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Evaluation of some genotypes of Panicum Mombasa plant in South Egypt

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ABSTRACT

This field experiment was conducted at the green fodder farms of the Animal Production Department of the Egyptian Aluminum Company in Qena Governorate—Nag Hammadi during the 2021/2022 and 2022/2023 seasons to evaluate the effect of planting date and seeding rates for three cultivars of panicum. Planting was done on two planting dates, D1 (25/05) and D2 (25/06), with seeding rates (kg/fad.) of 2 kg/fed -1 (S1), 4 kg/fed -1 (S2), and 6 kg/fed -1 (S3) for three different cultivars of fodder Panicum (Panicum super mombasa "F1" (C1), Panicum zori "Mg12" (C2), and Panicum maximum mombasa "A1" (C3)). The results showed that the seeding rate (S3) was superior to forage yield (FY), protein yield (PY), dry matter (DM), and fiber percentage, while the seeding rate (S1) was superior to the percentage of crude protein (CP). The sowing date (D2) was superior to (D1). All the traits under study showed significant improvements. While the cultivars had a significantly different effect on the studied traits, the cultivar (C1) and the cultivar (C2) were superior. The results indicated that Panicum plants planted on 25/6 with a seed rate of 6 kg/fed with Panicum super mombasa F1 cultivar and Panicum zori Mg12 led to increased forage field and traits under experimental conditions.

Key words: Panicum, planting date, seeding rates, cultivars.

INTRODUCTION

Egypt suffers from a great shortage of green fodder, especially summer and processed fodder, the problem of animal protein deficiency is one of the most important problems that facing improving the nutritional level in developing countries in general, Mohammed (2004).

In Egypt, the value of local production (self-sufficiency) of red meat decreased to 53.6% in 2021, compared with local production in 2009, which represented a self-sufficiency rate of 88.8%, and the number of livestock decreased from 19.9 million in 2009 to 8.1 million in 2021**.** The per capita consumption of animal protein in Egypt represents 29 grams/day in 2019, as it is lower than the safe limit recommended by international organizations by about 17% (which recommends a rate of 34 grams/day/capita). Hence, sustainable agricultural development aimed to reach the per capita share. of animal protein: 33 grams/day by 2030., Central Agency for Public Mobilization and Statistics (2023).

The panicum crop is an alternative to coarse fodder in animal feed due to its water requirement being reduced by about 40% compared to alfalfa. It is one of the non-traditional perennial fodder crops whose cultivation is good because it tolerates high salinity, it tolerates heat stress. Its cultivation is good in low-exploitation lands affected by salinity, in addition to its high rate of palatability to animals, which increases its ability to face rising costs. Due to the connection between the demand for fodder and the demand derived from the demand for livestock, the production of panicum becomes more profitable at production, because relying on it for feeding animals. On the farm, it contributes to reducing feeding costs when used as an alternative to high-cost roughage, it reduces the feeding costs of the head by about 33.3% when used as a substitute for rough alfalfa feed., Ibrahim and Al-khateb (2023).

Climate changes such as high temperatures, drought, salinity have a negative impact on agriculture. Therefore, evaluation of cultivars under different sowing dates and seeding rates is considered one of the important the factor and necessary researches at the present time. So, Th objectives of this study were Determine:

- The best sowing date, cultivars, and seeding rate for Panicum crop under Upper Egypt conditions with addition to, study:
-Some physiological and morphological traits of "Panicum".
- The nutritional value and quality of the Panicum plants.

MATERIAL AND METHODS

This experiment was conducted in the experimental fields of the Green Fodder Farm - Aluminum Company, Naga Hammadi, Qena Governorate, Egypt. during the two agricultural seasons 2021/2022 and 2022/2023, To evaluate three Cultivars of Panicum Super Mombasa F1 (Spanish hybrid) (C1), Zuri Mg12 (Brazilian hybrid) (C2) and maximum Mombasa (A1) (C3) under different of seeding rates 2 kg/fed-1 (S1), 4 kg/fed-1 (S2), and 6 kg/fed-1 (S3) on two planting date 05/25 (D1) and 06/25 (D2).

