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# Impacts of Recurrent Selection and Synthetic Population on Forage and Seed Yields of Monocut Egyptian Clover (*Trifolium alexandrinum* L.)

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## Abstract

The objectives of the current investigation were to determine the response of forage and seed yields and their components in monocut Egyptian clover to two methods of breeding, namely recurrent selection and synthetic population approach. One cycle of recurrent selection among superior accessions was imposed on a base population. Both yields were compared to the base population and a commercial cultivar (c.v. Fahl). In addition, first generation of a synthetic population created by compositing six superior accessions was compared to the commercial cultivar and their parents.

The realized gains of the recurrent selections were 18.6, 11.7, 14.6 and 24.1% for leaf/stem ratio, fresh, dry and forage protein yields, respectively, over the base population. Moreover, the realized gains were 14.4, 19.2, 13.1 and 16.9% for number of inflorescences/plant, number of seeds/inflorescence, seed yield and 1000-seed weight, respectively, over the base population.

The first generation of the synthetic population showed increases over parental means of 3.5, 3.0, 4.9 and 3.8% for leaf/stem ratio, fresh, dry, and forage protein yields, respectively. Similarly, the realized gains were 5.0, 5.3, 3.1 and 4.3% for number of inflorescences/plant, number of seeds/inflorescence, seed yield and 1000 seed weight, respectively, over to the check cultivar (c.v. Fahl).

***Keywords:*** *Recurrent selection, Synthetic population, Monocut Egyptian clover, Forage and seed yield, G.C.V. & P.C.V., Heritability*

## Introduction

Egyptian clover cv. Fahl is an annual legume, well adapted to the climate of the Mediterranean, Central Europe, India and Southern U.S.A., it is grown for soiling, hay production and grazing. This single cut cultivar is characterized by the rapid growth and large forage yield; hence, it is grown as a cash crop before sowing early summer crops such as cotton. Limited efforts has been done to improve yield potential of monocut Egyptian clover through recurrent selection or synthetic populations in contrast to the multicut Egyptian clover, where early breeders, e.g. Abou-El-Shawareb (1971), applied recurrent selection and reported that selections outyielded the original population by 19.9 to 29.0% in forage yield, while, Koraiem *et al*. (1980) reported that recurrent selection was effective in improving forage yield. Bakheit (1989a) found the realized gains were 14.0 and 22.9% over the base population for forage protein yield in the first and second cycle of recurrent selection, respectively. Rajab (2010) assessed the response to selection among and within berseem ecotypes based on dry forage yield and found that the relative increase over the check average of 13.7-23.5%. Moreover, Badawy (2013) noted that the realized gain in seed yield due to $S_1$-family selection reached 29.4% relative to the base population.

Synthetic populations of forage crops may be developed by combining either genotype or plants into a composite strain. Which is a commonly used procedure in forage crops breeding. Radwan *et al*. (1983) produced a synthetic variety by selecting 13 superior farmer lots with good combining ability and established crossing among them. The highest actual gain of selection recorded 13.1 and 19.2% in first and second cycles of selection, respectively. The synthetic $F_2$ population increased by 21.3% in dry forage yield (Bakheit, 1989a). Abdel-Galil *et al.* (2008) showed that synthetic population had higher yield and yield components than the best parents.

The objectives of the current investigation were to: (1) study the effectiveness of recurrent selection in improving forage and seed yields of the superior accessions of farmers' seed lots of the monocut Egyptian clover genotypes and (2) investigate the effect of synthetic population on the improvement of yielding ability of farmers' seed lots of monocut Egyptian clover.

## Materials and Methods

### Recurrent selection procedure

The materials used in this study were the best accessions of monocut Egyptian clover among twenty genotypes evaluated in 2010/2011 season at Shandaweel Agricultural Research Station, Sohag, Egypt. A spaced plant nursery of 2000 plants was established in 2011/2012 season where plants were arranged in small guarded plots with five cm space between plants within rows set at 15 cm. The best yielding 10 percent of the two hundred plants were selected and each plant was caged with fine muslin cloth before blooming followed by applying hand tripping at flowering stage. At maturity time, equal parts of selfed seeds from each of the 200 selected plants were bulked together.

