Influence of Sowing Dates on Forage and Seed Yields of Egyptian clover "*Trifolum alexandrinum*, L."

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ABSTRACT

A Field study was carried out at Sakha Agriculture Research Station during the winter seasons of 2013/14 and 2014/15 to study the effect of sowing dates on forage and seed yields of Helaly Egyptian clover (*Trifolium alexandrinum*, L.). The delay in sowing dates from October to December at 15-days intervals decreased the green and dry forage yields. Seed yield affected by sowing dates through the number of cuttings and date of the last cutting, whereas, the highest seed yield obtained when the last cuttings was at the 23 April at both seasons.

Key words: Sowing dates, barseem, Egyptian clover, forage and seed yields.

INTRODUCTION

Egyptian clover or barseem "*Trifolium alexandrinum*, L". is the major forage crop in Egypt, which plays an important role in the agricultural system. Annually, about two and half million faddans are planted with barseem, It produces highly palatable and succulent forage from four to six cuttings during the winter season. It is fed green or dry (hay).

The recommended sowing date in Egypt is from mid- September to mid- October. Potential seed yield following forage season is largely affect by the length of vegetation season (Ramadan *et al.*, 1994 and Sardana and Norwal, 2000, sowing date that influence environmental conditions at the period of seed development (Garza and Marques, 1994). Delaying sowing dates decreased fresh and dry forage yield (Ramadan *et al.*, 1994). Contrary, Athran (1989) reached that early planting, gave the highest seed yield. While, late planting gave lower seed yield. Lalia *et al.*, 1999, found that seed yield decreased with delaying sowing. Din *et al.*, 2014, in Pakistan, indicated that seed yield significantly reduced with delaying sowing.

The present study was carried out to determine the influence of sowing dates on forage and seed yields of "Hellaly" barseem clover in north delta of Egypt.

MATERIALS AND METHODS

Two field experiments were conducted during the two successive winter seasons of 2013/2014 and 2014/2015 at Sakha Agricultural Research Station, A.R.C, Egypt. In both seasons, Helaly variety was sown in a randomized complete block design (RCBD) with four replications in plots of $6m^2$ (1.5m ×4m). The studied treatments included five sowing dates at fifteen days interval starting from the 7^{th} of October until the 6^{th} of December in both seasons. The preceding crop was cotton at the first and second seasons, respectively.

Superphosphate 15.5% P_2O_5 was added during land preparation at a rate of 150 kg. fad^{-1}. Seed was broadcasted at seeding rate of 20 kg. fad^{-1}. Other cultural practices were applied as recommended for barseem production in the region, when every possible.

Table (1) Illustrates air temperature and relative humidity (R.H%) during the season of the study.

Table 1: Means of air temperatures and relative humidity percentages (R.H %) at Sakha during barseem season in both study years

Month	2013/2014				2014/2015			
	Air Temperature		P.H % Time		Air Temperature		P.H % Time	
	Max	Min	07:30	13:30	Max	Min	07:30	13:30
October	27.8	19.4	76.23	57.36	28.44	18.69	80.54	54.09
November	25.4	15.1	87	64.43	24.3	13.79	87.8	60.5
December	19.6	8.5	92.07	67.61	22.27	9.72	88.6	63.5
January	20.3	7.6	93.69	70.55	18.79	6.46	88.1	61.1
February	20.6	8.2	91.9	67.15	19.01	7.69	86.8	62.7
March	22.9	11.7	86.1	56.8	22.69	11.69	82.36	58.82
April	27.5	15.5	81.8	49.8	25.64	13.7	78.3	48.5
May	30.5	19.6	77.2	48.6	30.19	18.79	77.3	46.1
June	32.7	20.6	86.23	52.3	30.85	21.4	78.8	51.2
average	25.3	14.0	84.69	59.4	24.69	13.55	83.18	56.28

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Four to five cuttings were taken before leaving the crop for seed production. Cutting dates, cutting periods, number of cutting, forage- season length (days), seed harvesting date and period of seed development are shown in Table 2.