Each planting date was a separate experiment, and then a combined analysis was conducted for the planting dates for each season separately .The experiment was carried out according to a randomized complete block design (RCBD) to study the effect of seeding rate on three cultivars by using four replication. The seeds were spread manually and mixed with a small amount of sand at a ratio of 1:1 due to the light weight of the seeds and the ease of carrying out the spreading process. The total number of experimental units per planting date in the season became (36) units. The studied traits were: -

Forage yield (ton fed.$^{-1}$):

All plants within a unit area were cut and then weighed as green fodder immediately after cutting to maintain the wet weight and not lose any part of the moisture due to evaporation. These data were taken by weighing the plow inside the square scale (50 * 50 cm), which was randomly placed in the middle of the experimental units, and based on it, the productivity of green fodder in an area of 1 m^2 was calculated. Then the average fodder production was converted from (kg m^2) to (ton fed^{-1}) and this process was repeated after each cutting operation total of 8 cutting in the one season. Hussein, and Nadhum (2020).

Protein yield (ton fed.$^{-1}$):

After performing the protein analysis process to determine the percentage of crude protein in the dried samples, the protein productivity fed was calculated using the following equation: percentage of crude protein (according to the result of the sample analysis) / 5 plants * weight of dry matter kg fed.-1 (previously found). Michael (2020).

Dry Matter (DM):

A number of (5) tillers were cut per unit area and then weighed immediately after cutting (green weight), then dried and weighed dry to obtain the dry matter percentage, which was calculated with the following equation: (Dry matter content) = green fodder productivity x dry matter percentage) DM=(P2)*100/P1, Output kg fed = Output kg green fed *DM/100. Hussein and Nadhum (2020).

Crude Protein (CP)%:

A random number of 5 plants were selected from the plants that were obtained per unit area, then these plants were dried after cutting them by placing them in a pot and exposing them to the air and the sun for 4 days. They were weighed after drying. They were ground and packed in suitable packages to perform the required analyzes.

Conducting an assessment of the nitrogen content by means of protein analysis equipment in the central laboratories of the Faculty of Agriculture, Assiut University, to determine the percentage of protein based on the amount of nitrogen. Almubarak and Shemmery (2018).

Fiber %:

The evaluation was carried out using fiber analysis devices in the central laboratories of the Faculty of Agriculture, Assiut University, to determine the fiber percentage. Wilson and Yasmín (2019).

Average temperatures:

The average in every cut temperatures were obtained in the experimental area (Nag Hammadi - Qena) during the experimental seasons (2021/2022) and (2022/2023).

Table 1: average air temperatures.

CUT	(D1) 2020/2021		(D2)2020/2021		(D1) 2021/2022		(D2) 2021/2022	
	Average temperature							
	Min	Max	Min	Max	Min	Max	Min	Max
1	26.3	40.3	26.5	39.9	25.2	40.1	25.4	39.3
2	25.6	38.3	20.1	33.7	25.4	37.6	21.5	35.8
3	20.7	34.1	16.9	31.0	22.1	36.8	15.3	27.1
4	18.4	33.5	10.8	24.5	17.0	28.7	11.8	25.8
5	12.9	26.8	8.0	22.4	12.5	27.6	9.8	24.6
6	7.6	21.8	18.1	35.1	9.4	23.9	15.8	32.2
7	15.0	32.1	20.1	37.3	14.8	30.2	19.2	34.9
8	19.4	36.3	23.2	38.4	18.5	34.0	25.2	39.4
Mean	18.2	32.9	17.9	32.8	18.1	32.4	18.0	32.4
overall mean	25.6		25.4		25.2		25.2	

Temperatures were monitored by the website "ACCUWEATHER".

This table is the average of the minimum and maximum temperatures for each cutting at the site where the experiment was implemented.

Statistical analysis:

The data obtained were subjected to the proper statistical analysis as randomized complete block design according to Snedecar and Cochran (1989) using ANOVA. Dates of each season were analyzed separately as well as in combined. Average combined values of sowing dates along the three seeding rates, the three of genotypes along the two seasons and the interaction between them were compared using the least significant difference (LSD).

