield (g)
Defoliation intensities (%)		
0	709.2	1224.8
10	742.5	1228.0
20	688.3	1188.3
30	608.3	1229.8
Time (WAS)		
4	713.8	1185.7
6	660.4	1249.7
Variety		
Samnut 21	635.4	1199.6
Samnut 23	738.8	1235.8
Interactions		
DxT	NS	NS
DxV	NS	NS
TxV	NS	NS

Discussion

Assimilate availability and allocation to reproductive structures is an important factor which determines yield of any crop. Leaf is the major source of supplying assimilates to developing organs, young pods and seeds in crops (Abdi et al., 2007; Mondal, 2007; Barimavandi et al., 2010). Leaf removal may, therefore, influence TDM production and yield through photosynthate production and distribution into different parts depending

on the magnitude of leaf removal (Hossain et al. 2006; Gustafson et al., 2006).In this experiment, reduction in yield occured when defoliation increased from 10% (742.50g) to 30% (608.33g). This result is similar to that obtained by Gustafson et al. (2006) in soybean who had the opinion that plant could compensate its leaf loss by leaf regrowth potentials in defoliated plants. At 10% defoliation, it is possible that the groundnut crop has overcome the effects of defoliation better than at higher defoliation intensities.

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