Family Selection in Single-cut"*Fahl*" Barseem Clover "*Trifolium alexandrinum*,L."to Improve Forage and Seed Yields.

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ABSTRACT

The objectives of the study were to assess the direct response of green forage and seed yields of" *Fahl*" barseem type, to selection and detect the correlated responses in dry forage and leaves/stem ratio. The base population comprised from a composite of 43 farmers seed lots of *"Fahl"* single-cut barseem clover. In the base population's nursery of 2013/2014 season, 700 plants were visually selected before flowering depending on stem girth, stem branching and mass of ground cover. The highest 120 seed producing plants had saved as half-sib families. S_1- seeds of the selected families were saved in refrigerator. In 2014/2015 seasons, the 120 selected half-sib families had evaluated in six sets, each of twenty families. In winter season of 2015/2016, selfed seeds of the upper 20 % selected half-sib families had planted in an isolated block. At maturity, seeds had harvested to represent the new improved population designated as (C_1-H.S(F)) for families evaluated on forage yield and(C_1-H.S(S)) for families evaluated on seed yield .The superiority of gains were proportional to the direction of selection i.e.; higher responses in green or seed yields were obtained with selection directed to each separate character. Whereas, significant responses in dry forage yield and leaves/stem ratio were obtained when selection was directed to green forage yield. In the meantime, selection directed to seed yield gave insignificant gain in dry forage yield and leaves/stem ratio.

Key words: Selection, Barseem clover, Expected genetic advance, Realized gain, Forage yield, Seed yield .

INTRODUCTION

Barseem clover "*Trifolium alexandrinum*,L."is the major forage crop in Egypt, representing the basic feed for animals during a period of at least seven months, extending from November to May. A full-season forage production is afforded by the multi-cut types, whereas, short-season forages production is associated with single-cut "Fahl" type. Most of Fahl area is completing the crop rotation before early summer cash crops, providing high dry matter green forage suitable for hay production. Part of single-cut area is devoted to seed production , a product that is as valuable as produced forage.

Previous studies summarized the effect of different selection methods in improving yield and forage characters of barseem clover, especially multi-cut populations. **Koraiem *et al.* (1980)** reached an improvement of 20.5% in Meskawi yield from one cycle of recurrent selection depending on general combining ability over two locations. **Mikhiel(1987)** reported a positive response of 20% in forage yield after one cycle of half-sib family selection. **Bakheit and Mahdy(1988)** studied the efficiency of pedigree selection in improving green forage of Meskawi population and reached an improvement of 14.14%. **Bakheit(1989a)** from the first and second cycles of recurrent selection in Meskawi population obtained a realized gains of 13.90 and 21.70% in green forage yield,14.80 and 23.20% in dry forage yield and 14.00, 22.90% in protein yield, respectively. **Bakheit(1989b)** scored a realized gain from modified mass selection over the base population for seed yield of Fahl population of 6.03 and 9.31% for fresh forage yield, of 5.57 and 10.86% for protein yield and 13.23 and 16.19% for seed yield from cycles one and two, respectively .**Ahmed(1992)** with Meskawi population showed that, maternal line selection with S_1 progenies as recombiners was superior to both half-sibs and controlled mass selection. **Ahmed (2000)** reached a realized gain from recurrent selection for total green forage yield in Meskawi population depending on combining ability test of 6.6, 6.0 , 4.0 and 10.3% for total green forage , dry forage , protein and seed yields .**Ahmed (2006)** compared three different methods of selection in Khadarawi barseem population. These were; half-sib with S_1 families selection. All methods were successful in improving the population mean in protein yield. S_2 families selection gave the largest magnitude of response (37.32%) which was insignificantly different from the obtained gain with S_1 families (34.74%).Whereas, half-sib family selection gave the lowest gain of 16.94%.He added that , taking into-account both the cost.unit^{-1} gain and time required,S_1 families selection might have the highest rate of gain. Season^{-1} with the greatest return on investment .Comparison of the effectiveness of different selection methods is difficult because of variable populations under selection, variable selection traits under consideration and variable selection intensity. The ideal comparison between selection methods must depend on similar methods for similar traits by using different selection intensities in a common base population or different methods for similar selection intensities. However, these data regarding the efficiency of selection in Fahl barseem is missing in barseem clover.Data regarding the potentiality of improving forage or seed yield of single-cut barseem clover is relatively scare.

The objectives of the recent study were to assess the direct response of green forage and seed yields of" Fahl" barseem type to selection and detect the correlated response in dry forage and leaves/stem ratio.