RESULTS AND DISCUSSIONS

Forage yield (FY):

Forage yield/feed of panicum plant was significantly affected by wing date, seeding rates, and their interaction with some genotypes in 2020/2021 and 2021/2028 Seasons were presented in Table (2).

The results shown Table 2 indicate that sowing dates (D) did not have a significant effect on forage yield in the two seasons.

Table 2: Means of forage yield (FY) ton fed-1, as affected by sowing dates(D), seeding rates(S), cultivars (C), and their interactions in 2020/2021 and 2021/2022 seasons.

Season		2020/2021				2021/2022			
Sowing date (D)	Seeding rate (S) kg/fad	Cultivars (C)			Mean	Cultivars (C)			Mean
		C1	C2	C3		C1	C2	C3	
D1	S1	27.9	26.3	31.3	28.5	15.7	14.8	21.1	17.2
	S2	34.3	28.3	38.5	33.7	21.8	16.0	28.5	22.1
	S3	42.9	44.8	36.6	41.4	32.8	31.3	24.5	29.5
Mean		35.1	33.1	35.5	34.5	18.2	20.72	24.7	22.9
D2	S1	27.1	26.2	31.4	28.2	19.7	17.7	22.7	20.0
	S2	36.5	29.8	36.3	34.2	24.3	183.0	28.1	23.6
	S3	38.9	39.4	37.7	38.7	33.9	33.2	26.3	31.2
Mean		34.1	31.8	35.1	33.7	25.9	23.1	25.7	24.9
S × C	S1	27.5	26.2	31.3	28.3	17.6	16.3	21.9	18.6
	S2	35.3	29.1	37.4	33.9	23.0	17.2	28.3	22.9
	S3	40.8	42.1	37.1	40.0	33.4	32.3	25.4	30.4
General Mean		34.6	32.4	35.3		24.9	21.9	25.2	
			F test		RLSD at 0.05	F test		RLSD at 0.05	
sowing date (D)			N.S		-	N.S		-	
Seeding rate (S)			**		2733.65	*		5170.52	
Cultivars (C)			N.S		-	N.S		-	
D × S			N.S		-	N.S		-	
D × C			N.S		-	N.S		-	
S × C			*		5674.07	*		11204.41	
D x S x C			N.S		-	N.S		-	

*** and ** Significant at 0.05 and 0.01 levels of probability respectively and N.S nonsignificant.**

Moreover, the results in Table 2 showed that the seeding rate (S) had a significant effect on the forage yield in both seasons ($p<0.05$). Increasing seeding rate to 6 kg fed-1 (S3) led to a significant improvement in the forage yield compared to decreasing the seeding rate of 2 kg fed-1. Seeding rate (S3) recorded 40 and 30.4 ton fed-1 in the first and second seasons, respectively, while the forage yield decreased under (S1) seed rates, which recorded averages of 28.3 and 18.6 ton fed-1 in the first and second seasons, respectively. The increase in forage yield kg fed-1 with the increase in seeding rate (S) is due to the increase in the number of tillers m-2 this is consistent with Michael *et al*. (2014), forage production in kg fed-1 increases with increasing seeding rate(S).

In addition to the cultivars (C) had not a significant effect on the forage yield in both seasons, in addition to emphasize that the first-order interaction between sowing date (D)×seeding rates (S) and sowing date (D)×cultivars (C) was not significant at 5% probability level in both seasons.

On the other hand, the first-order interaction between seeding rates (S)×cultivars (C) had a significant effect ($p<0.05$) on forage yield in both growing seasons. The maximum forage yield (42.1 and 33.4 ton fed-1 in the two seasons, respectively) was obtained in the first season from (C2) cultivar when planting by seeding rate (S3) and in the second season was obtained from (C1) cultivar when planting by seeding rate (S3). While the lowest tillers height, 26.2 and 16.3 ton fed-1 in the two seasons respectively, was obtained from (C2) cultivar when planting by seeding rate (S1). This is due to the superiority of cultivar (C1) in the first season from due to the superiority number of tillers its production is heavier than the rest of cultivars and with the increase this seeding rate contributed to the greater productivity of forage yield this agree with differ from Michael *et al.* (2014), who found that cultivar "Mombasa" outperformed the rest of the cultivars in terms of the weight of tillers produced, while the cultivar (C2) was associated with low seeding rates (S) in both seasons, it achieved success only in the first season only with high seed rates (S3).