Selfed seeds were sown in 2012/2013 season in an isolated plot nearby a honeybee-hive which was placed at the time of flowering to allow cross-pollination between the selected plants. At harvest, the resulting seeds were bulked together as the new population of the first cycle of recurrent selection. In 2013/2014 season, the first cycle of selection with the original population (base population) and certified seeds from Fahl cultivar were evaluated in two experiments (forage yield traits and seed yield traits) using a randomized complete block design with three replications for each experiment. The plot size for each experiment was one $m^2$. All cultural practices were applied as recommended for Egyptian clover production. Eighty days from sowing, the plots for forage yield were clipped for each population. The traits studied were plant height (cm), leaf/stem ratio, fresh and dry forage yield ($kg/m^2$), forage protein yield ($g/m^2$) and protein percentage which was determined using micro-kjeldahl method as outlined by the A.O.A.C. (1980).

Furthermore, at seed maturity stage, the plots for seed yield traits were harvested. The studied traits were number of inflorescences/plant, number of seeds/inflorescence, seed yield and 1000-seed weight. Data for base population, first cycle of recurrent selection and check cultivar were statistically analyzed according to Gomez and Gomez (1984). The Least significant difference was used for comparisons among populations' averages. The expected mean squares for all traits were found following Miller *et al*. (1958). The genotypic ($\sigma_g^2$) and the phenotypic ($\sigma_p^2$) variances were calculated according to Al-Jibouri *et al.* (1958). Phenotypic coefficient of variability (P.C.V.) and genotypic coefficient of variability (G.C.V.) were calculated according to Burton (1952).

**Synthetic population procedure**

The twenty monocut Egyptian clover accessions that belong to Fahl type were evaluated in 2010/2011 season. The six accessions with the highest yields in open-pollinated progeny test in 2011/2012 season were selected and used as basic material for producing the synthetic variety. Three hundred seeds from each selected accessions were bulked. The composited seeds were planted in isolated plots far from other berseem clover field in 2012/2013 season. All plants were harvested and the seeds were bulked together to obtained the Syn. $F_1$ seed population. In 2013/2014 season the synthetic $F_1$, the original six selected accessions (parental materials of the synthetic) in addition to the commercial cultivar Fahl, were evaluated in a randomized complete block design using three replications for forage yield characters and three other replications for seed yield characters. Plot size, culture practices, recorded characters and statistical analysis were as described previously for recurrent selection procedure. The predicted response from selecting of the best 5% plants was calculated using the formula adopted by Falconer (1989) as follows $\Delta G = i.\sigma_p.H$. The percentage of predicted genetic advance was calculated as $G\,\% = \frac{\Delta G}{\overline{X}} \times 100$ .

**Results and Discussion**

**Performance of recurrent selection population**

The analysis of variances of forage and seed yields and their components showed significant differences among populations for plant height, leaf/stem ratio, fresh and dry forage yields, number of inflorescences / plant, number of seeds/inflorescence, seed yield. Meanwhile, forage protein yield and 1000-seed weight showed highly significant differences among populations (Table 1) revealing the large variability correlated to these characters. Means of one cycle of recurrent selection, their parental accession, check cultivar (c.v. Fahl) and their percentage of the check for all studied traits are presented in Table 2. The increase as a percentage of the population were measured for leaf/ stem ratio (18.6 and 42.1) and for fresh forage yield (11.7 and 29.9), for dry forage yield (14.6 and 44.7), forage protein yield (24.1 and 77.4), number of inflorescences/plant (14.4 and 25.8), number of seeds/inflorescence (19.2 and 26.6), seed yield (13.1 and 23.0) and 1000-seed weight (16.9 and 28.8%) in the recurrent selection population over the base population and check cultivar, respectively (Table 2). Such responses indicate effectiveness of this methods of selection.

