Research | Egyptian Journal of Agricultural Research | Field Crops

Evaluation of some Alfalfa (*Medicago sativa* L.) varieties under the drip irrigation system at North Sinai governorate, Egypt

Mohamed H. Mubarak [1]* , *Fawkia M. Salim*[2] *and Ahmed. S. Attaya*[2]

Address:

[1]*Plant Production Department (Crop Breeding Branch), Faculty of Environmental Agricultural Sciences, Arish University, North Sinai, Egypt.*

[2]*Plant Production Department (Agronomy Branch), Faculty of Environmental Agricultural Sciences, Arish University, North Sinai, Egypt.*

*Corresponding author: ***Mohamed H. Mubarak:*** mobarak_mohamed99@yahoo.com

Received: 06-03-2023, **Accepted**: 03-10-2023, **Published**: 03-10-2023 **DOI:** 10.21608/ejar.2023.198095.1380

ABSTRACT

This study was carried out at a special Farm, Ber El-Abd, North Sinai Governorate during the period from 2020 to 2021 year to investigate the impact of drip irrigation on performance of some Alfalfa varieties (Giza-1, Ismailia-1, Ramah-1, Siwa-1, Si-River and WL-528) as well as on their growth criteria. Chemical analysis and yield attributes of Alfalfa (*Medicago sativa* L.) in randomized complete block design (RCBD) with six replications. The results showed that, Ramah-1 and Ismailia-1 varieties obtained superiority (P≤0.05) for plant height with mean among all varieties (76.73 and 76.68 cm, respectively). However, the WL-528 variety produced the lowest mean value across all cuts (51.83 cm). Ramah-1, Ismailia-1 and Siwa-1 varieties achieved significant in fresh weight (4.88, 4.80 and 4.62 kg m^{-2}, respectively). However, the WL-528 variety produced (2.70 kg m^{-2}) the lowest mean value across all cuts tested. Ramah-1, Ismailia-1 and Siwa-1 varieties achieved significant in dry weight (1.98, 1.96 and 4.62 kg m^{-2}, respectively). But WL-528 variety gave the lowest mean value in all cuts it was (0.67 kg m^{-2}). Throughout the growth stages, the Ramah-1 variety achieved significant crude protein content in all cuts. However, WL-528 variety gave the lowest value on crude protein content (16.23%). Moreover, Ramah-1 variety had the highest crude protein content (24.82 %) at means over all cuts. During the growth stage, the crude fiber content of the Ismailia-1 variety was significant (22.76%). However, the Ramah-1 variety provided the lowest value in cuts. Furthermore, Ramah-1 had the lowest crude fiber content (14.92%). Finally, results concluded that planted Ramah-1 variety gave the highest quality and forage production in new reclamation lands under a drip irrigation system.

Keyword: Forage production, varieties, Alfalfa - *Medicago sativa* L., Forage quality, New reclamation lands.

INTRODUCTION

In Egypt, there is a shortage of green forages, especially during the summer when competition with strategic crops for limited arable land limits the availability of forages. To address this issue, alfalfa is considered the best crop to cultivate on newly reclaimed land because it produces high yields of high-quality forage and has a long lifespan (Diaa, 2015). Alfalfa is an important crop in the Sinai region of North and West Egypt, where there are salinity problems in the soil and irrigation water resources. While there has been significant research on the salt tolerance of alfalfa, there is a need to screen current and experimental cultivars to assist growers in selecting the right variety. Due to the complexity of salinity tolerance in plants, it is also necessary to adapt screening methodologies and results to field conditions. Biotic stresses such as salinization and drought are the main challenges in improving the yield and productivity of alfalfa in Egypt. Alfalfa is widely used as a perennial legume forage due to its high protein, content and biomass production (Scasta *et al.,* 2012). Compared to many other crops, alfalfa is relatively tolerant to salt stress (Munns and Tester, 2008). However, soil salinity remains an important environmental factor that limits yield and causes secondary stresses such as oxidative damage (Zhu, 2002). Sodium (Na+) stress triggers an increase in cytosolic calcium (Ca2+) and activates downstream pathways through Ca2+ binding proteins (Deinlein et al., 2014). Additionally, other second messengers linked to Ca2+ signaling play a role (Hozayn *et al*., 2019).