The second order interaction was not significant effect on the forage yield in the two growing seasons.

Protein yield (PY):

The results shown in Table 3 indicate that sowing dates (D) had a significant effect on the protein yield in both seasons. cultivation of panicum crop in the sowing date (D2) led to a significant increase in the protein yield, compared to sowing date (D1). The amount of increase in the protein yield reached about 75.9% compared to sowing date (D1). This is due to the superiority of the sowing date (D2) in forage yield and superiority of the prude protein%, which resulted in superiority also in protein yield and this is what Bakheit *et al.* (2021).

Table 3: Means of protein yield (PY) ton fed^{-1}, as affected by sowing dates (D), seeding rates(S), cultivars (C), and their interactions in 2020/2021 and 2021/2022 seasons.

Season		2020/2021				2021/2022			
Sowing date (D)	Seeding rate (S) kg/fad	Cultivars (C)			Mean	Cultivars (C)			Mean
		C1	C2	C3		C1	C2	C3	
D1	S1	2.1	6.0	7.2	5.1	3.7	4.0	6.0	4.6
	S2	8.7	7.9	10.2	8.9	7.3	6.0	6.9	6.7
	S3	12.4	10.6	8.9	10.7	12.1	10.4	11.3	11.2
Mean		7.7	8.2	8.8	8.2	6.4	6.8	8.1	7.5
D2	S1	13.3	16.6	18.7	16.2	7.1	7.6	8.5	7.8
	S2	15.5	13.5	22.1	17.0	10.0	8.7	10.2	9.6
	S3	22.8	25.0	14.5	20.8	14.4	12.0	8.7	11.7
Mean		17.2	18.4	18.4	18.0	10.5	9.4	9.1	9.7
S × C	S1	7.7	11.3	12.9	10.6	5.4	5.8	7.2	6.2
	S2	12.1	10.7	16.1	13.0	8.7	7.3	8.5	8.2
	S3	17.6	17.8	11.7	15.7	13.2	11.2	10.0	11.5
General Mean		12.5	13.3	13.6		9.1	8.1	8.6	
			F_{test}		RLSD at $_{0.05}$			F_{test}	RLSD at $_{0.05}$
sowing date (D)			**		1787.29			*	1587.34
Seeding rate (S)			*		2353.28			**	1853.50
Cultivars (C)			N.S		-			N.S	-
D × S			N.S		-			N.S	-
D × C			N.S		-			N.S	-
S × C			*		4239.68			N.S	-
D x S x C			N.S		-			N.S	-

*** and ** Significant at 0.05 and 0.01 levels of probability respectively and N.S nonsignificant.**

Moreover, the data in Table 3 showed that the seeding rate (S) had a significant effect ($p<0.05$) on the protein yield in both seasons. increasing seeding rate to 6 kg fed^{-1} (S3) led to a significant improvement in the protein yield compared to decreasing the seeding rate of 2kg fed^{-1}. Seeding rate (S3) recorded 15.7 and 11.5 ton fed^{-1} in the first and second seasons, respectively, while the protein yield decreased under (S1) seed rates, which recorded averages of 10.6 and 6.2 ton fed^{-1} in the first and second seasons, respectively. The amount of increase in the protein yield using (S3) reached about 61.9 and 28.4% compared to (S1) and (S2), respectively .The superiority is due to seeding rate (S3) in protein yield due to the superiority of seeding rate (S3) in forage yield this is what Bakheit *et al.* (2021) the indicated that the most effective components in the production of protein feed is the productivity of fresh feed.

The results in Table 3 indicate that the cultivars (C) had not a significant effect ($p<0.05$) on protein yield in both seasons.

The data in Table 3 emphasize that the first-order interaction between sowing date (D)×seeding rates (S) and sowing date (D)×cultivars (C) was not significant at 5% probability level in both seasons.

