The Influence of Different Cycocel Dosages and Artificial Pollination on Vegetative Traits of Hamedani Alfalfa

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Abstract: In order to study of the effect of Cycocel (CCC) dosages and pollination methods on alfalfa seed production an experiment was conducted using split plot design based on randomized complete block with three replications in Borujerd agricultural research station, Iran for two years (2011-12). In split plot design three artificial pollination systems (control, pulling rope over flowers in 70% and 100% pollination stages) were used as main plots and the four hormone dosages (0, 1.6, 3.2 and 6.4 liter per hectare) as sub plots. The results of variance analysis indicated that the influence of artificial pollination and mutual influence of the hormone in artificial pollination on traits such as, bush highness, stem diameter, and internodes distance have been significant. The effect of Cycocel hormone other traits: bush highness, stem diameter, and internodes distance at 5% level has become significant.
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Key words: alfalfa seed, artificial pollination, Cycocel.

1. Introduction

Alfalfa (Medicago sativa l.) is one of the most important forage plants playing a crucial role in providing the required forage of the country. As the cultivation of this product is increased, providing sufficient seed is required [1]. Alfalfa is considered as grass legume.

More than 616000 ha area has been cultivated by alfalfa in Iran [2]. Since alfalfa is a cross plant and its pollination is done by the help of wind, bees, pollinator insects and other external elements, the improvement of artificial pollination increases the number of bunches in each bush. In case, this plant cannot pollinate under some different circumstances, the seed production is decreased in the plant [3]. Through studying the onion plants, it has been determined that the pollination done by bees was 25.758 and 44.385% more than artificial pollination (using brush) and control one [4]. Cycocel (ccc) is an onion compound and regarded as most consumed moderator of plant growth especially in Europe and nowadays, is frequently applied to decrease the dormancy and control the germination growth of cultivating plants [5] . Ccc prevents the activities of synthesized anti-covering enzyme and decreases the plant height [6]. Seed performance of plants treated with ccc leads to the increases in root growth and water potential in the leaves [5]. Based on some research results, Cycocel reduces the stem length and enhances the number of seeds in the ears [6].

This paper aims to determine the best concentration of ccc and highest level of artificial pollination in order to enhance the yield of seeds and examine the alfalfa's components and behaviors' reactions in two-purpose (seed and forage) fields.

2. Materials and Methods

The investigation was carried out in Research Field of Hamedanian Seed Production was placed on Borujerd 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. Height of bush:

Results obtained by analysis of variance indicate that considering the height of bush, no significant variation exists between the levels of artificial pollination.

Hormone treatment has been significant at 5% level but the effects of artificial pollination on hormone are not significant (Table1). Comparing the means demonstrated that the lowest and highest heights were related to the 100% flowering stage and control treatment for the levels of artificial pollination, respectively. Through comparing the hormone level, the lowest height of bushes has been specified for 6.4 liter/ha concentration.

While comparing the means of these two variables' effects using Tukey test at 5% level, the lowest and highest bush heights have been found for 100% flowering stage and 6.4 (liter/ha) hormone level and control treatments of artificial pollination and hormone, respectively (graph1).

Results indicate that the lowest and highest heights have been related to flowing and hormone stages and control treatments of artificial pollination and hormone. Cycocel prevents the lengthwise growth of cells in nodes which is stimulated by Gibberellin hormone, stops the synthesis of ant-enzyme at early stages of Gibberellin biosynthesis and reduces the Apical dominance. Due to preventing the synthesis of Geranyl Pyrophosphate in the cycle of Gibberellin acid biosynthesis, the height of bush is reduced because the longitudinal growths of stem and nodes decrease. However, with regard to these conditions, Cycocel's effects do not always reduce the plant height and are varied in different plants because of various concentrations.

For example, the lack of effects on the length of wheat stem and oat has been reported in reference number [7].

3.2. Stem diameter: Results obtained by analysis of variance indicate that considering the Stem diameter, no significant variation exists between the levels of artificial pollination.

Hormone treatment has been significant at 5% level but the effects of artificial pollination on hormone are not significant (Table1). Comparing the means demonstrated that the lowest and highest heights were related to the 100% flowering stage and control treatment for the levels of artificial pollination, respectively. Through comparing the hormone level, the lowest Stem diameters has been specified for 6.4 liter/ha concentration.