Due to its high nutritional quality and herbage yield, alfalfa *(Medicago sativa* L., 2n=4x=32) is a crucial perennial legume crop and a valuable source of forage (Wang *et al.,* 2020). The seed yield of alfalfa is essential for effectively distributing of new cultivars to farmers (Li and Brummer, 2009). In 2020, approximately 79,339 fed of land in Egypt was dedicated to alfalfa cultivation, resulting in an annual production of 2,722,749 metric tonnes and an average yield of 34.318 tons/fed (EAS, 2022). Increasing alfalfa seed production can be achieved

through the development of high-yielding varieties and improved cultura practices. However, genetic and breeding research has shown limited progress in achieving higher seed yield in alfalfa (Bolanos-Aguilar *et al.* 2002). On the other hand, optimal mineral nutrition (Terzić, 2020), row distance, seed amount used for sowing, and plant density (Zhang *et al.,* 2008) can significantly impact yield components and overall seed yield. Therefore, focusing on these factors appears to be a better approach to achieving higher and more stable seed yields. A study was conducted to examine the response of four alfalfa varieties (New Valley (NV), Siwa-1, Ismailia-1, Ramah-1) on sandy soil using growth criteria. The results showed that the Ramah-1 variety had the highest forage production in sandy soil **(**Asmaa *et al.,* 2022).

A field experiment was planned on alfalfa with the following objectives:

1. To assess alfalfa varieties for forage and quality yields, as well as their constituents, in North Sinai and similar regions.
2. Determine the best variety for increased alfalfa production in Egypt.

MATERIALS AND METHODS

This research was conducted at a special farm, Ber El-Abd, North Sinai during 2020-2021 season to assess alfalfa varieties for forage and quilty yields under ideal North Sinai conditions to increase alfalfa production in Egypt.

Experimental Site:

The field experiment took place at Ber El-Abd Farm in North Sinai, Egypt, which is located in the north eastern sector of the country between a longitude of (30.59 °N 32.46°E). The total area of North Sinai Governorate is approximately 27574 km^2(10.646 sq mi)**.** Giza-1, Ismailia-1, Ramah-1, Siwa-1, Si-River, and WL-528 alfalfa seeds were obtained from the Forage Crops Research Department, Agricultural Research Center (ARC), Ministry of Agriculture, Giza, Egypt. The details of the origin of these varieties can be found in Table 1.

Table 1. Location and source of seed varieties

Number	Variety	Origin
1	Giza-1	Egypt
2	Ismailia-1	Egypt
3	Ramah-1	Egypt
4	Siwa-1	Egypt
5	Si-River	Australia
6	WL-528	U S A

Soil Characteristics:

The soil at the experimental site was sandy loam (Table 2). Soil samples were gathered from a depth of 30 cm prior to cultivation. Before analysing physical and mineral properties, collected samples were air dried, pulverised, and passed through a 2 mm filter (Richard, 1954). The mineral analysis of irrigation water is shown in Table 2.

Table 2. Chemical analysis of the experimental irrigation water

EC ($dS.m^{-1}$)	Cations ($meq.l^{-1}$)				Anions ($meq.l^{-1}$)				S.A.R
	Ca^{++}	Mg^{++}	Na^{+}	K^{+}	Cl^{-}	HCO_3^{-}	CO_3	SO_4^{-}	
5.47	2.70	0.8	1.64	0.21	1.5	2	-	1.85	1.24

Soil samples were collected from the experimental location at a depth of 30 cm prior to planting for analysis of soil physical and chemical parameters, and the findings are reported in Tables 3-a and 3-b

Table 3-a. Analysis of physical properties of the experimental site soil

Depth (cm)	Clay %	Silt %	Sand %	Organic carbon %	Drained level		Saturation	Bulk density g/cm^3	Root growth factor 0.0 to 1.0
					Lower limit	Upper limit			
30	5	15	80	0.9	0.11	0.25	0.33	1.2	0.5

Table 3-b. Analysis of chemical properties of the experimental sitesoil

Depth (cm)	pH	EC ($dS.m^{-1}$)	Cations Meq. l^{-1}				Anions Meq. l^{-1}			
			Ca^{++}	Mg^{++}	Na^{+}	K^{+}	Cl^{-}	HCO_3^{-}	Co_3	So_4^{-}
30	7.8	1.7	3.4	8.4	3.9	0.5	5.3	2.9	-	8

Seed and Sowing:

Alfalfa seeds were sown with ata rate was 10 kg seed/Fed . The land was plowed once by tractor and fertilizers including Potasom sulfate with 100 Kg/Fed, superphosphate with 200 Kg/Fed were added.