On the other hand, the first-order interaction between seeding rates (S)×cultivars (C) had a significant effect ($p<0.05$) on protein yield in in the first season only. The maximum protein yield (17.8 and 13.2 ton fed^{-1} in the two seasons, respectively) was obtained in the first season from (C2) cultivar when planting by seeding rate (S3) and in the second season was obtained from (C1) cultivar when planting by seeding rate (S3). While the lowest protein yield, 7.7 and 5.4 ton fed^{-1} in the two seasons respectively, was obtained from (C1) cultivar when planting by seeding rate (S1). This is what found that Bakheit *et al.* (2021) they found that protein yield is associated with increased production of forage yield, dry matter, and crude protein%.

The second-order interaction was not significantly affected on the protein yield in the two growing seasons.

Dry matter (DM%):

The results shown in Table 4 indicate that sowing dates (D) had a significant effect on the dry matter during the first season only. Cultivation of panicum crop in the sowing date (D2) led to a significant increase in the dry matter compared to sowing date (D1). The amount of increase in the dry matter reached about 36.2% compared to sowing date (D1). This may be due to the superiority of the same sowing date in leaf area index, which confirms that the same sowing date is superior also in the leaf stem ratio, and this is a characteristic that distinguishes this plant, this is different from what he found Abdalrady *et al.* (2017) they found, Who confirmed that fresh forage yield, plant height and number of branches/plant and this produced the highest of dry matter.

Table 4: Means of dry matter (DM) ton fed^{-1}, in the one cutting, as affected by sowing dates(D), seeding rates(S), cultivars (C), and their interactions in 2020/2021 and 2021/2022 seasons.

Season		2020/2021				2021/2022			
Sowing date (D)	Seeding rate (S) kg/fad	Cultivars (C)			Mean	Cultivars (C)			Mean
		C1	C2	C3		C1	C2	C3	
D1	S1	5.5	5.1	6.5	5.7	3.3	3.3	4.1	3.6
	S2	7.8	6.2	8.4	7.5	4.9	4.6	6.5	5.3
	S3	10.6	10.9	8.7	10.1	9.1	7.6	6.6	7.8
Mean		8.0	7.4	7.9	7.8	5.2	4.7	5.2	5.6
D2	S1	6.4	8.7	10.0	8.4	3.4	3.3	4.2	3.6
	S2	10.6	7.5	12.8	10.3	4.8	3.9	5.6	4.8
	S3	13.6	15.9	9.6	13.0	7.7	7.2	5.8	6.9
Mean		10.2	10.7	10.8	10.6	4.8	5.3	4.8	5.1
S × C	S1	5.9	6.9	8.2	7.0	3.3	3.3	4.1	3.6
	S2	9.2	6.9	10.6	8.9	4.9	4.3	6.1	5.1
	S3	12.1	13.4	9.1	11.5	8.4	7.4	6.2	7.3
General Mean		9.1	9.1	9.3		5.0	5.5	5.5	
			F_{test}			RLSD at $_{0.05}$		F_{test}	RLSD at $_{0.05}$
sowing date (D)			**			1139.08		N.S	-
Seeding rate (S)			**			1357.08		**	1248.48
Cultivars (C)			N.S			-		N.S	-
D × S			N.S			-		N.S	-
D × C			N.S			-		N.S	-
S × C			*			2350.54		N.S	-
D x S x C			*			3324.16		N.S	-

*** and ** Significant at 0.05 and 0.01 levels of probability respectively and N.S nonsignificant.**

Moreover, the data in Table 4 showed that the seeding rate (S) had a significant effect ($p<0.05$) on the dry matter in both seasons. seeding rate to 6 kg fed^{-1} (S3) led to a significant improvement in the dry matter compared with the seeding rate of 2 kg fed^{-1}. Seeding rate (S3) recorded 11.5 and 7.3 ton fed^{-1} in the first and second seasons, respectively, while the dry matter decreased under (S1) seed rates, which recorded averages of 7.0 and 3.6 ton fed^{-1} in the first and second seasons, respectively. The percentage of increase in the dry matter using (S3) reached about 77.8 and 35.3% compared to (S1) and (S2), respectively. This may be due to the superiority of the S3 in forage yield, number of tillers, and tiller height. Bakheit *et al.* (2021) found that under high seeding rates, the S3 produced the highest average number of tillers and plant height, resulting in the greatest productivity of forage yield and dry matter.