MATERIALS & METHODS

The recent study was carried-out at the Agricultural Experimental Station of Alexandria University. The base population comprised from a composite of 43 farmers seed lots of Fahl single-cut barseem clover. In 2013-2014 season, seeds of the composite base population were sown in 500 rows, 40 cm apart and 4.0 m long at the rate of 12 kg.fad^{-1}. One month after planting, spacing within rows was adjusted to 50 cm among plants by eradicating weak plants and weeds. Weeding manually continued to maintain weed-free crop. Other cultural practices were applied as recommended for optimum barseem productivity.

Families formulation

In the base population's nursery of 2013/2014 season, 700 plants were visually selected before flowering depending on stem girth, stem branching and mass of ground cover. In each plant some heads were isolated in fine cloth bags to control pollination. In the meantime, hand tripping was applied to isolated heads to enhance self-seed setting. Other heads in each plant were allowed to open pollination. At maturity open pollinated and selfed seeds of each plant were harvested separately. The highest 120 seed producing plants had saved as half-sib families. S_1- seeds of the selected families were saved in a refrigerator.

Families evaluation

In 2014/2015 seasons,the 120 selected half-sib families had evaluated in six sets, each of twenty families. Each sets was treated as a randomized complete block experiment, with four replications. One-row plots of 2 m. length and 30 cm apart were used. Seeding rate of 5kg.faddan^{-1} (0.9533g.row^{-1}) mixed with two times weight of barseem seeds previously oven heated at 130C$^{\circ}$ for 4 hours (1.907g). Each plot was guarded by two rows planted with the base population seeds.In each set, two replications were used for green forage evaluation and the other two replications for seed yield determination. Forage and seed yields in the respective replications were determined from the middle meter of each plot (0.3 m^2).Forage yield was determined after 90 days from planting. Seed yield components included; number of heads per plant, number of flowers per inflorescence number of seeds per head and thousand seed weight. Measurements for seed yield and its components were made after 140 days from planting.

Identifying superior families

Date of forage and seed yields from families evaluation trial had analyzed for each set as a randomized complete block design by **Mstat-C package, 1988**. The highest producing four families in each set (20% selection intensity) depending on forage and seed yield were identified. Variance components as genetic variance (σ^2_f) and environmental variance (σ^2_e) had derived from the expected mean squares. Those values had used to estimate heritability and the expected advance from selection according to **Fehr,1987.**

Synthesis of new population

In winter season of 2015/2016, selfed seeds of the selected half-sib families had planted in an isolated block. Equal seed number of each selected family had mixed entirely before sowing in rows at 30 cm apart. At maturity seeds had harvested to represent the new improved population designated as (C_1-H.S(F)) for families evaluated on forage yield and (C_1-H.S(S)) for families evaluated on seed yield.

Evaluation of improved populations

In 2016/2017 winter season, an experiment included the base population (C_0), first cycle of half-sib family selection for forage yield (C_1-H.S(F)) , first cycle of half-sib family selection for seed yield(C_1-H.S(S))and two check variety i.e.; Giza1 and Ahaly-Behiyra in a randomized complete block design of eight replications had used. Each entry plot was one row, four meters long and 0.30 m apart. Plots were separated by rows planted with Giza1 cultivar. Four replications were used for forage determination, whereas, the other four replications used for seed yield evaluation.

Statistical analysis

Analysis of variance for the data collected in each set as well as combined analysis over-sets was performed as described by **Cochran and Cox (1957).** According to analysis of variance assumption, numerical data were subjected to square root transformation before analysis. Combined analysis over sets was performed when the assumption of homogeneity of errors was not rejected **(Bartlett, 1937).**

RESULTS AND DISCUSSION

The two developed synthetics through selection for high green forage yield (C_1- H.S. (F)) and for high seed yield (C_1- H.S. (S)), the base population (C_0) and the two check populations namely; Giza 1 and Ahaly-Behiyra were evaluated in 2016/2017 winter season. Response to selection in green, dry and seed yields and leaves/stem ratio were studied.

