

The Effect of Various Sowing Rate and Row Distance on Yield and Yield Components of Chickling Vetch (*Lathyrus sativus* L.) in Thrace Region, Turkey

Murat Altin, Adnan Orak and Taylan Aksoy

Abstract

This research was concluded under dryland condition in Thrace region in 1994-1995 growing season. This experiment was arranged in randomised block design with three replications. Yield and some important yield components (plant height, number of pods per plant, number of seeds per pod and 1000 seed weight) were determined.

According to the results, it can be concluded that the best sowing rate and row distance of chickling vetch for the region are 100 seed/m² and 20 cm, respectively.

(Key words : Sowing rate, Row distance, Yield, Chickling vetch)

I. Introduction

Thrace Region takes place in western part of Turkey. Agricultural knowledge of farmers and soil fertility in this area are very suitable for the maximum agricultural production. Most of the farmers prefer wheat-sunflower crop rotation systems. This monoculture production system results in gradual reductions in yield of wheat and sunflower, overdependence on economic returns from a single crop, and reduced opportunity for weed and pest control. In the Region second agricultural practice is animal production. Although 92% of culture and hybrid cow populations depends on forage crop production in the region, forage crop production area is only 1.41% of cultivated area. However in developed countries, changes between 25-61%. In addition to this insufficient forage crop production pasture and meadow area were not enough in Thrace Region. So the problem is obvious. This problem can be solved by increasing the forage crop

production area by growing native forage crops of the region. One of them is chickling vetch which is an important forage legume. It is also grown in European countries and is an annual summer crop. In the past many research were conducted on chickling vetch. According to these research, it was pointed out that plant height varies from 30 to 120cm (Gençkan, 1983; Sağlamtimur et al., 1986; Klysha, 1990; Falco, 1993). Its branches are very close to soil surface and has several pods and different number of seeds. Number of pods per plant decreased with increasing the sowing rate in *Phaseolus* (Aquilar et al., 1977). Some researchers found that each pod consists of 2-5 seeds (Erkun et al., 1960; Gençkan, 1983). Another important character is 1000 seed weight, changed with seed color. 150-180g in color seed and 230-400g in white color (Gençkan, 1983), similarly Klysha (1990) also reported that 1,000 seed weight varied between 174-274 g.

The main purpose of growing chickling vetch is

to obtain forage. This character changes between 1,750~2,260 kg/ha (Sağlamtimur et al., 1986; Klysha, 1990). Soya (1987) reported that plant height, fodder and seed yield were positively affected by increasing sowing rate of common vetch. Mean seed yield varies between 50~269 kg/ha (Sağlamtimur et al., 1986; Klysha, 1990; Açıkgöz, 1991).

II. Materials and Methods

Two field experiments were carried out under farmer conditions in Malkara (Town), Thrace Region, Turkey. Analysis of soil samples taken from the experimental field showed that organic matter content (0.45~1.99%) was low. The climatic condition during the growing season is given Table 1. Seeds of chickling vetch were obtained from Central Field Crops Research Institute (Ankara, Turkey). Two different row distance (20 and 40 cm) and three different sowing rates (100, 150 and 200 seeds/m²) were used. The experimental design was a randomised complete block with three replications. Sowing dates were 17th April in 1994 and 6th April in 1995.

Seeds were sown manually in 3m long plots and each plot consisted of 6 rows. The central 2m section of the two inner rows was cut at ground level at the stage of flowering for fodder yield. Other two rows were harvested for seed yield when pods on the lower parts seed became yellow in colour.

The results were analysed by using MSTAT statistical computer package program.

III. RESULTS AND DISCUSSION

1. Plant height

There were significant differences between sowing rate of chickling vetch in terms of plant height. Maximum plant height (60.54 cm) was obtained from 100 seeds/m² of sowing rate. Our results were similar to previous findings (Gençkan, 1983; Sağlamtimur et al., 1986; Klysha, 1990; Falco, 1993).

As can be seen in Table 2, plant height varied depending on sowing rate and decreased with increasing sowing rate.

2. Number of pods per plant

Number of pods per plant was significantly affected by the sowing rate. The highest number of pods per plant (22.67) was obtained from 100 seed/m² of sowing rate (Table 3).

In addition, effect of row distance on number of pods per plant was found to be significant. The highest number of pods per plant (20.07) was obtained from 20 cm, whereas the lowest value (17.33) was determined from 40 cm row distance. Our results are similar the other researchers findings (Aguilar et al., 1977).