Fertilizer application:

Plant for seeds production treated with fertilizer as obtained from Ministry of Agriculture, Egypt. That's recommended amount its mineral Fertilizers per Fed it's (300Kg/Fed) Ammonium. And biofertilization add with the seed before sowing Phosphoren 50 g/1 kg, Potasomag 50 g/kg seed and Rizobactrean 50 g/kg. The biofertilization is mixed with sugar solution after that mixed with seed and sowing in land just one time.

IrrigationIrrigation system:

The date of sowing was 1st of October 2020 and harvested eight timing up to end of August 2021 . The irrigation system was applied three times every week during winter season for (1 hour) with rate (2 L/hr) for each driper, while, in the summer season, the irrigation was applied five times each week.

Cuttings:

The first cutting was taken 80 days after sowing, followed by 30-day intervals. At each cutting, the plants were cut 5-cm above the ground level. For recording biometric observations, including some vegetative growth traits and yield, a sample of plants randomly selected from treatment was used. The studied alfalfa genotypes were tested in a randomized complete block design (RCBD) with six replicates. The plot size area was 2 m^2 containing 4 rows of 1 m length (50 cm between rows).

Forage yield and its components:

1- The average plant height in centimeters was determined at harvest for each cut by measuring the height of 10 plants from the soil surface to the tip of the tallest tiller. The average of the three cuts was calculated.
2- The number of branches per plant was determined, and the average of the three cuts was calculated.
3- The ratio of leaves to stems (both fresh and dry weight) was determined by separating a 200 gram sample of fresh into leaves and stems. The components were then dried in an oven at 70°C to determine the dry leaves to stems ratio. The average of the three cuts was calculated.
4- The fresh forage yield in kilograms per plot (m^2) was determined by hand clipping each plot, and the total of the three cuts was calculated for each sowing date.
5- The dry forage yield was estimated by multiplying the green forage yield of each plot by mean dry matter percentage. The dry matter percentage was determined from random samples of 150 grams from each plot at each cut, after drying in an oven at 70°C until weight constancy. The total of plots per cut was calculated.
6- The protein content was determined by the micro-kjeldahl method as outlined by A.O.A.C. (1980) to estimate the total nitrogen. The nitrogen percentage was multiplied by 6.25 to obtain the crude protein.
7- The crude fiber percentage was determined using the method described in A.O.A.C. (1986).

Statistical analysis:

The data obtained data were computed and subjected to the appropriate statistical analysis of randomized complete block design using the General Linear Models (GLMs) procedures in SAS (SAS, 2004). The means followed by the same alphabetical letters were not statistically significant at the 0.05 level of significance as determined by **Duncan's** multiple range test (1955).

RESULTS

Growth parameters:

Six alfalfa varieties were grown during the 2020 and 2021 growing seasons to investigate their effect of on forage yields and components. The six alfalfa varieties used to evaluate the performance of the varieties in this study provided a range of variations. The obtained results can be depicted as follows.

3.1. Alfalfa Forage Yield and Quality:

3.1.1. Plant height.

Table 4 shows that plant height was significantly influenced by the varieties in all cuts. The Ramah-1 and Ismailia-1 varieties outperformed all others (P≤0.05) in plant height with mean (76.73 and 76.68 cm, respectively), but the WL-528 variety had the lowest mean value in all cuts (51.83 cm).

Table 4. Mean performance for plant height (cm) of some alfalfa varieties under drip irrigation during one year from 1 / 10 / 2020 to 2021.

Treatments	Cut NO.							
	20 / 12 / 2020 (1)	1 / 2 / 2021 (2)	10 /3 / 2021 (3)	20 / 4 / 2021 (4)	1 / 5 / 2021 (5)	10 / 6 / 2021 (6)	20 / 7 / 2021 (7)	10 / 8 / 2021 (8)
Giza-1	58.60b	55.73ab	54.83a	56.48a	57.27b	57.09d	65.23d	73.26b
Ismailia-1	58.60b	55.66ab	54.54a	53.77b	57.87b	67.66b	76.68a	74.40b
Ramah-1	59.50a	58.86a	55.58a	54.07b	59.47a	68.37a	76.81a	76.73a
Siwa-1	59.00a	57.86a	54.58a	53.07b	56.87b	66.66b	75.81a	73.40b
Si-River	58.13b	57.26ab	52.20b	55.32a	57.70ab	61.58c	72.40b	73.06b
WL-528	58.06b	55.20ab	51.83b	54.16c	53.32c	56.44d	68.16c	71.20c
Significance	*	*	*	*	*	*	*	*

Using Duncan's Multiple range test, the means of each factor denoted by the same letter are not significantly different at the 5% level.