Families evaluation:

Table (1), illustrated the analysis of variance of Fahl berseem families in green forage yield, seed yield, head.plant^{-1}, seeds.head^{-1}and 1000-seed weight. The obtained results indicated that the differences among the tested families were significant for all studied forage, seed yields and seed yield components. The magnitude of mean squares was descending for number of heads.plant^{-1}, number of seeds.head^{-1} and seed yield, respectively. In the meantime, mean squares of error, followed similar maner. Variance component for families (σ^2_F) reached the largest obtained value for number of heads.plant-^{1}(8.921) followed by number of seeds.plant-^{1}(6.234), then seed yield (4.551). That variance accounted for 1/4 σ^2_A ,(**Falconer (1967) and Hallawer and Miranda(1988)).**This might indicate that ,estimate of additive variance is positive for all studied characters, suggesting that, additive genetic variance was more effective in controlling both forage and seed yields |**(Hallawer and Miranda(1981) and Weyhrich *et al* (1998)).**

Estimates of heritability (h^2), expected genetic advance (G) and relative genetic advance (G%) were presented in **Table (2).** For all studied traits, the estimated values for heritability from half-sib families evaluation were nearly about 0.6 (0.60 ,0.58 ,0.55 and 0.55 for green forage yield , seed yield, number of heads.plant^{-1}, number of seeds.head-^{1} and 1000-seed weight ,respectively).This might indicate a strong genetic control on such characters. An estimate of heritability was scored by **Malengier and Baer (2007)** for seed yield in red clover reached 0.82. **Bakheit (1989)** presented abroad-sense heritability for seed yield of barseem clover as 0.63. **Ahmed (1992)** reached an estimate of 0.97 for seed yield from variance components. **Rajab (2010)** estimated heritability in broad-sense for seed yield as 0.96.**Ahmed *et al*. (2017)** reported that heritability estimates in Khadarawi population for total seed weight.plant^{-1} and number of heads.plant^{-1} as 0.98 and 0.97. Seed weight.head^{-1} gave a strong estimate of 0.67.While, genetic control on number of seeds.head^{-1} and 1000-seed weight was relatively weak (0.05 and 0.07).

Expected genetic advance from selecting the upper 20% half-sib families for green forage yield reached 0.834 kg. /0.3 m^2,which amount to about 82.33% of the overall mean of evaluated families. Whereas, selecting the upper 20% families for seed yield might result in 2.269 g/0.3 m^2 increase which amount to 5.58% of the overall families mean. The highest expected genetic advance in seed yield components was scored for 1000-seed weight that reached 1.660 gram, which amount to 64.25% of the overall mean of evaluated families. While, the least expected genetic advance was that scored for number of heads.plant^{-1} that reached 3.1 heads.plant^{-1} ,amounting to 3.43% relative to over all mean. **Abou-El-Shawareb(1971)** reached a gain from selection reached 19.90 to 29.0 % in seed yield of Meskawi population. **Bakheit (1989)** estimated a realized gain in seed yield from selection amounted to 17.4%. **Ahmed (2000)** presented a realized gain in seed yield of 8.55% from index selection. **Ahmed (2006)** published a gain from half-sib family selection, in seed yield of low value. **Bakheit *et al*.(2007)** reached a realized gain in seed yield of barseem ranged between 13.59 and 18.45. **Ahmed *et al*. (2017)** scored expected genetic advance from selecting the upper 20% half-sib families of multi-cut berseem populations ranged between 60.72% in Helaly population to 46.93% in Meskawi population for total seed weight.plant^{-1} from ,60.71% in Serow population to 51.43% in Meskawi population for number of heads.plant^{-1} and from 5.05% in Serow population to 15.07% in Helaly population for number of seeds.head^{-1}.

The gain from selection is influenced largely, by the presence of additive variations. The latter is indicative of the magnitude of heritability and some other factors, such as selection differential and parental control. That was strongely supported by the findings **of Hallawer and Miranda (1988), Weyhrich *et al*.(1998), Ahmed(2000), Ahmed (2006) and Ahmed *et al*.(2017).**

Means of designated families and selected upper 20% families for the studied characters were presented in **Table (3).** Selected half-sib families for green forage yield had 34.65% higher yield relative to the overall mean of the 120 evaluated families (1.364 *vs*. 1.013 kg. (0.3) m^{-2}).The respective values for seed yield reached 48.99% of the overall mean of families (60.61 *vs*.40.68 g. (0.3) m^{-2}). The prospective improvement in seed yield components might reach 72.64 , 52.15 and 40.69% of the overall mean of families in number of heads.plant^{-1}, number of seeds.head^{-1} and 1000-seed weight, respectively (136.3 *vs*.78.95 , 54.38 *vs*.35.74 and 3.634 *vs*. 2.583 for the aforementioned characters, respectively).