Table 1. The climatic data of the experimental site (Malkara) for 1994~1995 and long years' mean

Month	Temperature (°C)			Rainfall (mm)			Moisture (%)		
	1994	1995	Long years' mean	1994	1995	Long years' mean	1994	1995	Long years' mean
April	13.9	13.1	12.8	29.2	41.0	32.7	71.7	69.0	75.4
May	18.6	17.4	17.9	33.2	45.8	40.8	65.2	80.7	70.2
June	20.7	20.5	19.4	50.4	46.8	44.2	67.0	74.5	72.2
July	24.3	23.0	24.7	5.6	17.6	9.8	70.3	63.0	68.5

Table 2. Mean values for the plant height(cm) of chickling vetch

Years	Row distance(cm)	Sowing rate (Number/m ²)			Mean
		100	150	200	
1994	20	63.47	58.44	54.92	58.94
	40	58.78	55.89	51.67	55.45
	Mean	61.13	57.17	53.29	57.19
1995	20	61.66	56.43	58.27	58.79
	40	58.25	53.77	55.97	56.00
	Mean	59.96	55.10	57.12	57.39
Mean	20	62.56	57.44	56.59	58.87
	40	58.52	54.83	53.82	55.72
	Mean	60.54a ¹⁾	56.13b	55.21b	57.30

LSD% 5²⁾ Sowing rate : 3.717¹⁾ Means with the same letter are not significantly different at 0.05 significance level.²⁾ Non significant parameters are not shown.

Table 3. Mean values for the number of pod per plant to chickling vetch

Years	Row distance(cm)	Sowing rate (Number/m ²)			Mean
		100	150	200	
1994	20	26.36	15.64	17.52	19.84
	40	19.21	14.64	13.93	15.93
	Mean	22.79	15.14	15.73	17.88
1995	20	24.67	17.82	18.41	20.30
	40	20.43	18.01	17.76	18.73
	Mean	22.55	17.92	18.09	19.52
Mean	20	25.52	16.73	17.97	20.07a
	40	19.82	16.33	15.85	17.33b
	Mean	22.67a ¹⁾	16.53b	16.91b	18.70

LSD% 5²⁾ Sowing rate : 3.331

Row distance : 2.720

¹⁾ Means with the same letter are not significantly different at 0.05 significance level.²⁾ Non significant parameters are not shown.

3. Number of seeds per pod

There was a significant effect of sowing rate on number of seeds per pod. The sowing rate of 200 seeds/m² resulted in the heights number of seeds per pod (2.74) (Table 4). The result of this experiment was similar with those of other experiments conducted by some researchers (Erkun et al., 1960; Gençkan, 1983).

4. 1,000-seed weight

As seen in Table 5, there is no difference between mean values as the effects of sowing rate and row distance on 1,000 seed weight.

Our findings were in line with the other researchers' results (Gençkan, 1983; Klysha, 1990).

5. Fresh fodder yield

Mean values for fresh yield of chickling vetch are given Table 6. The highest yield (1,981.33 kg/ha) was obtained from 100 seeds /m² of sowing rate.

Table 4. Mean values for the number of seeds per pod of chickling vetch

Years	Row distance(cm)	Sowing rate (Number/m ²)			Mean
		100	150	200	
1994	20	1.98	2.64	2.67	2.43
	40	2.12	2.39	2.73	2.41
	Mean	2.05	2.52	2.70	2.42
1995	20	2.40	2.64	2.74	2.59
	40	2.34	2.56	2.80	2.57
	Mean	2.37	2.60	2.77	2.58
Mean	20	2.19	2.64	2.70	2.51
	40	2.23	2.47	2.77	2.49
	Mean	2.21c ¹⁾	2.56b	2.74a	

LSD% 5²⁾ Sowing rate : 0.1442

¹⁾ Means with the same letter are not significantly different at 0.05 significance level.

²⁾ Non significant parameters are not shown.

Table 5. Mean values for the 1,000 seed weight(g) of chickling vetch

Years	Row distance(cm)	Sowing rate (Number/m ²)			Mean
		100	150	200	
1995	20	324.00	331.67	317.00	324.22
	40	328.67	316.67	333.67	326.33
	Mean	326.33	324.17	325.33	325.28

LSD% 5¹⁾

¹⁾ Non significant parameters are not shown.

Table 6. Mean values for the fresh fodder yield (kg/ha) of chickling vetch

Years	Row distance(cm)	Sowing rate (Number/m ²)			Mean
		100	150	200	
1994	20	2081.87	1817.20	2013.25	1970.77
	40	1907.80	1694.80	1666.42	1756.34
	Mean	1994.83	1756.00	1839.84	1868.00
1995	20	2028.64	1712.57	1806.80	1863.56
	40	1907.02	1528.46	1491.69	1642.39
	Mean	1967.83a	1620.51	1649.24	1745.86
Mean	20	2055.26	1764.88	1910.03	1910.05a
	40	1907.41	1611.63	1579.06	1699.37b
	Mean	1981.33a ¹⁾	1688.26b	1744.54ab	

LSD% 5²⁾ Sowing rate : 255.850

Row distance : 208.898

¹⁾ Means with the same letter are not significantly different at 0.05 significance level.

²⁾ Non significant parameters are not shown.

Mean fresh fodder yield was found to be very close to other research results (Sağlamtimur et al, 1986; Klysha, 1990). Meanwhile some differences were determined when compared with other results (Soya, 1987). These differences could be attributed to regional conditions (Soil and climate).