The results in Table 4 indicate that the cultivars (C) had a not significant effect on dry matter in both seasons.

The results in Table 4 emphasize that the first-order interaction between sowing date (D)×seeding rates (S) and sowing date (D)×cultivars (C) was not significant at 5% probability level in both seasons.

On the other hand, the first-order interaction between seeding rates (S)×cultivars (C) had a significant effect ($p<0.05$) on dry matter in the first season only. The maximum dry matter (13.4 and 8.4 ton fed^{-1} in the two seasons, respectively) was obtained in the first season from (C2) cultivar when planting by seeding rate (S3) and in the second season was obtained from (C1) cultivar when planting by seeding rate (S3). While the lowest dry matter, 5.9 and 3.3 ton fed^{-1} of the two seasons respectively, was obtained in the first season from (C1) cultivar when planting by seeding rate (S1) and in the second season was obtained from (C2) cultivar when planting by seeding rate (S1). This is due to the excellence of the Interference in the average forage yield, and this is what Abd El-Galil (2007) he found that more useful for the productivity of forage yield it is dry feed productivity.

The second-order interaction was significant effect on the dry matter in the first season only. The highest value (15.9) ton fed^{-1} in the first season was obtained from the interaction among C2 x S3 x D2, but the highest value (9.1) ton fed^{-1} in the second season was obtained from the interaction among C1 x S3 x D1. On the other hand, the lowest value (6.4) in the first season was obtained from the interaction among C1 x S1 x D2, but the lowest value (3.3) in the second season was obtained from the interaction among C2 x S1 x D1. This where he confirmed El-Hifny *et al.* (2019) is due to the superiority of the studied trait in the high seeding rate (S3), and which change sowing date and cultivar.

Crude protein (CP %):

The results shown in Table 5 indicated that cultivation of panicum crop in the sowing date (D2) led to indicated seasons the crude protein% compared to sowing date (D1) where registered 8.67 and 9.81% in the first and second seasons, respectively, the Percentage of increase in the crude protein reached about 55.2% compared to sowing date (D1). This indicates that delaying planting until the second sowing date is optimal to achieve the highest results for the panicum crop with respect to the crude protein trait. This is what Bakheit *et al.* (2021) they found that the sowing date that produced the highest average dry matter productivity gives the highest protein yield, it also confirms what was mentioned by Abdalrady *et al.* (2017) that there may be the highest seasonal fodder yield for protein in the late sowing dates due to the high temperature and as a result of the high percent dry matter in the late sowing date plots.

Table 5: Means of crude protein (CP) %, as affected by sowing dates(D), seeding rates(S), cultivars (C), and their interactions in 2020/2021 and 2021/2022 seasons.

Season		2020/2021				2021/2022			
Sowing date (D)	Seeding rate (S) kg/fad	Cultivars (C)			Mean	Cultivars (C)			Mean
		C1	C2	C3		C1	C2	C3	
D1	S1	1.87	5.82	5.56	4.42	5.50	6.10	7.30	6.30
	S2	5.62	6.31	6.08	6.00	7.40	6.50	5.30	6.40
	S3	5.85	4.86	5.13	5.28	6.60	6.80	8.60	7.33
Mean		4.45	5.66	5.59	5.23	4.67	6.47	7.07	6.68
D2	S1	10.44	9.52	9.33	9.76	10.60	11.70	10.20	10.83
	S2	7.29	8.97	8.64	8.30	10.40	11.10	9.10	10.20
	S3	8.41	7.87	7.56	7.95	9.30	8.40	7.50	8.40
Mean		8.71	8.79	8.51	8.67	10.10	10.40	8.93	9.81
S × C	S1	6.16	7.67	7.45	7.09	8.05	8.90	8.75	8.57
	S2	6.46	7.64	7.36	7.15	8.90	8.80	7.20	8.30
	S3	7.13	6.37	6.35	6.61	7.95	7.60	8.05	7.87
General Mean		6.58	7.23	7.05		8.30	8.43	8.00	

Moreover, the data in Table 5 demonstrated that the use of seeding rate to 4 kg fed-^{1} (S2) led to a significant improvement in the crude protein% compared in the first season only, recorded (7.15%), while in the second season the seeding rate exceeded (S1) and scored (8.57%), the crude protein% decreased under (S3) seed rates, which recorded averages of 6.61 and 7.87% in the first and second seasons, respectively. This is not consistent with FAO recommendations for seeding rates of 1−2 kg/ha and 3.5–4.5 kg/ha in Guinea Common (FAO 2005). also recommended a general seeding rate of 2–3 kg/ha for all tropical regions.