Table1:Pertinent mean squares from analysis of variance and estimates of variance components for families of Fahl berseem.

Character	Mean squares		$\sigma^2{}_F$
	Families	Error	
Forage yield	3.967**	1.595	0.5930
Seed yield	31.522**	13.318	4.551
Number of heads/plant	64.80**	29.12	8.921
Number of Seeds/head	44.80**	19.86	6.234
1000-seed weight	18.91**	8.600	2.577

*** Significant at 0.05 level**
**** Significant at 0.01 level**

Table 2:Estimates of heritability (h^2), expected genetic advance (G) and relative genetic advance (G%).

Character	h^2	G*	
		Units	%
Forage yield	0.5980	0.834	82.33
Seed yield	0.5775	2.269	5.58
Number of heads/plant	0.5507	3.103	3.43
Number of seeds/head	0.5567	2.608	7.30
1000-seed weight	0.5452	1.660	64.25

* G ;Calculated according to Fehr(1987).

Table 3: Means of families sets and the upper 20% selected families for green forage and seed yields along with seed yield component characters.

Character	Forage yield ($Kg/0.3m^2$)		Seed yield ($g/0.3m^2$)		Number of heads/ plant		Number of seeds/head		1000-seed weight (g)	
Sets	**Mean**	**Upper 20%**	**Mean**	**Upper 20%**	**Mean**	**Upper 20%**	**Mean**	**Upper 20%**	**Mean**	**Upper 20%**
Set I	1.017	1.385	40.54	66.11	79.44	123.6	37.59	540.50	2.375	3.705
		1.565		51.82		115.5		55.00		2.515
		1.320		63.86		138.5		60.50		2.415
		1.375		58.19		128.9		59.80		3.615
Set II	1.067	1.198	42.23	63.35	84.82	108.3	35.79	43.89	2.584	3.375
		1.135		64.75		141.4		57.93		3.810
		1.550		65.41		118.2		55.55		4.045
		1.410		57.90		150.4		51.63		3.710
Set III	1.075	1.405	39.21	57.39	73.84	138.9	31.02	40.35	2.407	3.695
		1.535		66.25		154.4		55.00		3.790
		1.325		59.30		147.5		57.65		4.305
		1.740		74.55		175.9		60.05		4.255
Set IV	0.988	1.227	38.16	57.15	78.46	147.5	34.76	52.05	2.623	3.765
		1.195		58.55		154.0		56.25		3.720
		1.375		64.65		152.2		58.95		3.860
		1.365		61.20		137.6		57.95		3.585
Set V	0.944	1.275	38.41	56.50	71.71	138.2	35.97	52.50	2.634	3.385
		1.258		55.45		129.6		38.35		3.400
		1.235		49.23		120.3		54.30		3.370
		1.308		47.55		115.7		54.25		3.260
Set VI	0.988	1.395	45.51	63.30	85.44	142.4	39.30	59.05	2.874	4.065
		1.318		60.45		116.7		52.85		3.975
		1.495		68.93		144.1		61.25		3.750
		1.340		62.68		130.4		55.45		3.840
Mean	1.013	1.364	40.68	60.61	78.95	136.2	35.74	54.38	2.583	3.634

Evaluation of improved populations:

The C_1 populations, designated as C_1-H.S (F) (selected for green forage yield), C_1-H.S (S) (selected for seed yield) in addition to base population (C_0) and two check populations namely; Giza 1 and Ahaly- Behiyra were evaluated in a randomized complete block design with eight replications. Four replications were used for green forage yield evaluation and the others for seed yield determination. Analysis of variance for green forage yield, dry forage yield, seed yield and leaves/stem ratio of *Fahl* populations were presented in **Table(4)**.Significant variations ($p \geq 0.01$) were detected among the tested populations in all studied characters.

The means and percent realized gain in green forage yield ($ton.fad^{-1}$.) relative to the base population (C_o) and the average of the two check populations were presented in **Table(5).** Synthetic of half-sib families selected for high yield of green forage (C_1-H.S (F)) recorded the highest significant gain relative to the base population and the average of checks (18.02 and 18.38% for the former and the latter, respectively). Synthetic selected for high seed yield (C_1-H.S (S)) gave significantly lower green forage yield (17.96 *vs*. 19.39 for C_1-H.S (F) and C_1-H.S (S), respectively). The latter synthetic scored 9.31 and 9.65% realized gain relative to the base and average of the checks, respectively. It was valuable to notice that, the difference between the base and any of the two tested checks had not reached the level of significance.