Fresh forage yield in kilograms was determined for each plot at the time of cutting. Dry matter percentage was calculated from drying fresh forage samples at 105°C till constant weight. Dry matter yield obtained from multiplying green- forage yield by dry matter percentage for each plot.

Data were statistically analyzed according to Snedecore, 1963. The least significant difference test (L.S.D) was used for treatment means comparisons (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

A-Forage yield

Fresh and dry forage yields decreased with delay in sowing from October to December in the two growing seasons (Table 3). In the first and second seasons, total green and dry fodder yields from the 1st and 2ndsowing dates (October) were significantly higher than those recorded for other dates. This might be due to the effect of sowing dates on the number of obtainable cuttings. Forage yields decreased with delay in sowing mainly due to the shorter duration of the production season in the later sowings, and hence less number of cuttings were taken relative to early sowing. In the meantime, the difference among early and late sowing dates in the productivity of barseem were due to suitable environmental conditions at the period of seedling development for the first date. The results might indicate that the first sowing 15 days of October is the optimum sowing date of Egyptian clover. These results were in agreement with Singh (1979), Lal (1981),Brar (1986), Taneja*et al.*, (1987), Younis*et al.*, (1988), Rana *et al.*,(1992), Ramadan*et al.*, (1994) and Sardana and Narwal (2000).

Dry forage yield, showed insignificant differences among the obtained yield from sowing dates of the first three cuttings in both seasons. The differences between fresh and dry yields in response to delay of sowing might due to dry matter percentages increase with delay in sowing date.

Table 2: Date of sowing, cutting dates, cutting periods, number of cuttings, forage season length (days), seed harvesting date and period of seed development.

Sowing dates	1st cut		2nd cut		3rd cut		4th cut		5th cut		Number of cuttings	Forage season length (days)	Date of seed harvest	period of seed development
	Dates	Period	Dates	Period	Dates	Period	Dates	Period	Dates	Period				
07-Oct	3 Dec.	57	16 Jan.	44	21 Feb.	36	23 Mar.	30	22 Apr.	30	5	197		65
22-Oct	23 Dec.	62	4 Feb.	43	11 Mar.	35	8 Apr.	28	04-May	26	5	194		53
06-Nov	15 Jan.	70	24 Feb.	40	28 Mar.	32	23 Apr.	26	-	-	4	168	26-Jun	64
21-Nov	2 Feb,	73	8 Mar.	34	6 Apr.	29	02-May	26	-	-	4	162		55
6 Dec.	24 Feb.	80	26 Mar.	30	22 Apr.	27	17-May	25	-	-	4	162		40

Table 3: Means of fresh, dry forage and seed yields as affected by sowing dates at Sakha Agricultural Experimental station during 2013/2014 and 2014/2015 seasons.

Sowing Dates	Fresh yield kg/plot						Dry yield kg/plot						Seed yield
	1st cut	2nd cut	3rd cut	4th cut	5th cut	Total yield	1st cut	2nd cut	3rd cut	4th cut	5th cut	Total yield	
2013\2014													
07-	17.7	18.75	19.9	21.4	17	94.75	1.646	2.113	2.812	3.465	3.301	13.337	64.2
22-	16.75	18.3	18.75	20.75	18.5	93.05	1.529	2.051	2.597	3.332	3.156	12.665	60.1
06-	15.55	17.75	18.5	20.5	-	72.3	1.407	1.965	2.559	3.253	-	9.184	118.
21-	14.2	16.2	18.45	20.25	-	69.1	1.282	1.771	2.541	3.187	-	8.781	101.
06-	13.75	15.65	18	20	-	67.4	1.213	1.706	2.452	3.13	-	8.501	48.6
							N.S	N.S	N.S	N.S		**	**
L.S.D	0.59	0.44	0.28	0.31		0.94	N.S.	N.S.	N.S.	N.S.		1.095	1.33
2014\2015													
07-	17.25	20	21	21.5	19	98.75	1.608	2.288	2.955	3.498	3.323	13.672	103.
22-	16.4	19.9	20.1	21	18.75	96.15	1.512	2.213	2.657	3.392	3.231	13.005	112.
06-	16	19.65	20	20.5	-	76.15	1.469	2.183	2.636	3.145	-	9.433	137.
21-	15	19	19.75	20.25	-	74	1.365	2.068	2.587	3.062	-	9.082	131.
06-	14.75	18.4	19	19.75	-	71.9	1.335	1.945	2.483	2.972	-	8.735	48.7
L.S.D	0.52	0.29	0.48	0.66		0.91	N.S.	N.S.	N.S.	0.207		0.828	1.27