3.1.2. The number of branches per plant:

Results are presented in **Table** 5. In all cuts, the number of branches was significantly affected by the varieties. The Siwa-1 and Ramah-1 varieties outperformed all others (P≤0.05) in terms of the number of branches formed during the growth stages in cut No (2 to 8). However, the WL-528 variety had the lowest mean value. (13.87) in cut No. (2). Moreover, Ramah-1 then Siwa-1 and Giza-1 varieties increased number of branches at means over the 8 cuts (21.08, 20.97, and 19.85, respectively).

Table 5. Mean performance for number of branches of some alfalfa varieties under drip irrigation during one year from 1 / 10 / 2020 to 2021.

Treatments	Cut NO.							
	20 / 12 / 2020 (1)	1 / 2 / 2021 (2)	10 /3 / 2021 (3)	20 / 4 / 2021 (4)	1 / 5 / 2021 (5)	10 / 6 / 2021 (6)	20 / 7 / 2021 (7)	10 / 8 / 2021 (8)
Giza-1	14.30	14.22ab	15.33b	15.16bc	15.73b	18.00cd	19.27d	19.85b
Ismailia-1	14.52	14.16ab	15.10b	15.54a	16.57a	18.26b	20.68ab	19.53c
Ramah-1	14.44	14.24ab	17.66 a	15.020c	16.40a	18.54a	19.95c	21.08a
Siwa-1	14.46	14.37a	15.27b	15.65a	15.92b	18.31bc	20.92a	20.97a
Si-River	14.39	13.97b	17.68a	15.42ab	15.94b	17.92d	19.50b	19.24d
WL-528	14.36	13.87b	15.02b	15.42ab	15.84b	17.82d	19.40b	19.23d
Significance	ns	*	*	*	*	*	*	*

Using Duncan's Multiple range test, the means of each factor denoted by the same letter are not significantly different at the 5% level.

3.1.3. Fresh forage yield (Kg/m^2):

Results in **Table** 6 revealed that the varieties had a significant impact on fresh weight (kg m^{-2}) in all cuts. In terms of fresh weight, the Ramah-1, Ismailia-1, and Siwa-1 varieties outperformed all others (P≤0.05) (4.88, 4.80 and 4.62 kg m^{-2}, respectively). However, the WL-528 variety had the lowest mean value across all cuts (2.27 kg m-^{2}).

Table 6. Mean performance for fresh weight of some alfalfa varieties under drip irrigation during one year from 1 / 10 / 2020 to 2021.

Treatments	Cut NO.							
	20 / 12 / 2020 (1)	1 / 2 / 2021 (2)	10 /3 / 2021 (3)	20 / 4 / 2021 (4)	1 / 5 / 2021 (5)	10 / 6 / 2021 (6)	20 / 7 / 2021 (7)	10 / 8 / 2021 (8)
Giza-1	2.94	2.89ab	2.58a	2.45ab	3.18	3.35ab	3.48ab	4.47ab
Ismailia-1	2.73	2.02a	2.65a	2.35ab	3.15	3.50a	3.99a	4.80a
Ramah-1	2.75	2.90ab	2.51a	2.72a	3.12	3.61ab	3.85a	4.88a
Siwa-1	2.89	2.95ab	2.64a	2.63ab	3.04	3.28a	3.89a	4.62a
Si-River	2.94	2.71b	2.58a	1.93b	3.01	2.56b	3.71b	4.06b
WL-528	2.70	2.89ab	2.27b	2.45ab	3.18	3.35ab	3.48ab	4.47ab
Significance	ns	*	*	*	ns	*	*	*

Using Duncan's Multiple range test, the means of each factor denoted by the same letter are not significantly different at the 5% level.

3.1.4. Dry forage yield (Kgm^{-2}):

Results also in **Table** 7 showed that the highest values of dry weight from Ramah-1, Ismailia-1, and Siwa-1 varieties achieved significant superiority (P≤0.05) among all varieties in dry weight (1.98, 1.96 and 1.91 kg m^{-2}, respectively). However, the Si-River variety had the lowest mean value across all cuts (0.50 kg m^{-2}).

Table 7. Mean performance for dry weight of some alfalfa varieties under drip irrigation during one year from 1 / 10 / 2020 to 2021.