Realized gain relative to the base population and the average of the checks in seed yield ($kg.fad^{-1}$) were presented in **Table (6).** Synthetic of selected half-sib families evaluated for seed yield (C_1-H.S (S)), significantly gave higher seed yield relative to any of the base (C_1) or checks populations. The realized gain in seed yield when families were evaluated for green forage yield C_1-H.S (F) was significantly inferior to (C_1-H.S (S)).Value of realized gain from selection for green forage yield in seed yield relative to the base population (C_1) reached 21.61% , whereas, reached 22.38% relative to the average of the checks.

Table 4: Analysis of variance for green forage yield, dry forage yield, seed yield and leaves/stems ratio of Fahl populations.

S.O.V	d.f.	M.S.			
		Green forage yield	Dry forage yield	Seed yield	Leaves/stem ratio
Population	4	8.162^{**}	0.3182^{**}	12942.0^{*}	17.61^{**}
Error	12	0.3802	0.0322	365.8	1.057

*** Significant at 0.05 level**
**** Significant at 0.01 level**

Table 5: Population means and realized gain (%) from selection for green forage ($ton.fad^{-1}$) in Fahl barseem type..

Population	Mean ($ton.fad^{-1}$)	Realized gain	
		C_0	Checks
Base (C_0)	16.43^{c}		
C_1 H.S (F)	19.39^{a}	18.02	18.38
C_1 H.S (S)	17.96^{b}	9.31	9.65
Checks			
Check $population_1$	17.04^{c}		
Check $population_2$	15.71^{c}		
Average	16.38		

*Realized gain(%) relative to base=C_1-C_0/C_0X 100.
relative to Checks= C_1-check average yield/ check average yield X 100

Table 6: Population means and realized gain (%) from selection for seed yield ($kg.fad^{-1}$) in Fahl barseem type..

Population	Mean ($ton.fad^{-1}$)	Realized gain	
		C_0	Checks
Base (C_0)	497.5^{d}		
C_1 H.S (F)	605.0^{b}	21.61	15.24
C_1 H.S (S)	642.5^{a}	29.15	22.38
Checks			
Check $population_1$	545.0^{c}		
Check $population_2$	505.0^{d}		
Average	525.0		

*Realized gain(%) relative to base=C_1-C_0/C_0X 100.
relative to Checks= C_1-check average yield/ check average yield X 100

It was valuable to notice that, selecting half-sib family of *Fahl* barseem for high green forage or seed yield might result in subsequent improvement in the further synthetics , with clear sound improvement proportional to the base at which the families were evaluated . The fact that additive genetic variance in the base *Fahl* population was of reseanable importance, might explain the superiority of selected synthetics. **Falconer (1993)** stated that,inbred progeny selection might not necessarily increase mean performance by directly acting to increase the frequency of favorable alleles, but by directly decreasing the frequency of deleterious recessive alleles. The discrepancy, however, between predicted (**Table2)** and realized gains**(Tables 5and 6)** was not unique to the present study. Possible reasons for this discrepancy involved the over estimation of heritability in the families evaluation trial. **Lannucci and Halllawer (1987)** showed that, when heritability was estimated from the variance among families in the selection trails, heritability might be biased upwards and represented an upper bound of the heritability for certain progeny type. Likewise, heritability based on single-year data, such as the case in selection trails, was biased upwards because of genotype X year interaction being confounded in the numerator **(Comstock and Moll, 1963).**

Another possible reason for the lack of relationship between predicted and realized gain was the potential for genotype X environment interactions, not to be representative of real interaction that occur in multi-year evaluation trails **(Comstock and Moll, 1963**).

Another reason for that discrepancy , is the difference in gene frequency between additive and dominance alleles that deviate from the assumption of gene frequency equality.

Selection based on green forage yield, resulted in significant change in dry forage yield **Table (7).**

Table 7:Population means and realized gain (%) from selection for dry forage ($ton.fad^{-1}$) in Fahl barseem type.

Population	Mean ($ton.fad^{-1}$)	Realized gain	
		C_0	Checks
Base (C_0)	3.465 [b]		
C_1 H.S (F)	4.028 [a]	16.25	15.75
C_1 H.S (S)	3.688 [b]	6.44	5.98
Checks			
Check population$_1$	3.690 [b]		
Check population$_2$	3.275 [b]		
Average	3.48		

The realized gain in dry forage yield correlated with response to selection for green forage yield reached 16.25% relative to the base population and 15.75% relative to the average of the check populations. Meanwhile, correlated response to selection for seed yield in dry forage yield although reached 6.44 and 5.98% of C_0 and the average of the checks,respectively had not reached the level of significance.