Comparison between the check cultivar and selections of the first cycle of recurrent selection indicated that a considerable improvement has been achieved for all studied traits. Meanwhile, the recurrent selection population significantly increased over the base population for plant height, forage protein yield, number of seeds/inflorescence, seed yield and 1000-seed weight. These results are in line with those reported by Abou-El-Shawareb (1971), Koraiem *et al.* (1980), Bakheit (1989a&b). Mikhiel (1987), Ahmed (1992), Ahmed (2006), Rajab (2010) and Badawy (2013) who found that recurrent selection was effective in improving yield in multi-cut Egyptian clover. In an early study, Johnson *et al.* (1955**)** phenotype recurrent selection was suggested as effective means for modifying an unselected population of sweet clover to improve uniformity in growth type and plant vigor.

The phenotypic variance ($\sigma^2_p$) and genotypic variances ($\sigma^2_g$), P.C.V. and G.C.V. for the three populations are presented in Table 3. The percentage of genotypic to phenotypic variances ($\sigma^2_g$-$\sigma^2_p$) were high for all traits indicating that they are highly heritable. Moreover, the phenotypic and genotypic coefficient of variation ranged from 5.4 and 5.0% for plant height to 27.6 and 27.2% for forage protein yield, referring to enough variation a following future selection.

**Performance of synthetic population**

The analysis of variance of forage and seed yields and their components showed that the eight populations (synthetic, their 6 parents and the check cultivar) differed significantly or highly significantly for all traits (Table 4). The obtained results revealed significant differences among populations. Means of forage and seed yields and their components of the synthetic population, their parents, and check cultivar (c.v. Fahl) and their percentage of the check, are presented in Tables 5 and 6. The results revealed realized gains for plant height (6.0 and 2.5), leaf/stem ratio (15.2 and 3.2), fresh forage yield (13.1 and 2.7), dry forage yield (20.4 and 4.2) and forage protein yield (23.0 and 3.1%) in synthetic population over the check cultivar and parental mean, respectively (Table 5). Results in Table 6 showed realized gains for number of inflorescences/plant (13.3 and 4.4), number of seeds/inflorescence (16.7 and 4.7), seed yield (15.7 and 2.8) and 1000-seed weight (14.3 and 3.9%) in synthetic population over the check cultivar and parental mean, respectively.

The results means of the synthetic population significantly exceeded those of the check cultivar for all traits. On the other hand, there were no significant differences between the parental mean and the synthetic population for all traits. In addition, the comparison showed that most parents were significantly different from check variety in all traits. The higher forage and seed yields and their components of the synthetic population relative to the check cultivar could be due to the higher yield and combining ability of most the parents involved in the production of the synthetic population. The synthetic productivity exceeded that of the check cultivar in all traits. Moreover, this synthetic would be adapted to a wider range of environmental factors due to the presence of genetic variability and would be more stable from season to season. In addition to this synthetic population could be used as reservoir of desirable gene combinations. These results are in line with those obtained by Katta *et al.* (1980), Bakheit (1989a), Abdel-Galil *et al.* (2008) and Badawy (2013) who found that the synthetic population was effective in improving yield in multi-cut Egyptian clover.

The phenotypic ($\sigma^2_p$) and genotypic ($\sigma^2_g$) variances, P.C.V. and G.C.V., heritability % and expected response estimates for the eight populations are presented in Table 7. The genotypic variance relative to the environmental variance was high for all traits. The environmental variation ranged from 9.6 for leaf/stem ratio to 38.1% for 1000-seed weight.

The phenotypic and genotypic coefficient of variation ranged from 3.10 and 2.45% for plant height to 12.36 and 11.55% for forage protein yield. These results were reflected in lower estimates for broad sense heritability of plant height as compared to forage protein yield. The expected responses ranged from 4.1 for plant height to 22.24% for forage protein yield.

Finally, the used methods proved to be power full tool for improving the forage and seed yield as well as their components in the studied materials. Consequently, these methods may be applied in other materials of monocut Egyptian clover.