Treatments		Cut NO.						
	20 / 12 / 2020 (1)	1 / 2 / 2021 (2)	10 /3 / 2021 (3)	20 / 4 / 2021 (4)	1 / 5 / 2021 (5)	10 / 6 / 2021 (6)	20 / 7 / 2021 (7)	10 / 8 / 2021 (8)
Giza-1	0.66	0.52b	0.68	1.72	1.71b	1.83	1.86	1.91ab
Ismailia-1	0.69	0.65a	0.75	1.76	1.85a	1.89	1.96	1.05a
Ramah-1	0.69	0.67a	0.77	1.77	1.86a	1.89	1.95	1.98a
Siwa-1	0.68	0.62ab	0.72	1.73	1.82a	1.86	1.94	1.01ab
Si-River	0.64	0.50b	0.68	1.72	1.71b	1.82	1.85	1.80b
WL-528	0.67	0.61ab	0.73	1.71	1.71b	1.80	1.89	1.90ab
Significance	ns	*	ns	ns	*	ns	ns	*

Using Duncan's Multiple range test, the means of each factor denoted by the same letter are not significantly different at the 5% level.

3.1.5. Leaf/ stem ratio %:

Also, it could be stated that (Table 8) leaf: stem ratio had been significantly increased where it was affected by Ramah-1, Ismailia-1 varieties during the first and late growth stage in most of cuts No. (1: 8). But, Si-River variety gave the lowest value in most of cuts. Moreover, Ramah-1 variety had the highest leaf/stem ratio (64.1 %) in all cuts. The lowest leaf/stem ratio (51.9%) was found with Si-River variety.

Table 8. Mean performance for leaf: stem ratio of some alfalfa varieties under drip irrigation during one year from 1 / 10 / 2020 to 2021.

Treatments	Cut NO.							
	20 / 12 / 2020 (1)	1 / 2 / 2021 (2)	10 /3 / 2021 (3)	20 / 4 / 2021 (4)	1 / 5 / 2021 (5)	10 / 6 / 2021 (6)	20 / 7 / 2021 (7)	10 / 8 / 2021 (8)
Giza-1	53.7	50.6c	61.3b	57.3a	57.3a	59.5a	53.3a	49.5c
Ismailia-1	51.8	53.2b	63.2a	54.0b	53.9bc	56.3b	48.6b	52.6a
Ramah-1	52.4	54.8a	64.1a	59.2a	58.9a	59.8a	54.2a	53.1a
Siwa-1	54.5	53.2b	62.5ab	58.3a	53.0c	55.3b	49.5ab	50.6c
Si-River	51.9	54.0a	62.0ab	57.6a	55.7ab	55.9b	51.8a	50.9bc
WL-528	52.4	53.8ab	62.1ab	57.2a	55.9a	55.8b	52.2a	52.1ab
Significance	ns	*	*	*	*	*	*	*

Using Duncan's Multiple range test, the means of each factor denoted by the same letter are not significantly different at the 5% level.

3.1.6. Chemical analysis:

3.1.6.1. Crude protein content (%):

Results presented in **Table** 9 revealed that crude protein content varied significantly across all cuts. The Ramah-1 variety outperformed all other varieties in crude protein content during growth stages in all cuts (P≤0.05). However, Si-River variety had the lowest crude protein content value (16.23%). Overall cuts, the Ramah-1 variety had the highest crude protein content (24.82%).

Table 9. Mean performance for crude protein of some alfalfa varieties under drip irrigation during one year from 1 / 10 / 2020 to 2021.

Treatments	Cut NO.							
	20 / 12 / 2020 (1)	1 / 2 / 2021 (2)	10 /3 / 2021 (3)	20 / 4 / 2021 (4)	1 / 5 / 2021 (5)	10 / 6 / 2021 (6)	20 / 7 / 2021 (7)	10 / 8 / 2021 (8)
Giza-1	16.22b	17.49b	20.95a	20.40a	21.05a	21.77a	22.24a	22.32a
Ismailia-1	16.42b	17.70b	21.16a	21.61a	21.23a	21.96a	22.42a	22.51a
Ramah-1	19.14a	20.33a	22.20a	21.46a	21.78a	21.55a	24.82a	24.30a
Siwa-1	18.33a	19.56a	22.32a	20.04a	21.02a	21.81a	24.12a	24.49a
Si-River	14.60c	15.94c	16.82b	19.56b	19.65b	20.29b	19.00b	20.58b
WL-528	16.23b	17.44b	20.85a	20.50a	21.45a	21.76a	22.27a	22.35a
Significance	*	*	*	*	*	*	*	*

Using Duncan's Multiple range test, the means of each factor denoted by the same letter are not significantly different at the 5% level.