Correlated response in leaves/stem ratio **Table (8)** when selection was directed to high green forage yield reached 13.88 and 12.11% relative to the base population and the average of the checks, respectively. Meanwhile, insignificant negative response reached -1.38 and -2.92% relative to the base population and the average of the checks were obtained with selection directed to high seed yield.

Commonly, the correlated response in dry forage yield were of similar magnitude to direct response obtained in green forage yield. **Bakheit and Mahdy (1988)** reported that green yield was genetically and phenotypically strongly correlated with dry forage yield. **Ahmed (1992)** reached that the correlation between forage and seed yield in multi-cut berseem clover was strong to moderate depending on population .Also, **Ahmed(2006)** obtained a positive response in leaves/stem ratio when selection was directed to high protein yield.

The success of breeding methods in improving forage and seed yields of single-cut barseem clover and other correlated traits depended essentially upon genetic diversity of families and the predominance of additive genetic effects. The superiority of gains were proportional to the direction of selection i.e.; higher responses in green or seed yields were obtained with selection directed to each separate character. Whereas, significated responses in dry forage yield and leaves/stem ratio were obtained when selection was directed to green forage yield. In a time that selection directed to seed yield gave insignificant gain in dry forage yield and leaves/stem ratio.

Table 8: Population means and realized gain (%) from selection for leaves/stem ratio in Fahl barseem type..

Population	Mean ($ton.fad^{-1}$)	Realized gain	
		C_0	Checks
Base (C_0)	34.07 [b]		
C_1 H.S (F)	38.80 [a]	13.88	12.11
C_1 H.S (S)	33.60 [b]	-1.38	-2.92
Checks			
Check population$_1$	34.68 [b]		
Check population$_2$	34.53 [b]		
Average	34.61		

*Realized gain(%) relative to base=C_1-C_0/C_0X 100.
relative to Checks= C_1-check average yield/ check average yield X 100

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الملخص العربي

انتخاب عائلات البرسيم المصرى الفحل" أحادي ا لحشه "

"*Trifolium alexandrinum* ,L." لتحسين محصول العلف و البذور.

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الهدف من الدراسه هو تقدير الاستجابة المباشرة لمحصول العلف الاخضر ومحصول البذرة للصنف " الفحل" من البرسيم للانتخاب مع تقدير الاستجابة المرتبطة في محصول العلف الجاف ونسبة الاوراق للسيقان.

عشيرة الاساس عبارة عن مخلوط من 43 عينة مزارعين مختلفين حيث زرعت العشيرة في مشتل خلال موسم 2014/2013 وتم اختيار 700 نبات مظهريا قبل الازهار علي اساس سمك الساق و التفريع وكتلة النمو الخضري. وبعد نضج البذور تم حصاد اعلي 120 نبات كعائلات نصف شقيقة، كما حفظت كمية من البذور ذاتية الاخصاب لذات النباتات في الثلاجة . وفي موسم شتاء 2015/2014 تم تقييم العائلات المنتخبة في ست مجموعات كل من عشرون عائلة . وفي موسم 2016/2015 زرعت البذور ذاتية الاخصاب لاعلي 20% من العائلات النصف شقيقة المنتخبة في منطقة معزولة ليتم التهجين بينهما. وعند نضج البذور خلطت البذورلتمثل الدورة الاولي لانتخاب العائلات نصف المنسبة لمحصول العلف الاخضر ((C_1-H.S(F)) ولانتخاب العائلات نصف المنسبة لمحصول البذور .((C_1-H.S(S)).

كانت الاستجابة للانتخاب متناسبة مع اتجاه تقييم العائلات المنتخبة حيث سجلت اعلي استجابات في محصول العلف الاخضر من العشيرة المحسنة بانتخاب العائلات للعلف الاخضر، كما سجلت اعلي استجابات في محصول البذور من العشيرة المحسنة بانتخاب العائلات لمحصول البذور. في حين سجلت استجابات معنوية في كل من محصول العلف الجاف و نسبة الاوراق/ السيقان عند انتخاب العائلات لمحصول العلف الاخضر. يضاف الي ذلك ان الانتخاب المباشر للعائلات علي اساس محصول البذرة نتج عنه استجابات غير معنوية في كل من محصول العلف الجاف و نسبة الاوراق للسيقان.