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**Table 1. Analysis of variance of forage and seed yields and their components for the one cycle of recurrent selection and their base population and check cultivar in monocut Egyptian clover.**

| Source of variations | d.f | Mean squares | | | | |
|---|---|---|---|---|---|---|
| | | Forage characters | | | | |
| | | Plant height (cm) | Leaf/stem ratio (%) | Fresh forage yield (kg/m$^2$) | Dry forage yield (kg/m$^2$) | Forage protein yield (kg/m$^2$) |
| Replications | 2 | 7.75 | 1.56 | 0.021 | 1.06 | 379.0 |
| Populations | 2 | 68.79* | 107.6* | 2.000* | 0.157 | 7200.9** |
| Error | 4 | 9.79 | 11.35 | 0.163 | 0.024 | 179.6 |
| | | Seed characters | | | | |
| | | Number of inflores-cences/plant | Number of seeds/ inflorescence | Seed yield/m$^2$ (g) | 1000-seed weight (g) | |
| Replications | 2 | 0.229 | 1.482 | 7.00 | 0.40 | |
| Populations | 2 | 7.238 | 93.11* | 490.33* | 0.882** | |
| Error | 4 | 1.090 | 10.785 | 30.83 | 0.031 | |

* and ** significant at the 0.05 and 0.01 levels of probability, respectively.

**Table 2. Means of forage and seed yields and their components of the one cycle of recurrent selection, their parental accessions, and check cultivar and their percentage of the check cultivar in monocut Egyptian clover.**

| Populations | Forage characters | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Plant height | | Leaf/stem ratio | | Fresh forage yield | | Dry forage yield | | Protein yield | | Dry matter (%) | |
| | cm | % of the check | % | % of the check | $kg/m^2$ | % of the check | $kg/m^2$ | % of the check | $g/m^2$ | % of the check | % | % of the check |
| 1- First cycle of recurrent selection | 93.5 | 111.4 | 40.2 | 142.1 | 7.07 | 129.9 | 1.49 | 144.6 | 227.3 | 177.6 | 21.1 | 112.2 |
| 2- Base population ($P_6$) | 85.0 | 101.3 | 33.9 | 119.8 | 6.33 | 116.4 | 1.30 | 126.2 | 178.2 | 139.1 | 20.2 | 107.4 |
| 3- Check cultivar | 83.9 | 100.0 | 28.3 | 100.0 | 5.44 | 100.0 | 1.03 | 100.0 | 128.1 | 100.0 | 18.8 | 100.0 |
| LSD 5% | 7.09 | | 7.64 | | 0.91 | | 0.35 | | 30.4 | | N.S. | |
| Realized gain % | | | | | | | | | | | | |
| From base population | | 10.0 | | 18.6 | | 11.7 | | 14.6 | | 24.1 | | 4.5 |
| From check cultivar | | 11.4 | | 42.1 | | 29.9 | | 44.7 | | 77.4 | | 12.2 |

| | Seed characters | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Number of inflorescences/plant | | Number of seeds/inflorescence | | Seed yield/$m^2$ | | 1000-seed weight | |
| | | % of the check | | % of the check | g | % of the check | g | % of the check |
| 1- First cycle of recurrent selection | 15.1 | 125.8 | 50.9 | 126.6 | 135.3 | 123.0 | 4.78 | 128.8 |
| 2- Base population | 13.2 | 110.0 | 42.7 | 106.2 | 119.7 | 108.8 | 4.09 | 110.2 |
| 3- Check cultivar | 12.0 | 100.0 | 40.2 | 100.0 | 110.0 | 100.0 | 3.71 | 100.0 |
| LSD 5% | 2.3 | | 7.4 | | 12.6 | | 0.40 | |
| Realized gain % | | | | | | | | |
| From base population | | 14.4 | | 19.2 | | 13.1 | | 16.9 |
| From check cultivar | | 25.8 | | 26.6 | | 23.0 | | 28.8 |

