

The Effect of Artificial Pollination and Different Dosages of Cycocel on Yield Components and Seed Yield in Hamedanian Alfalfa

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Abstract: In order to study effect of difference dosages of Cycocel (CCC) and artificial pollination in yield Components and Seed yield in Hamedanian alfalfa in both purposes (forage-seed) an experiment in Agricultural Research Station of Borujerd under 2011-2012 years using split plot design by Randomized Complete Block Design (RCBD) with three replications was carried out. In this experiment main treatments including Artificial pollination with Pulling rope under two stages with 70% levels pollination that this treatment in 100% pollination was repeated and 100% pollination and without artificial pollination was performed and sub treatments including difference dosages of cycocel hormones including levels (0- 1.6-3.2 -6.4) liter per hectare were performed. The results of analyses of variance were showed that artificial pollination effect in seed yield in 1% level probability and number of pods per plant, number of seed per pods and harvest index in 5% lever were significant. Also effect of hormone and interaction effect them with artificial pollination per seed yield and harvest index in 1% probability level and number of seed per pods in 5% probability lever were significant but number of pod per plant non significant. In this study the highest of seed yield in artificial pollination treatment in 100% + 70% levels and 3.2 liter per hectare were found.

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1. Introduction

Alfalfa (*Medicago Sativa L.*) is originated from Iran and it is one of the most important forage species in this country. Breeding for improving yield and quality traits are important objectives in herbage breeding programs [1]. In reference [2], forage traits have been ranked in terms of their nutritional value for dairy production. Improved digestibility was the most important criteria and high crude protein and low fiber content was ranked as moderate priority in terms of quality objectives. High leaf to stem ratio (LSR) is also desirable because leaves are more palatable and retain higher digestibility much time than stems. There are positive correlations between LSR ratio and digestibility in alfalfa [3]. Alfalfa (*medicago sativa l.*) is originated from Iran and it is one of the most important forage species with cultivated area 600.000 ha with average annual 7200 kg ha⁻¹ dm yield. Improved quality traits are an important goal in alfalfa breeding programs. Data from animal nutrition studies show the need to focus more attention on nutritive value to improve new varieties; improved DMD, WSC and CP couple with low fiber content had higher priority in terms of forage quality for live weight gain and dairy production [2]. Genetic correlation between digestibility and fibre content is negative and correlation with crude protein is positively high and

significant [3-5]. Increasing of planted area of this valuable plant required to provide sufficient seed. Alfalfa is an autotetraploid and cross pollinated plant and forage legume plants. Area of alfalfa planted in Iran over 616000 hectares [6]. Chloromacovate Chloride (CCC) one of derived chlorine that produced from reaction between trimethyl amine and halide aliphatic as 1, 2 dichloromate is produced. Chloromacovate Chloride or Cycocel is an Onov component group and is very consumption growth reduction of plant especially in European and today used for reduced lodging and vegetative growth control in crops that very frequent applied [7]. Chloromacovate Chloride with stopped in path of biosynthesis of gibberic acid as a barrier for activity of enzyme anti-carvone synthetase and reduction of plant height [8]. The increase of seed yield in plants treatment with CCC due to was increase root growth, stomata resistance and water potential in leaf [7]. According to results some of researchers, CCC was induced reduction stem height and increased numbers of seed in spike [8]. An experiment was carried out in onion indicated that in pollination with honey bees, pollinated more 25-75% than artificial pollination and 44.38 more than was checked. The aim of present research is determined of the better content of Cycocel dosage and the best of artificial level in order to

increasing grain yield and study reaction yield components and yield in Hamedanian alfalfa in bi purposed fields (forage and seed) .

2. Materials and Methods

The investigation was carried out in Research Field of Hamedanian Seed Production was placed on Borojerd Agriculture Research Station that this station had cooled and humid winter and summers relatively template and dry and variety for planted was Hamedanian. An experiment was carried out in the base on split plot design with three replications. Every treatment in a plot with dimension six meter length and two meter width was performed. Main treatment including artificial pollination with rope in two stages with 70% pollination levels that them in 100% pollination and without artificial pollination and liquid spread in 25 cm plant height using atomizer with 1 atmosphere was performed sub treatment including different dosages of Cycosel hormone (0, 1.6, 3.2, 6.4) liter per hectare that CCC treatment in form of liquid spry was performed. The traits studied in this study including: numbers of pods per plant, numbers of seed per pod, seed yield, harvest index. After normality test for data (Kolmogorov Smirnov method) analyses of variance was performed with Minitab 16, SAS 9, SPSS18 software's, also means compared used Tukey method.

