

Evaluation of Intercropping of Rhodes Grass with Alfalfa Under Irrigation at Shambat**¹Atif Elsadig Idris, ¹Alaeldin Idris H.khairi and ¹Yassin, Mohamed Ibrahim***Department of Agronomy, College of Agricultural Studies, Sudan University of Science and Technology, P.O. Box 71, Shambat, Sudan.*

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ABSTRACT

The evaluation of Rhodes grass (*Chloris gayana* Kunth) as intercropped with alfalfa (*Medicago sativa* L.) was assessed under different intercropping ratios at Shambat, Sudan. A completely randomized block design with three replications was used. Different Rhodes grass growth characters and the yield characters of the intercropping were measured. The significance of intercropping was resulted in plant height and leaf area of Rhodes grass. The fresh yield of intercropping was also higher and significant than monocropping ratios. Thus, the experiment showed the positive effect of Alfalfa on Rhodes grass characters when they intercropped with each others. The highest yield of intercropping ratios than monocropping and the superior of treatment D (50% Rhodes grass + 50% Alfalfa) over other treatments used in the study was evident

Key words: Intercropping, Rhodes Grass, Alfalfa, Growth, Yield**Introduction**

Numerous advantages of forage crops intercropping leads researchers in the developing countries to concern it with great interest. Intercropping has various systems and many advantages. Osman and Osman, [9] reported that these advantages include reduces levels of diseases and pests, creation of a suitable micro-climatical soil improvement. Recently, Ibrahim [5] stated forage intercropping between grasses and legumes increase yield, improve growth, produce palatability, supply the soil with nitrogen by legumes, make a better soil coverage and keep it from erosion, compete weeds, attained a balanced and highly nutritive feeding to animals and decrease animals bloats. Rhodes grass (*Chloris gayana* Kunth) is a perennial forage grass belongs to the family *Poaceae* (*Gramineae*). It occurs in some tropical and subtropical parts of Africa and it was first cultivated in more than 100 years ago. It has since become widely sown throughout the tropical and subtropical world where it remains one of the major C₄ forage grasses [8]. Rhodes grass is used primarily as pasture, hay or lay crop and to stabilize disturbed sites.

It is now widely naturalized in areas where it is well adapted [7]. Alfalfa (*Medicago sativa* L.) is a perennial forage legume crop and has the ability to stay

in soil for 3-5 years producing economical forage production. In addition Alfalfa is characterized by its ability to tolerate frequent cutting and produce forage every 20-30 days, add nitrogen to the soil by bacterial nodules in roots, ability to re-growth after cut and store energy in the crown which helps the buds in a quick re-growth Abusuwar, [1] and khair [6]. Intercropping between Rhodes grass and Alfalfa under irrigation could be a good basic experiment for using intercropping in the irrigated schemes or in natural pastures. Thus the main objectives of this study are to evaluate the effect of Alfalfa on yield and growth of Rhodes grass and to select the best yielding combinations between the two crops.

Materials and Methods

The study was carried out at the Demonstration farm, Sudan university of Science Technology, College of Agricultural Studies, Shambat (Latitude 14° 40' N. , Longitude 32° 35' E. and Elevation 380 m above the sea Level) during the period from 15. Nov. 2009 to, first of April 2010. Five treatments of different seeding combinations (ratios) of Rhodes grass (*Chloris gayana* L.) variety katmbora introduced from Australia by selected seeds company and Alfalfa (*Medicago sativa* L.) variety hegazi from Agricultural research

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corporation (ARC) were used in this study (tablets). the seed rates used in the study were 20Kg/F and 10 Kg/F for Rhodes grass and Alfalfa, respectively.

The treatments were arranged in a randomized complete block design (RCBD) with three replications. Replication were divided into 5 plots, each plot was 3×3 m consisted of 8 Lines, 25 cm apart.

Irrigation was conducted every 7 days, hand weeding was frequently done to get rid of weeds. Consecutive three cuts were conducted after 75,105and

135 days From sowing, respectively. Ten plants of Rhodes grass were randomly selected before every cut in the three replications. Then, plant height (cm), leaf area (cm²), number of leaves/ plant, number of tillers/ plant and stem diameter (cm) were measured for each cut separately. Forage fresh yield (t/ha) and forage dry yield (t/ha) were also calculated for the five ratios of intercropping for each cut separately. The statistical analysis for (RCBD) as described by Gomez and Gomez [3] was performed.

Table 1: Intercropping ratios of Rhodes grass with Alfalfa used in the study.

Treatment	Sowing Method
A	Pure Rhodes grass (monocrop)
B	75% of Rhodes grass seed rate mixed with 25% of Alfalfa seed rate
C	25% of Rhodes grass seed rate mixed with 75% of Alfalfa seed rate
D	50% of Rhodes grass seed rate mixed with 50% of alfalfa seed rate
E	Pure alfalfa (monocrop)

Results and Discussion

The plant height of Rhodes grass was significant ($P \leq 0.05$) for the three cuts (table, 2). The height of Rhodes grass for the first cut seemed to be higher than the second and the third cuts. The overall mean of the first cut for the four treatments was also exceeded the overall mean of the second and the third cuts (table, 4). As indicated in table 4 significance was observed for Rhodes grass leaf area between the four treatments. Treatment C was considered to be the best one for Rhodes grass height and leaf area in the three cuts and reflect the positive effect of Alfalfa on these characters. For number of tillers the significancy between the treatments was observed in the first and the third cuts (table, 2), generally the third cut scored the highest values for number of tillers (table 4). The non significance observed for Rhodes grass stem diameter illustrate the negative effect of alfalfa on Rhodes grass for this character. Table 3 showed the significance of

intercropping for fresh weight in the first and second cuts, respectively. The intercropping evident was clearly resulted in treatments B,C and D. Generally treatment D. Showed the highest total fresh and dry yields for the three cuts and indicate that it is the best treatment for intercropping between Rhodes grass and alfalfa (table, 4). These findings were supported those supported by Elmore and dacobs [2], Ibrahim [4] Loch, [8] in different intercropping trials between grasses and legumes.