**Table 3. Phenotypic ($\sigma^2_p$), genotypic ($\sigma^2_g$) variances, phenotypic (P.C.V.), and genotypic (G.C.V.) coefficient of variations and heritability % ($h^2$), for forage yields and their components in one cycle of recurrent selection and their base population and check cultivar in monocut Egyptian clover.**

| Estimates | Forage characters | | | | |
|---|---|---|---|---|---|
| | Plant height (cm) | Leaf/stem ratio (%) | Fresh forage yield (kg/m²) | Dry forage yield (kg/m²) | Protein yield (gm/m²) |
| $\sigma^2_p$ | 22.93 | 35.9 | 0.67 | 0.052 | 2400.3 |
| $\sigma^2_g$ | 19.67 | 32.1 | 0.61 | 0.044 | 2340.4 |
| P.C.V. (%) | 5.4 | 17.6 | 13.03 | 17.9 | 27.55 |
| G.C.V. (%) | 5.0 | 16.6 | 12.44 | 16.48 | 27.2 |
| $h^2$ (%) | 85.7 | 89.4 | 97.0 | 84.6 | 97.5 |

| | Seed characters | | | |
|---|---|---|---|---|
| | Number of inflorescences/ plant | Number of seeds/ inflorescence | Seed yield/m² (g) | 1000-seed weight (g) |
| $\sigma^2_p$ | 2.41 | 31.0 | 163.4 | 0.294 |
| $\sigma^2_g$ | 2.05 | 27.4 | 153.2 | 0.283 |
| P.C.V. (%) | 11.6 | 12.5 | 10.51 | 12.9 |
| G.C.V. (%) | 10.7 | 11.7 | 10.17 | 12.7 |
| $h^2$ (%) | 85.0 | 88.4 | 93.7 | 96.2 |

**Table 4. Analysis of variance of forage and seed yields and their components for the synthetic, their six parental accessions and check cultivar in monocut Egyptian clover.**

| Source of variations | d.f | Mean squares | | | | |
|---|---|---|---|---|---|---|
| | | Forage characters | | | | |
| | | Plant height (cm) | Leaf/stem ratio (%) | Fresh forage yield (kg/m$^2$) | Dry forage yield (kg/m$^2$) | Protein yield (g/m$^2$) |
| **Replications** | 2 | 1.296 | 0.73 | 0.207 | 0.157 | 122.3 |
| **Populations** | 7 | 20.85* | 11.672** | 0.340* | 0.030* | 1039.1** |
| **Error** | 14 | 7.38 | 1.122 | 0.11 | 0.009 | 131.4 |
| | | Seed characters | | | | |
| | | Number of inflorescences/ plant | Number of seeds/ inflorescence | Seed yield/m$^2$ (g) | 1000-seed weight (g) | |
| **Replications** | 2 | 0.14 | 13.82 | 40.87 | 0.173 | |
| **Populations** | 7 | 1.36* | 29.05* | 159.14** | 0.210* | |
| **Error** | 14 | 0.356 | 9.59 | 29.02 | 0.08 | |

**Table 5. Means of forage yield and their components of the synthetic, their parental accessions, and check cultivar and their percentage of the check cultivar in monocut Egyptian clover.**