3. Discussion

3.1. Numbers pod in plant: The result of analysis of variance was showed about this trait artificial pollination was significant in 5% level but CCC treatment and interaction between hormone and artificial pollination was not significant (table 1). Also mean comparison to Tukey method was indicated that the highest content related to check (table 2) and for CCC had not significant difference between treatments (table 3) and about interaction in 5% probability level the highest related to check and the lowest related to 70%+ 100% pollination level and 1.6 liter per hectare CCC. The results were showed that plants treatment by artificial pollination and CCC hormone had low numbers pod per plant related to check and it was not affected on numbers pod per plant trait.

3.2. Numbers seed in pod: The results of analysis of variance was indicated there were significant difference between artificial pollination and hormone in 5% probability level and interaction between two factors was significant in 1% probability level (table 1). Means comparison was showed that the highest and lowest related to check and pollination level, respectively (table 2). Also the highest and lowest contents for hormone levels related to 3.2 lit.ha⁻¹ and 1.6 lit.ha⁻¹ levels, respectively (table 3) and interaction the highest and lowest contents related to 100%

artificial pollination and hormone check level and 70% + 100% artificial pollination and 6.4 lit.ha⁻¹ hormone level, respectively (table 4). The results were indicated that plant was treatment artificial pollination had lower seed per pod in compared with check and hormone increased caused increased seed numbers per pod especially in 3.2 lit.ha⁻¹ level that may be related to increased potential sink power means seeds had before flowering [9].

Table 1: Analysis of variance for evaluated traits
(Mean of squares for evaluated traits)

Source of variation (S.O.V)	(df)	Numbers of pod in plant	Numbers of seed in pod	Grain yield	Harvest index
Block	2	0.06	2745.85	1.53	0.05
Artificial pollination	2	4.28*	667.86*	45.15**	0.169*
Error(a)	4	0.49	103.72	0.81	0.02
Hormone	3	1.76	278.43*	8.52**	0.22**
Hormone × Artificial pollination	6	1.49	4086.92**	28.09**	0.25**
Error(b)	18	0.69	73.24	0.272	0.008
CV%	-	12.84	4.49	3.88	14.58

ns, *, ** Non-significant, Significant at probability level 5% and 1% , respectively.

Table 2: Comparison of means for artificial pollination (at 5% level)

Artificial pollination	Numbers of pod in plant (no. m ²)	Numbers of seed in pod (no. m ²)	Grain yield (g/m ²)	Harvest index (%)
Check	7.19a	198.33a	11.84b	0.76a
Artificial pollination treatment 2	6.15b	183.52b	12.87b	0.56b
Artificial pollination treatment 3	6.16b	189.37b	15.59a	0.55b

3.3. Grain yield: The results of analysis of variance were showed that effects artificial pollination, hormone and interaction between them in 1% probability level were significant (table 1). Mean comparison to Tukey method for pollination levels for grain yield was showed that the highest and lowest contents related to 100% artificial pollination level and check, respectively, (table 2) and about hormone levels also 3.2 lit.ha⁻¹ and check level, respectively (table 3) and mean comparison for interaction in 5% probability level and 70% + 100% pollination and 3.2

lit.ha⁻¹ hormone and check pollination and 3.2 lit.ha⁻¹ hormone (table4). The results were showed increased artificial pollination cause to increase grain yield so that the highest yield had 70% + 100% artificial level also with increasing hormone rate grain yield increased that it could be cause increase seed numbers per pod related to increasing physiological method induction that before pollination stage was determined [9-10].

Table 3: Comparison of means for hormone treatment (at 5% level)

Hormone treatment	Numbers of pod per plant (no.m ²)	The numbers of seed per pod (no.m ²)	Grain yield (g/m ²)	Harvest index (%)
Check	7.02a	193.86a	12.74b	0.71a
Hormone treatment 2	5.94a	182.38b	12.99b	0.42c
Hormone treatment 3	6.51a	194.44a	14.78a	0.741b
Hormone treatment 4	6.53a	190.94a	13.13b	0.78a