** Significance at 0.01 level., N.S.; not significantly different.

The first sowing date gave the highest total dry forage yield of 13.3 and 13.7 kg/plot in the two successive seasons, respectively. While the late sowing date gave the least dry forage yield of 8.5 and 8.7 kg/plot in the two successive seasons, respectively. This data agreement with Ramadan *et al.*, (1994) and Sardana and Narwal (2000).

B- Seed yield

Data in Table (3) indicated that seed production was significantly affected by sowing dates in both seasons. The third sowing date (November 6th) In the first season and the fourth date (20 November) in the second season, significantly gave higher seed yields than the other studied sowing dates. While, the 5th sowing date, gave the least seed yield in both seasons. High seed yield from the 3rd sowing date might be due to the fact that, only four cuttings were taken and date of the last cut was at 23rd, April. This was correlated with environmental factors which include temperature and humidity. Also, it had affected the period of seed development. That was clearly illustrated in Table (2). Fewer number of cuttings in late sowing might have resulted in translocation of more photosynthates to seed.These results generally agree with Barik and Mukherjee (1990), Pasumarty *et al.*, (1993) and Ramadan *et al.* (1994).

It might be concluded that, Seed yield depends on sowing date, variety, number of cuts, date of last cut, period of seed development and activity of honey bees. Optimum forage yield resulted from October early sowing, whereas, optimum seed yield resulted from November sowing.

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الملخص العربى

تأثير مواعيد الزراعة على محصول العلف والبذرة فى البرسيم المصرى صنف هلالى

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تم اجراء هذا البحث بمحطة البحوث الزراعيه بسخا خلال موسمى ٢٠١٣/٢٠١٤، ٢٠١٤/٢٠١٥ لدراسة تاثير خمس مواعيد زراعه على العلف الاخضر والجاف ومحصول البذور وكانت بداية الزراعه ٧ اكتوبر بفاصل ١٥ يوما بين مواعيد الزراعه المتتاليه حتى ديسمبر.

ويمكن تلخيص اهم النتائج كالاتى:

١. التاخير فى مواعيد الزراعه بفاصل ١٥ يوما ادى الى نقص محصول العلف الاخضر والجاف.
٢. محصول العلف الاخضر والجاف الكلى الاعلى معنويا فى الميعادين الاول والثانى للزراعه عن باقى المواعيد فى كلا الموسمين.
٣. تم الحصول على ٥ حشات للميعادين الاول والثانى للزراعه بينما تم الحصول على ٤ حشات لباقى المواعيد فى كلا الموسمين.
٤. زاد محصول البذرة بالتاخير قى مواعيد الزراعه حيث ان زيادة محصول البذرة يتاثر بميعاد الزراعه، عدد الحشات، ميعاد اخر حشه.

وللحصول على انتاج عالى من العلف ينصح بزراعة صنف البرسيم المصرى هلالى فى اكتوبر للحصول على خمس حشات. اما اذا كان الهدف هو محصول البذرة فيجب اخذ ٤ حشات للعلف قبل ترك المحصول للبذرة على ان يكون ميعاد اخر حشه قبل ٢٣ ابريل.