| Populations | Plant height | | Leaf/stem ratio | | Fresh forage yield | | Dry forage yield | | Forage protein yield | |
|---|---|---|---|---|---|---|---|---|---|---|
| | cm | % of the check | % | % of the check | Kg/m$^2$ | % of the check | Kg/m$^2$ | % of the check | g/m$^2$ | % of the check |
| $P_3$ | 89.1 | 106.2 | 32.2 | 113.8 | 6.10 | 112.1 | 1.22 | 118.4 | 181.7 | 137.6 |
| $P_6$ | 84.0 | 100.1 | 33.9 | 115.8 | 6.33 | 116.4 | 1.30 | 126.2 | 180.8 | 137.0 |
| $P_{11}$ | 86.1 | 102.6 | 30.0 | 106.0 | 5.66 | 104.0 | 1.11 | 107.8 | 147.7 | 111.9 |
| $P_{13}$ | 83.2 | 99.2 | 29.2 | 103.2 | 5.57 | 102.4 | 1.03 | 100.0 | 135.5 | 102.7 |
| $P_{15}$ | 88.9 | 106.0 | 31.6 | 111.7 | 6.06 | 111.4 | 1.19 | 115.5 | 156.9 | 118.9 |
| $P_{19}$ | 89.2 | 106.3 | 32.9 | 116.3 | 6.23 | 114.5 | 1.27 | 123.3 | 163.0 | 123.5 |
| Synthetic population | 88.9 | 106.0 | 32.6 | 115.2 | 6.15 | 113.1 | 1.24 | 120.4 | 162.4 | 123.0 |
| Check cultivar | 83.9 | 100.0 | 28.3 | 100.0 | 5.44 | 100.0 | 1.03 | 100.0 | 132.0 | 100.0 |
| Parents mean | 86.7 | 103.3 | 31.6 | 111.7 | 5.99 | 110.1 | 1.19 | 115.5 | 157.4 | 119.2 |
| LSD 5% | 4.8 | | 1.85 | | 0.58 | | 0.17 | | 20.1 | |
| Realized gain % | | | | | | | | | | |
| From check | | 6.0 | | 15.2 | | 13.1 | | 20.4 | | 23.0 |
| From parents mean | | 2.5 | | 3.2 | | 2.7 | | 4.2 | | 3.1 |

**Table 6. Means of seed yield and their components of the synthetic, their parental accessions, and check cultivar and their percentage of the check cultivar in monocut Egyptian clover.**

| Populations | Number of inflorescences/plant | | Number of seeds/inflorescence | | Seed yield/m$^2$ | | 1000-seed weight | |
|---|---|---|---|---|---|---|---|---|
| | g | % of the check | g | % of the check | g | % of the check | g | % of the check |
| $P_3$ | 13.0 | 108.3 | 44.0 | 109.4 | 120.7 | 109.7 | 3.98 | 107.6 |
| $P_6$ | 13.2 | 110.0 | 42.7 | 106.2 | 119.7 | 108.8 | 4.09 | 110.5 |
| $P_{11}$ | 13.7 | 114.2 | 48.8 | 121.4 | 129.3 | 117.6 | 4.44 | 120.0 |
| $P_{13}$ | 13.6 | 113.3 | 48.2 | 119.9 | 131.0 | 119.1 | 4.28 | 115.7 |
| $P_{15}$ | 12.4 | 103.3 | 43.1 | 107.2 | 126.3 | 114.8 | 3.87 | 104.6 |
| $P_{19}$ | 12.2 | 101.7 | 42.1 | 104.7 | 115.7 | 105.2 | 3.74 | 101.1 |
| Synthetic | 13.6 | 113.3 | 46.9 | 116.7 | 127.3 | 115.7 | 4.23 | 114.3 |
| Check cultivar | 12.0 | 100.0 | 40.2 | 100.0 | 110.0 | 100.0 | 3.70 | 100.0 |
| Parents mean | 13.0 | 108.3 | 44.8 | 111.4 | 123.8 | 112.6 | 4.07 | 110.0 |
| LSD 5% | 1.05 | | 5.4 | | 9.4 | | 0.5 | |
| Realized gain % | | | | | | | | |
| From check | | 13.3 | | 16.7 | | 15.7 | | 14.3 |
| From parents mean | | 4.6 | | 4.7 | | 2.8 | | 3.9 |

**Table 7. Phenotypic ($\sigma^2_p$) and genotypic ($\sigma^2_g$) variances, phenotypic (P.C.V.) and genotypic (G.C.V.) coefficient variations, heritability ($h^2$), and expected response for forage and seed yields and their components in synthetic and their parental accessions and check cultivar of the monocut Egyptian clover.**