The results in Table 5 the cultivar (C2) achieved the highest average values for this trait, reaching 7.23 and 8.43% in the first and second seasons, respectively. On the other hand, the lowest average values for this trait, reaching (6.58%) the first season were obtained from (C1) cultivar and (8.00%) in the second season were obtained from (C3) cultivar. It also confirms what Abdalrady *et al.* (2017) mentioned, that there may be a large difference in the genotypes this result the variable response genotypes.

The data in Table 5 emphasize that the first-order interaction between sowing date (D)×seeding rates (S) the highest averages (9.76 and 10.83%) were recorded in the first and second seasons of the intervention D2×S1, while the lowest averages (4.42 and 6.30%) were recorded in the first and second seasons of the intervention D1×S1. While that sowing date (D)×cultivars (C) the highest averages (8.79 and 10.40%) were recorded in the first and second seasons of the intervention D2×C2, while the lowest averages (4.45 and 4.67%) were recorded in the first and second seasons of the intervention D1×C1.

It was obtained the maximum crude protein that reached (7.67%) from the overlap between (S1 × C2) in the first season, as for the second season It was obtained the maximum crude protein that reached (8.90%) from the overlaps between (S1 × C2) and (S2 × C1). while the lowest crude protein reaches 6.16% it was obtained the first season of in overlap (S1 × C1), and in the second season, it (7.20%) was obtained from interference (S2 × C3). This is due to the concentration of crude protein% in the leaves, where the leaf area index was superior this confirms what Francisco *et al.* (2014) said that the Leaf area index contributes to the superiority of crude protein.

Crude protein highest averages (10.44%) in the first season were obtained from the interaction among C1 x S1 x D2, but the highest value in the second season (11.70%) was obtained from the interaction among C2 x S1 x D2. On the other hand, the lowest value (1.87%) in the first season was obtained from the interaction among C1 x S1 x D1, and (5.30%) in the one second season, was obtained from the interaction among C3 x S2 x D1. This is due to what Obaid *et al.* (2019) perhaps these same conditions helped provide plants with their full and balanced needs for nutrients, which was reflected in an increase in crude protein.

Fiber (%):

The results shown in Table 6 cultivation of panicum crop in the sowing date (D1) led to the fiber% compared to sowing date (D2) where registered 32.02 and 34.68% In the first and second seasons, respectively, where agriculture led at the date of planting (D1) the amount of increase in the fiber% reached about 4.6% compared to sowing date (D2). This is consistent with what Salem *et al.* (2019) found that sowing date has an effect on the fiber percentage Mansoor and Kharbeet (2017) they showed that there is effect on sowing date(D) on fiber%, which confirms that there is a negative moral correlation between fiber% and crude protein (CP)%.

Table 6: Means of fiber%, as affected by sowing dates(D), seeding rates(S), cultivars (C), and their interactions in 2020/2021 and 2021/2022 seasons.