3.1.6.2. Crude fiber content (%):

Results presented in **Table** 10 revealed that crude fiber content in all cuts was significantly affected by variety. The Ismailia-1 variety outperformed all others (P≤0.05) in crude fiber content mean all was (22.76%) and during growth stage in all cuts. However, the Ramah-1 variety provided the lowest value in cuts. Furthermore, the Ramah-1 variety had the lowest crude fiber content (14.92%) across all cuts.

Table 10. Mean performance for crude fiber content (%) of some alfalfa varieties under drip irrigation during one year from 1 / 10 / 2020 to 2021.

Treatments	Cut NO.							
	20 / 12 / 2020 (1)	1 / 2 / 2021 (2)	10 /3 / 2021 (3)	20 / 4 / 2021 (4)	1 / 5 / 2021 (5)	10 / 6 / 2021 (6)	20 / 7 / 2021 (7)	10 / 8 / 2021 (8)
Giza-1	18.24b	17.69b	19.15a	19.53a	22.50a	22.55a	20.40a	19.54a
Ismailia-1	18.24b	17.84b	19.28a	19.70a	22.66a	22.76a	20.62a	19.70a
Ramah-1	15.44c	14.92c	17.62b	16.58b	19.24b	19.80b	18.36b	17.58b
Siwa-1	19.89a	19.31a	19.62a	20.26a	20.38a	21.75a	20.76a	19.27a
Si-River	20.51a	19.89a	19.62a	20.90a	20.10a	21.56a	20.64a	19.91a
WL-528	18.24b	17.69b	19.15a	19.53a	20.50a	20.55a	19.80a	19.54a
Significance	*	*	*	*	*	*	*	*

Using Duncan's Multiple range test, the means of each factor denoted by the same letter are not significantly different at the 5% level.

DISCUSSION

Plant height at forage harvest was significantly different (P<0.01) among genotypes across environments. Neutral detergent fiber, acid detergent fiber and lignin, hemicellulose and other nutrients, dry matter *in vitro* digestibility and relative feed value were significantly different in genotype variation (P<0.01). FGI-9001 had the highest mean DM yield, followed by FGI-3054. FGI-8091 had the tallest plant (60.13 cm), while the shortest genotype was FGI-1011. CP yields were recorded above the threshold for all tested genotypes. FGI-9001 recorded the highest *in vitro* TS digestibility and relative feed value and the lowest levels of neutral detergent fiber, acid detergent fiber, lignin and cellulose (Atumo *et al.,* 2021). Similar results were obtained by Mundhe and Shelke (1991), who found that dry matter production was not affected in the different cuts, and their results are consistent with the observations of Shukla (2003) and Marino and Berardo, 2005) that dry matter increases in different varieties significantly. The results are consistent with those of Oushy *et al.* (1999) who studied alfalfa cultivars in sandy soil conditions, there were significant differences in the leaf/stem ratio between alfalfa cultivars. Similar results were reported by Petil*et al.* (1992), Bonner (1997), Buxton (2004), Abdul-Galil (2007) and Martens (2007).

Similar results for crude protein and fiber content were obtained by (Diaa *et al.,* 2015) showed that crude protein content in all cuts was significantly affected by the Siriver alfalfa variety. Si-River cultivar had a significant advantage (P ≤ 0.05) among all cultivars in terms of crude protein content in cuts (3-20) growth stage, but Giza cultivar had the lowest value in cuts (3:20) and Siwa varieties in cuts (3-6 and 11-20). Furthermore, the Si-River variety had the highest average crude protein content (37.76%), but the Giza variety had the lowest average (33.87%). Gizeh cultivar grown in mineral-treated soil resulted in a decrease in crude fiber content with the lowest average value (26.58%). NV variety grew the highest number of branches per plant, with 20.88 on average. The first Cut also featured Siwa variety growing at a height of 73.05 cm. Ramah1 variety increased fresh weight significantly in cut 1, achieved the highest average fresh weight (4.17 tons per faddan) that was recorded. Ramah1 seeds were sown in hills 25 cm apart to produce the highest yield. At 1st harvest, weighed 2.17 tons per faddan. The tallest crop reached as part of the Fourth cut, a recording of 25 cm was made Ramah1 variety with a height of 92.2 cm, the plant placed in 4th Cut surpassed all others by 25 cm (Deiaa *et al.,* 2017 and Asmaa *et al.,* 2022).

Variability is vital to developing cultivars with high quality and high forage production. It's commonly used in breeding programs to develop these traits. The Phenotypic and genotypic coefficients of variation, heritability, genetic advance in the population and association between yield and its components are key indicators in improving traits (Denton and Nwangburuk 2011). Genetic merit is only obtained when there is genetic diversity (Costa *et al.,* 2021), which allows simultaneous selection of multiple traits associated with yield (Mahajan *et al.,* 2011).