3.4. Harvest Index: The results of analysis of variance for this trait was showed artificial pollination in 5% probability level and hormone and interaction between them in 1% probability level were significant (table 1). Comparison means were showed that the highest and lowest for artificial pollination levels related to check and artificial pollination levels (table 2). Also for hormone the highest and lowest content related to 6.4 lit.ha⁻¹ and 1.6 lit.ha⁻¹ levels, respectively (table 3). Comparison interaction effect mean two factors with using Tukey test in 5% probability level was showed that the highest and lowest related to check add 6.4 lit.ha⁻¹ hormone and 100% +70% pollination add 3.2 lit.ha⁻¹, respectively (table 4). The results were showed increasing harvest index effect hormone using that cause metabolism activities improvement, enzyme, protein and osmotic adjustment seedling [11]. Alfalfa cause decrease seed production in hectare one of extension barriers area plant them efficiency and expensive desirable seed, so plant density in area unit proportion with forage production (high density) consider that cause increase vegetative growth that reduce light penetrance into canopy and latent reproduction phase in result, reduce seed production with harvest index. Therefore, for solve this problem if we can growth in field alfalfa forage production with preventer material is reduced also by used artificial pollination can be increased seed yield and increase harvest index.

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Table 4: Comparison of means for interaction between two factors (at 5% level)

Comparison of means for two treatments	Numbers of pod in plant (no.m ²)	Numbers of seed in pod (no.m ²)	Grain yield (g/m ²)	Harvest index (%)
Check	8.61a	167.50cde	11.26de	0.79b
P1c2	6.27ab	192.50bc	12.45d	0.37d
P1c3	7.15ab	200b	9.34f	0.53bcd
P1c4	6.73ab	233.33a	14.32c	1.36a
P2c1	6.77ac	178.75bcd	12.10d	0.62bcd
P2c2	5.20b	176.66b-e	10.27e	0.43cd
P2c3	6.14b	226.667a	18.81a	0.81b
P2c4	6.51ab	152e	10.29ef	0.38d
P3c1	5.70b	235.33a	14.85bc	0.71bc
P3c2	6.35ab	178b-e	16.28b	0.46cd
P3c3	6.24ab	156.66d-e	16.48b	0.41d
P3c4	6.34ab	187.5bc	14.479bc	0.62bcd

P: Artificial pollination C: Hormone CCC

References

- Arbab, A., 2001. Research plan report according to initial examination of pests of Alfalfa and seed in Ghazvin, Research of pests and plant diseases. 35(not published).
- Smith, K. F., Reed, K. F. M. and Foot, J. Z. 1997. An assessment of relative importance of specific traits for the genetic improvement of nutritive value in dairy pasture. Grass and Forage Science 52: 167-175.
- Julier, B., Ecalle, c. and Huyghe, c. 1999. Potential for including the digestibility in breeding of alfalfa. In: lucerne and medics for the xxi century. Proceeding of the xlii EUCARPIA *medicago* spp. Group meeting, Perugia, Italy, 13-16 september 1999, pages 125-133.
- Julier, B., Huyghe, C. And Ecalle, C. (2000). Within and among-cultivar genetic variation in alfalfa. Crop science, 40:365-369.
- Reday, H. and E. C. Brummer. 2004. Relationships among biomass yield component within and between subspecies of alfalfa. *Medicago* genetic reports 4:1-7.
- Bolanos, E. D., Huyghe, C., julier, B., and Ecalle, C., 2000. Genetic variation for seed yield and its components in alfalfa (*Medicago sativa* L.) Populations. Agronomie. 20: 335-345.
- Emam, Y. and G.R.Moaid, 2000. Effect of planting density and chlormequat chloride on morphological characteristics of winter barley (*Hordeum vulgare* L.) cultivar "valfajr". J. sci. technol. 2:75-83.
- Rajala, A., 2003. Plant growth regulators to manipulate cereal growth in northern growing conditions. University of Helsinki. Finland.
- Emam, Y., Tafazoly, A. Karimie mazaee shah, H., 1996. Examining the influence of 2-chloroethyl triethyl ammonium chloride on growth and development of Ghods wheat, Magazine of Iran Agricultural science. 27:23-30.
- Sharif, s. Safary, m.Emam, y., 2006. Impact of drought tension and Cycocel on function and component of valfajr barley function. Magazine of Agricultural science and techniques and natural resources. 10: 281-291.
- Hashemzadeh, F., 2009. Impact of drought tension and Cycocel on function of maize marks (items) in second cultivation. New knowledge of Agriculture. 14:67-79.