| Estimates | Forage characters | | | | |
|---|---|---|---|---|---|
| | Plant height (cm) | Leaf/stem ratio (%) | Fresh forage yield ($kg/m^2$) | Dry forage yield ($kg/m^2$) | Protein yield ($g/m^2$) |
| $\sigma^2_p$ | 6.95 | 3.89 | 0.113 | 0.01 | 346.4 |
| $\sigma^2_g$ | 4.49 | 3.52 | 0.077 | 0.007 | 302.6 |
| P.C.V. (%) | 3.10 | 6.40 | 5.74 | 8.70 | 12.36 |
| G.C.V. (%) | 2.45 | 6.09 | 4.73 | 7.28 | 11.55 |
| $h^2$ (%) | 64.6 | 90.4 | 67.9 | 70.0 | 87.3 |
| Expected response | 3.51 | 3.68 | 0.47 | 0.144 | 33.5 |
| Expected response % | 4.1 | 11.95 | 8.02 | 12.52 | 22.24 |

| | Seed characters | | | |
|---|---|---|---|---|
| | Number of inflorescences plant | Number of seeds/ inflorescence | Seed yield/$m^2$ (g) | 1000-seed weight (g) |
| $\sigma^2_p$ | 0.453 | 9.68 | 53.1 | 0.070 |
| $\sigma^2_g$ | 0.335 | 6.49 | 43.4 | 0.043 |
| P.C.V. (%) | 5.23 | 7.01 | 6.05 | 6.61 |
| G.C.V. (%) | 4.50 | 5.79 | 5.47 | 5.18 |
| $h^2$ | 73.9 | 67.1 | 81.7 | 61.9 |
| Expected response | 1.03 | 4.31 | 12.28 | 0.34 |
| Expected response % | 8.00 | 9.80 | 10.20 | 8.50 |

# تأثير الانتخاب الدوري والعشيرة التركيبية علي المحصول العلفي والبذري في البرسيم المصري وحيد الحشة

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**الملخص**

استهدف البحث دراسة تأثير الانتخاب الدوري علي المحصول العلفي والبذري ومكوناتهما في البرسيم المصري وحيد الحشة وكذلك سلوك صنف تركيبي حيث تم إجراء دورة واحدة من الانتخاب الدوري في عشيرة منتخبة. ثم قيمت هذه الدورة لصفات المحصول العلفي والبذري وقورنت مع الصنف التجاري والعشيرة الأصلية. أيضاً تم دراسة جيل واحد من الصنف التركيبي تكون من خلط ستة تراكيب وراثية منتخبة للمحصول العالي والقدرة الائتلافية العالية وقيمة الصفات المحصولية العلفية والبذرية مع مقارنتها بالآباء والصنف التجاري.

وكانت أهم النتائج المتحصل عليها:

١- كانت الزيادة المحققة عن طريق الانتخاب الدوري هي ١٨,٦ ، ١١,٧ ، ١٤,٦ ، ٢٤,١% لصفات نسبة الأوراق/ السيقان، المحصول العلفي الطازج والجاف والبروتين علي التوالي عن متوسط العشيرة الأصلية، أيضاً كانت الزيادة المحققة في هذه الطريقة ١٤,٤ ، ١٩,٢ ، ١٣,١ ، ١٦,٩% لصفات عدد النورات/للنبات وعدد البذور/للنورة ومحصول البذور ووزن ١٠٠٠ بذرة علي التوالي مقارنة بالعشيرة الأصلية.

٢- تفوق الصنف التركيبي في الجيل الأول التركيبي عن متوسط الآباء بمقدار ٣,٥ ، ٣,٠ ، ٤,٩ ، ٣,٨% لصفات نسبة الأوراق/السيقان، المحصول العلفي الطازج والجاف والبروتين علي التوالي كنسبة مئوية من الصنف التجاري، أيضاً كانت الزيادة المحققة للصنف التركيبي هي ٥,٠ ، ٥,٣ ، ٣,١، ٤,٣ لصفات عدد النورات/للنبات ، عدد البذور/للنورة، محصول البذور، وزن ١٠٠٠ بذرة علي التوالي.

لم تلاحظ ميزة جوهرية للعشيرة التركيبية بالمقارنة ببعض الآباء وذلك لأن الآباء منتخبة للمحصول العالي ولكن من ناحية أخري فإن تعدد التراكيب الوراثية الداخلة فيه ميزة في ثبات السلوك عبر الظروف البيئية المتباينة مقارنة بأي من آبائه.