Alfalfa varieties displayed different behaviors and the highest yield was found in Milenia, Chipilo, Oaxaca and Valenciana. According to the statistical differences between the general averages of each season, the dry matter yield in summer was mostly contributed by stem density and plants. A greater stem weight led to higher dry matter yield in spring (Adelaido *et al.,* 2019).

This suggests that these indices were successful in identifying genotypes that produced high yields in both drought stress and non-stress conditions. The control-50% analysis using principal component analysis identified genotype Bts 1237 and Temar as the most stable high yielding genotypes in both environments (Okasha and Mubarak, 2018).

CONCLUSION

It can be concluded that the studied alfalfa varieties (Ramah-1, Ismailia-1, and Siwa-1) could be recommended for maximizing forage and quality yields as well as their constituents under the environmental conditions in North Sinai and similar regions in Egypt. Additionally, Ramah-1 alfalfa variety is the best variety for increased alfalfa production in Egypt.

REFERENCES

Asmaa M. Hosni, A. M., Mubarak, M. H., El-Maleh, M. S., Abdalla, M. Y., & Mohamed, M. M. (2022). Forage productivity of some alfalfa (*Medicago sativa* l.) varieties under north Sinai conditions. *Sinai Journal of Applied Sciences,* 11(4), 643-658.

Atumo, T. Tesfaye, Richard Kauffmanb, Deribe Gemiyo Talorec, Mergia Aberad, Temesgen Tesfayee, Bereket Zeleke Tunkalaf, Muluken Zelekee and Getinet KebedeKalsa. (2021). Adaptability, forage yield and nutritional quality of alfalfa Medicago sativa genotypes. *Sustainable Environment*. Vol. 7(1), 1–7.

Bolanos-Aguilar, E., C. Huyghe, C. Ecalle, J. Hacquet and B. Julier (2002). Effect of cultivar & environment on seed yield in alfalfa. *Crop Sciences,* 42, 45-50.

Costa, W.G., I.G. Santos, A.C. Júnior, C.D. Cruz, M. Nascimento, R.P. Ferreira & D. Vilela(2021). Potential of dry matter yield from alfalfa germplasm in composing base populations. *Crop Breeding and Applied Biotechnology,* 21(2), 178-189.

Diaa, A.M., Belal, A.H., Atta, M.E. and El-Nahrawy, M.A. (2015). Evaluation of some Alfalfa Cultivars Forage Production under Different Fertilizer Levels in Sandy Soils Conditions. *Sinai Journal of Applied Sciences,* 4, 2.

Deiaa El-Din A. Mohamed, Mohamed H. Mubarak Eman I. El-Sarag, Maher. M. Magdy and Ahmed Attaya. (2017). EFEECT OF planting distance of Some Alfalfa Cultivars for Seed Production under North Sinai Conditions. *Seventh International Conference on Sustainable Agricultural Development* - College of Agriculture - Fayoum University.6-8 March 2017.

Denton, O.A. & C.C. Negbyruka. (2011). Heritability genetic advance and character association in six related characters of solanum. Asien. *Journal of Agriculture Research*, 5, 201-207.

Duncan, D.B. (1955). Multiple range & multiple F-tests. *Biometrics*, 11, 1-42.

EAS, (2022). Data in agricultural statistics book of Economic Affair Sector, *Ministry of Agriculture and Land Reclamation Egypt.*

Hozayn, Abeer A. Ahmed 2, A. A. El-Saady 3, A. A. Abd-Elmonem (2019).Enhancement in germination, seedling attributes and yields of alfalfa (Medicago sativa, L.) under salinity stress using static magnetic field treatments. *Eur Asian Journal of BioSciences,* 13, 369-378.

Li, X. and E. Brummer (2009). Inbreeding depression for fertility and biomass in advanced generations of inter- and intrasubspecific hybrids of tetraploid alfalfa. *Crop Sciences,* 49,13-19.

Mahajan, R.C., P.B. Wadikar, S.P. Pole and M.V. Dhuppe(2011). Variability, correlation, and path analysis studies in sorghum. *Research Journal of Agricultural Sciences,* 2(1), 101-103.

Munns R, Tester M (2008) Mechanisms of salinity tolerance. *Annu. Annual Review of Plant Biology,* 59, 651–81

Richard's, L.A. (1954). Diagnosis and improvement of saline and alkaline soils. U.S.D.A. Handbook No. 60.

SAS (2004). SAS/STAT User's. Guide.SAS, *Institute Inc.,* Cary, N.C.