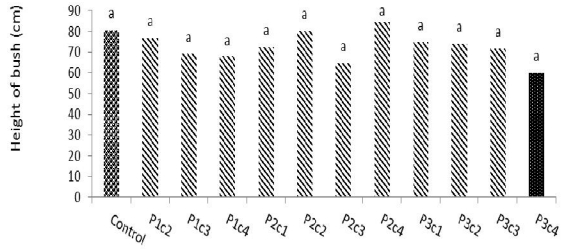
While comparing the means of these two variables' effects using Tukey test at 5% level, the lowest and highest bush heights have been found for 100% flowering stage and 6.4 (liter/ha) hormone level and control treatments of artificial pollination and hormone, respectively (graph1).

it can be deduced that the reason of increasing in stem diameter as a result of using Cycocel is because of using Cycocel which leads to dominate on terminal preponderating, decrease the stem highness, and increase the stem diameter so that as a result of highness decreasing the competition for light absorption is decreased. Consequently, it causes designing change in plant shading so that more light penetrates into shading part and so it increases the amount of Photosynthesis and gathering of carbohydrate and lignin in the stem of the plant which causes the increase of the plant stem diameter.

The results of this examination have been similar to those reported in [8, 9].

Table 1: Analysis of variance for studied traits

Variation coefficients	Degree of freedom (df)	Height of bush (cm)	Stem diameter(mm)	Internodes distance(cm)
Block	2	1013.26	0.015	0.03
Artificial pollination	2	279.95	0.070	1.83
Error of a	4	335.25	0.45	1.61
Hormone	3	543.11	0.03	3.78
Artificial pollination*hormone	6	649.07	0.74	0.28
Error of b	18	4504.98	0.25	3.02
Cv%	-	12.02	16.83	14.87



Graph 1: Effects of artificial hormone pollination on the bush height

3.3. Internodes distance: Results obtained by analysis of variance indicate that considering the Internodes distance, no significant variation exists between the levels of artificial pollination.

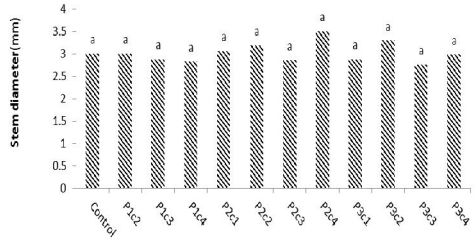
Hormone treatment has been significant at 5% level but the effects of artificial pollination on hormone are not significant (Table1). Comparing the means demonstrated that the lowest and highest heights were related to the 100% flowering stage and

control treatment for the levels of artificial pollination, respectively. Through comparing the hormone level, the lowest Internodes distancees has been specified for 6.4 liter/ha concentration.

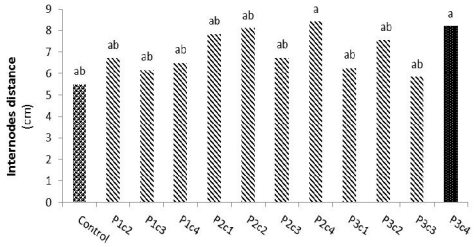
While comparing the means of these two variables' effects using Tukey test at 5% level, the lowest and highest bush heights have been found for 100% flowering stage and 6.4 (liter/ha) hormone level and control treatments of artificial pollination and hormone, respectively (graph1).

According to the above results, it can be deduced that the internodes distances decrease by increasing the hormone concentration which was the result of Cycocel influence on preventing cells lengthwise growth in internodes. Because the hormone is responsible for gibberellins growth and Cycocel prevents the synthesis of antchauron enzyme at the primary step of gibberellins biosynthesis and decreases the terminal preponderating as well. Also, as a result of using Cycocel, because of preventing seranil pyrophosphate synthesis at the gibberlic acid cycle which leads to the decrease of the lengthwise growth of the stem and that of the internodes, the highness of bushes decreases. On the other hand, using Cycocel growth decelerator causes the decrease of stem highness, the increase of stem diameter, and the decrease of internodes length; so light penetration into the plant shading increases and Photosynthesis increases, consequently.

The results of this examination have been similar to those reported in [10-12].



Graph2: Effects of artificial hormone pollination on the Stem diameter



Graph3: Effects of artificial hormone pollination on the Internodes distance

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