Conclusion:

In conclusion the experiment showed the importance of intercropping as most of intercropping treatment were better in performance than monocropping. The treatment D. (50% Rhodes grass t50% alfalfa) was found to be best one for both fresh and dry yield characters.

Table 2: Mean squares of some growth characters of Rhodes grass as affected by intercropping with Alfalfa.

Source of variation	1 st cut			2 nd cut			3 rd cut		
	Replication df = 2	Treatment df = 3	Error df = 6	Replication df = 2	Treatments df = 3	Error df = 6	Replication df = 2	Treatments df = 3	Error df = 6
Plant height (cm)	12.1	6.24*	8.17	11.17	5.14*	7.43	11.09	5.11*	8.00
Leaf area (cm ²)	17.6	10.56**	13.05	14.88	7.33*	11.11	14.12	9.82**	12.26
Number of leafs	3.48	2.09 ^{n.s}	2.51	2.31	1.09 ^{n.s}	2.29	2.31	1.56 ^{n.s}	2.41
The number of tillers	9.32	4.98*	7.07	7.22	3.72 ^{n.s}	6.89	8.17	4.81*	4.87
Stem diameter (cm)	0.00	0.70 ^{n.s}	0.00	0.80	0.27 ^{n.s}	1.03	0.94	0.68 ^{n.s}	0.74

** significant differences at 0.01 * significant differences at 0.05 ^{n.s} Non significant deference

Table 3: Mean squares of dry and fresh yield (weight) characters of the five ratios of intercropping between Rhodes grass with Alfalfa.

Source of variation	1 st cut			2 nd cut			3 rd cut		
	Replication df = 2	Treatment df = 4	Error df = 8	Replication df = 2	Treatments df = 4	Error df = 8	Replication df = 2	Treatments df = 4	Error df = 8
Dry weight (ton/ha)	0.20	0.53 ^{n.s}	0.35	0.5	1.61 ^{n.s}	0.67	0.85	1.15 ^{n.s}	1.37
Fresh weight (ton/ha)	12.06	12.46**	0.99	4.10	47.51**	6.23	13.6	19.80 ^{n.s}	7.3

** significant differences at 0.01 ^{n.s} Non significant deference.

Table 4: Means of some growth characters of Rhodes grass affected by intercropping with alfalfa.

Treatments	Plant height (cm)			Leaf area (cm ²)			Number of leafs			The number of tillers			Stem diameter			Fresh weight (ton/ha)			Dry weight (ton/ha)		
	1 st Cut	2 nd Cut	3 rd cut	1 st Cut	2 nd Cut	3 rd cut	1 st Cut	2 nd Cut	3 rd cut	1 st Cut	2 nd Cut	3 rd cut	1 st Cut	2 nd Cut	3 rd cut	1 st Cut	2 nd Cut	3 rd cut	1 st Cut	2 nd Cut	3 rd cut
A	84.0	75.4	70.0	18.2	13.90	16.7	6.00	5.93	7.60	29.9	17.7	20.4	1.26	1.08	1.08	8.05	12.71	10.57	6.28	9.60	2.6
B	82.2	67.4	74.5	22.2	20.26	17.9	6.13	6.33	7.26	11.5	11.9	24.5	1.14	1.24	1.13	11.86	12.44	15.83	4.40	9.40	3.83
C	77.8	76.8	77.2	20.2	18.95	22.4	6.60	6.86	7.20	13.2	16.6	16.9	1.14	1.22	1.12	13.55	16.56	15.13	7.24	12.00	3.31
D	80.2	61.8	73.6	21.0	14.37	20.7	6.46	6.13	7.00	14.1	16.6	14.1	1.15	0.94	1.46	13.45	18.95	17.33	7.66	14.48	4.23
E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.26	15.68	13.61	6.34	13.04	3.39
Overa ll mean	81.0	56.6	73.8	20.4	16.87	19.4	6.30	6.31	7.27	17.2	29.7	19.0	1.17	1.12	1.20	11.59	15.27	14.50	2.13	11.70	3.46
C.V%	17.2	12.4	9.1	06.0	06.00	05.5	2.80	1.66	1.90	4.56	5.77	4.00	2.16	0.23	2.44	6.6	16.0	18.0	4.0	6.00	8.00
L.S.D	13.4	11.5	12.0	4.01	03.88	03.9	1.74	1.82	1.89	3.78	5.16	3.92	1.38	1.16	1.09	1.87	4.73	5.10	1.11	1.55	2.21

A= 100% Rhodes, B= 75% Rhodes with 25% alfalfa, C= 50Rhodes with 50% alfalfa, D=25% Rhodes grass with 75% alfalfa, E=100% Alfalfa

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