6. Dry fodder yield

Means for dry fodder yield are given in Table 7, maximum yield (511.36 kg/ha) and minimum yield (459.01 kg/ha) were obtained from 100 and 150 seed/m² sowing rate, respectively.

Effect of row distance on dry fodder was also significant. The highest fodder yield (504.89 kg/ha) was obtained from 20 cm of row distance.

The yield in first year was higher than that of

Table 7. Mean values for dry fodder yield (kg/ha) of chickling vetch

Years	Row distance(cm)	Sowing rate (Number/m ²)			Mean
		100	150	200	
1994	20	518.31	482.45	563.33	521.36
	40	493.80	481.22	499.67	491.56
	Mean	506.17	479.95	531.50	506.46a
1995	20	542.56	434.69	488.00	488.42
	40	490.78	437.67	392.00	440.15
	Mean	516.78	486.18	448.33	464.28b
Mean	20	530.44	458.57	525.68	504.89a
	40	492.51	459.45	445.83	465.86b
	Mean	511.36a ¹⁾	459.01c	485.75b	
LSD% 5 ²⁾	Year : 9.077 Row distance : 9.077	Sowing rate : 11.117			

¹⁾ Means with the same letter are not significantly different at 0.05 significance level.

²⁾ Non significant parameters are not shown.

Table 8. Mean values for the seed yield (kg/ha) of chickling vetch

Years	Row distance(cm)	Sowing rate (Number/m ²)			Mean
		100	150	200	
1994	20	343.00	385.17	367.67	365.28
	40	336.30	317.33	322.67	325.43
	Mean	339.65	351.25	345.17	345.57
1995	20	350.98	376.00	347.00	357.99
	40	300.36	319.00	309.33	309.56
	Mean	325.67	347.50	328.17	333.78
Mean	20	346.99	380.58	357.33	361.64a
	40	318.33	318.17	316.00	317.50b
	Mean	332.66b ¹⁾	349.38a	336.67ab	
LSD% 5 ²⁾	Sowing rate : 14.703		Row distance : 12.005		

¹⁾ Means with the same letter are not significantly different at 0.05 significance level.

²⁾ Non significant parameters are not shown.

second year. Climatic condition may have an important role on this difference.

7. Seed yield

There were significant differences between seeding rates with respect to seed yield. Moreover row distance had a significant effect on seed yield. In this experiment the seed yield was found to be higher than previous experiments conducted by several researchers (Sağlamtimur et al., 1986; Klysha, 1990; Açıkgöz, 1991). Climatic and soil conditions may affected on this difference.

According to our results, it can be concluded that the best sowing rate and row distance of chickling vetch for the region are 100 seed/m² and 20 cm, respectively.

IV. References

1. Anonymous, 1982. MSTAT Version 3.00/EM. Paket Program, Michigan State University. Dept. of Crop and Soil Sciences, USA.
2. Anonymous, 1995. T.C. Başbakanlık Devlet Meteoroloji İşleri Genel Müdürlüğü, Tekirdağ Meteoroloji İstasyonu, Gözlem Raporları, 1994-1995.
3. Anonymous, 1995. Tarım Orman ve Köyişleri Bakanlığı, Köy Hizmetleri Genel Müdürlüğü, Atatürk Köy Hizmetleri Araştırma Enstitüsü Müdürlüğü, Toprak Analiz Sonuçları.
4. Aquilar, M.I., K.A., Fischer, and S.J. Kohashi. 1977. Effect of plant density and thinning on high yielding dry beans (*Phaseolus vulgaris*) in Mexico, Experimental Agriculture 13(4):325-335.
5. Erkun, V., Ö. Bakır and N. Alınoğlu. 1960. Çayır mera ve nebatları ziraat vekaleti mesleki kitapları Serisi D-12.
6. Açıkgöz, E., 1991. Yembitkileri. U.Ü. Ziraat Fak. yayınları. No. 7-025-0210.
7. Falco, B., 1993. Morphological and productive features of ecotypes of chickling vetch (*L. sativus* L.) Instituto Di Agronomia, Università Della Basilicata Potenza, Italy.
8. Gençkan, S., 1983, Yembitkileri tanımları, Ege Üniv. Ziraat Fakültesi Yayınları No:467.
9. Klysha, 1990. Lathyrus sativus cv. Krasnodarskaya 5 Selektisiya-i Semenovostvo.
10. Soya, H. 1987. Ege bölgesi kıyı kesimi yerel adı fiğ (*Vicia sativa* L.) çeşitlerinde sıra arası mesafesi ve tohumluk miktarının verim verim karakterlerine etkisi, E.Ü.Z.F. Dergisi No: (21)3.
11. Sağlamtimur, T., H. Gülcan, T. Tükel, V. Tansı, R. Hatipoğlu, and E. Anlısal. 1986. Çukurova Koşullarında Yembitkileri Adaptasyon Denemeleri. İkinci Baklagil Yembitkileri Ç.Ü. Ziraat Fakültesi Dergisi, Cilt 1, Sayı: 3 Adana.