Scasta, J. D., Trostle, C. L., & Foster, M. A. (2012). Evaluating alfalfa (Medicago sativa L.) cultivars for salt tolerance using laboratory, greenhouse and field methods. *Journal of Agricultural Science,* 4(6), 90-103

Okasha, S. A., & Mubarak, M. H. (2018). Evaluation of some sugar beet genotypes under drought stress based on selection indices. *Journal of Agronomy Research,* 1(1), 34-48.

Terzić, D. (2020). The effect of cutting schedule, fertilization with micronutrients & plant growth regulation on yield and quality of alfalfa seed (*Medicago Sativa* L.). *Ph.D. Thesis.* University of Belgrade, Faculty of Agriculture Belgrade.

Wang, X., Yang, X., Chen, L., Feng, G., Zhang, J., & Jin, L. (2011). Genetic diversity among alfalfa (Medicago sativa L.) cultivars in Northwest China. Acta Agriculturae Scandinavica, *Section B—Soil and Plant Science,* 61(1), 60-66.

Zhang, T., Wang, X., Han, J., Wang, Y., Mao, P., & Majerus, M. (2008). Effects of between-row and within-row spacing on alfalfa seed yields. *Crop science,* 48(2), 794-803.

Zhu, J. K. (2002). Salt and drought stress signal transduction in plants. *Annual Review of Plant Biology,* 53(1), 247-273.

تقييم بعض اصناف البرسيم الحجازي تحت نظام الري بالتنقيط في محافظة شمال سيناء، مصر

محمد حسن مبارك[1]* فوقية محمد أحمد سالم[2] ، احمد سعد عطايا[2]

[1] قسم الانتاج النباتي (فرع تربية المحاصيل) ، كلية العلوم الزراعية البيئية ، جامعة العريش ، شمال سيناء ، مصر

[2] قسم الانتاج النباتي (فرع انتاج المحاصيل) ،كلية العلوم الزراعية البيئية ، جامعة العريش ، شمال سيناء ، مصر

*بريد المؤلف المراسل mobarak_mohamed99@yahoo.com

اجريت هذه الدراسة بمزرعه خاصة بقرية ام عقبة بمركز بئر العبد محافظة شمال سيناء, مصر في الفترة من2020 حتي 2021 لدراسة تاثير زراعة سته اصناف من البرسيم الحجازي هي (جيزة1 – اسماعيلية1 – رماح 1- سيوة1 – سي ريفر- دبليو ال 528) علي صفات النمو والجوده ومكونات المحصول للبرسيم الحجازي في تصميم قطاعات كاملة العشوائية في ثلاث مكررات. ووجد ان هناك تاثير معنوي للاصناف علي صفة ارتفاع النبات في المواسم الزراعية2020 و2021 حيث اعطت الاصناف رماح 1 ، و اسماعيلية 1 اعلي نسبة لارتفاع النبات (96,73 و 94,4 سم) علي التوالي . بينما اعطي الصنف دبيلو ال 528 اقل ارتفاع للنبات وهي 31,83 سم. واعطت الاصناف رماح 1 واسماعيلية1 وسيوة 1 اعلي وزن غض لمحصول العلف في المتر المربع (4,88 و 4,80 و4,62كجم/م2) علي التوالي. بينما اعطي الصنف دبيلو ال 528 اقل وزن للمحصول الغضو هي 2,70كجم / م2. واعطت الاصناف رماح 1 واسماعيلية 1 وسيوة 1 اعلي وزن جاف لمحصول العلف في المترالمربع (1,98 و1,96 و 4,62كجم/م2) علي التوالي .بينما اعطي الصنف دبيلو ال 528 اقل وزن للمحصول الجاف وهي67,.كجم/م2.

.وكان اعلي نسبة للبروتين الخام وصنف ارماح 1 حيث اعطي متوسط 24,82% بينما اعطي الصنف دبيلوال 528 اقل نسبة من الالياف الخام و هي 16,23 %. وكان اعلي نسبة للالياف الخام هو صنف اسماعيلية1 حيث اعطي متوسط 22,76 % بينما اعطي الصنف رماح 1 اقل نسبة من الالياف الخام و هي 14,92 % .وأخيرا النتائج توصي بأن زراعة الصنف رماح تعطي أعلي جودة وإنتاجية في الأراضي الرملية تحت نظام الري بالتنقيط.

الكلمات المفتاحية: محصول العلف ، الأصناف ، البرسيم الحجازي ، جودة العلف ، الاراضي الرملية.