Season		2020/2021				2021/2022			
Sowing date (D)	Seeding rate (S) kg/fad	Cultivars (C)			Mean	Cultivars (C)			Mean
		C1	C2	C3		C1	C2	C3	
D1	S1	29.50	28.15	30.13	29.26	34.53	34.53	33.79	34.28
	S2	33.43	30.14	39.06	34.21	32.71	33.52	36.16	34.13
	S3	31.17	34.52	32.13	32.60	35.76	36.40	34.75	35.64
Mean		31.37	30.93	33.77	32.02	22.82	34.82	34.90	34.68
D2	S1	29.18	29.13	29.46	29.26	32.71	32.62	33.70	33.01
	S2	27.32	28.07	29.05	28.15	32.17	33.04	34.56	33.26
	S3	31.10	29.94	31.31	30.78	37.45	36.75	36.23	36.81
Mean		29.20	29.05	29.94	29.39	34.11	34.14	34.83	34.36
S × C	S1	29.34	28.64	29.79	29.26	33.62	33.58	33.75	33.65
	S2	30.38	29.10	34.05	31.18	32.44	33.28	35.36	33.69
	S3	31.13	32.23	31.72	31.69	36.61	36.58	35.49	36.22
General Mean		30.28	29.99	31.85		34.22	34.48	34.87	

Moreover, the data in Table 6 demonstrated that the use of seeding rate to 6 kg fed-1 (S3) led to a significant improvement in the fiber% and scored (31.69 and 36.22%) In the first and second season, respectively, the crude protein% decreased under (S1) seed rates, which recorded averages of 29.26 and 33.65% in the first and second seasons, respectively. The rate of the increase in fiber% when using (S3) by (8.0 and 4.7%) was compared to using (S1) and (S2), respectively. This is consistent with what Salem *et al.* (2019) they found that the seeding rate has an effect on fiber% and the highest fiber% was recorded for high seeding rates.

The results in Table 6 indicated that cultivar (C3) achieved the highest average values for fiber %, reaching 31.85 and 34.87% in the first and second seasons, respectively. On the other hand, the lowest average values for this trait, reaching (29.99%) the first season were obtained from (C2) cultivar and (34.22%) in the second season were obtained from (C1) cultivar. This is consistent with what Kassambara *et al.* (2019) they found that cultivars (C) had an effect on fiber% and recorded the highest fiber% and cultivar superior in qualities tillers height, number of tillers and forage yield.

The results in Table 6 emphasize that the first-order interaction between sowing date (D)×seeding rates (S) the highest averages in the first season(34.21%) obtained from the reaction D1×S2, and (36.81%) in the second season on the intervention D2×S3, while the lowest averages (28.15%) obtained from the reaction D2×S3, and (33.01%) in the second season in the intervention D2×S3.

While interaction sowing date (D)×cultivars (C) gave the highest averages (33.77 and 34.90%) in the first and second seasons of the intervention D1×C3, and the lowest averages

(29.05%) in the first season obtained from the reaction D2×C2, and (22.82%) in the second season of the intervention D1×C1.

It was obtained the maximum fiber% that reached (34.0535%) from the overlap between S2 × C3 in the first season, as for the second season It was obtained the maximum fiber% that reached (36.61%) from the overlaps between S3 × C1, while the lowest fiber% reaches (29.1%) it was obtained from the first season of in overlap S2 × C2, and in the second season, it (32.44%) was obtained from interference S2 × C1. This may be due to the individual convergence of both cultivars (C) and seeding rate (S) in addition to the convergence of the individual results, which contributed to a strong relationship during the interaction. This is not consistent with what was found by Salem *et al.* (2019) who confirmed that there is a relationship between dry matter and fiber%.

Fiber% highest averages (39.06%) in the first season were obtained from the interaction among C3 x S2 x D1, but the highest value in the second season (37.45%) was obtained from the interaction among C1 x S3 x D2. On the other hand, the lowest value (27.32% and 32.17%) in the first and second seasons, respectively, was obtained from the interaction among C1 x S2 x D2. This confirms what Salem *et al.* (2019) mentioned that the average seeding rate with the superior sowing date recorded the highest percentage of fiber%, in addition to what confirms what Kassambara *et al.* (2019) mentioned that the sowing date in the month of 6 with the relatively superior cultivars recorded the highest percentage fiber % this may be due to the suitability of climatic conditions for the growth period and environmental conditions such as humidity, dryness, temperature, sunlight, nutrient elements for plants.

CONCLUSION

Previous results indicated that panicum plants planted on the planting date of 25/06 with seed rates of 6 kg/fed^{1-} (S3) for cultivars panicum super mombasa F1 (C1), panicum zori (Brazilian Mg12) (C2) LED to increase forage yield and quality traits under experimental soil conditions in south valley.

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