

Determining Agronomic Properties of Some Pea Genotypes

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Abstract: This study was carried out in 2002-2003 and 2003-2004 winter vegetation periods. 12 unit pea genotypes were used in order to determine of their agronomic characters in this study. Pea genotypes which used in the study are variety candidates. Pea genotypes were obtained as cross breed from wild pea and white flowery pea which selected from pea population. Cross bred peas are composed as line by the way separate selections. Individuals which coded with B are parents. Genotypes were selected due to the resistance to winter. These genotypes are 1(101917), 2(121918), 3(10431), 4(B 6), 5(110121), 6(1101545), 7(1084222), 8(1131522), 9(B 8), 10(1131556), 11(1103220) and 12(110121-1). The study was carried out at randomized complete blocks design as three replication. The highest plant height was obtained from numbered 4 genotype (97.2 cm), the highest yield was obtained from numbered 12 genotype (2332.5 kg ha⁻¹).

Key words: Pea, genotypes, agronomic characters.

INTRODUCTION

The leguminous seeds are very important in plant production, in feed, in plant rotation systems and in economics. These leguminous contain protein 18-36 % and digestion rate of their protein contents are about 78 %. This value fairly high level. On the other hand dry grains of these leguminous are affluent as vitamins (A, B, C, D) and minerals (Fe, P, Ca). Their proteins are nearby to animal proteins as essential aminoacids^[1]

Pea is a plant of temperate climate. The most pea sowing area is in Asia and pea production and yield is in Europa. Its sowing area is second after bean in the world. Pea total sowing area is 1100 ha and pea production is 2500 ton in Turkey. Average pea yield is 2272 kg.ha⁻¹ in Turkey^[2]

Pea consumption is widespread in the world, but isn't in Turkey. Frozen food and canned food industry have developed on the recent years in Turkey. Thus pea production has increased. There are a few species in pea genus. These species resemble to each other as morphological properties. Pea which cultivated is called *Pisum sativum*. *Pisum sativum* ssp *arvense* is called feed pea which used to herb production.

Pea is cultivated for a lot of purpose. Pea pods are gathered with hands or special machine. Pea grains are eaten as fresh or processed as canfood. Sugar rate of pea grains is high. Dry pea grains are broken and used to make soup. On the other hand, the pea grains used to in animal feed as mixture. Some pea varieties are used to

purpose of green forage production and dry forage and green manure production. These varieties are called 'feed peas'. Nutrition value of dry pea grains (%) more higher than green pea grains. Pea is cool climate plant and its potential is high in Turkey. If adequate pea varieties are revised pea export will be possible^[3]. Variety development studies are important in these conditions. The study was carried out with this purpose. These pea lines which are resistant to winter are selected by Selçuk University. Some pea genotypes were good adapted to Van ecological conditions. Pea plants are used to limitation of fallowing lands. Pea can be located in plant rotations in Van ecological conditions.

MATERIALS AND METHODS

The study was carried out at randomized complete blocks design as three replication. There are 48 parcel in the experiment. Each parcel are consist of 6 row. Parcel area is 5x1.5m=7.5 m². One each rows discarded in two side of each parcel. The plants of 0.5 m in the beginning and the end of the parcel discarded^[4]150 kg.ha⁻¹ di ammonium phosphate treated on the each parcel. Sowing norm adjusted as 50 plant per m²^[5]. The plants are brought in the nonirrigated conditions. All observations and measurements treated on the ten plants which received from each parcel. Plant height, first pod height, pod number, grain number, yield, biological yield, 1000 seed weight determined on the each ten plants.

Twice a season hoe treated to control of weeds and

Table 1: Some properties of the soils of the experiment lands.

Years	Depth (cm)	Sand (%)	Silt (%)	Clay (%)	Texture class	pH	Lime (ppm)	Phosphorus (me/100 g)	Potassium (me/100 g)	Organic Matter	Total Salty
02-03	0-30	82.3	6.1	11.6	Sandy loam	8.45	12.71	9.31	3.04	0.51	0.22
	30-60	77.1	9.2	13.7	Sandy loam	8.65	19.06	5.96	1.25	0.18	0.15
03-04	0-30	56.53	19.76	24.1	Sandy clay loam	8.42	14.27	4.92	0.65	0.57	0.41
	30-60	58.4	17.5	24.1	Sandy clay loam	8.54	15.41	2.72	0.48	0.41	0.18

*Soil analysis were done at the Agricultural Faculty laboratories

Table 2: Climatic data of Van in 2002-2003 and 2003-2004 and Long term. (Anonymous 2004 b)^[6].

Months	Precipitation (mm)			Average Temperature (C°)			Relative Humidity (%)		
	02-03	03-04	Long Term	02-03	03-04	Long Term	02-03	03-04	Long Term
September	6.4	16.4	13.0	18.1	17.0	17.2	48.6	64.5	44.0
October	58.8	23.6	45.2	12.8	13.0	10.6	63.4	71.0	58.0
November	49.8	59.6	47.9	5.3	4.5	4.4	65.2	74.3	66.0
December	72.9	14.9	37.3	-2.6	0.2	-0.8	69.7	76.7	69.0
January	26.1	25.0	35.4	-1.3	-0.9	-3.6	68.3	78.8	68.0
February	54.5	39.6	32.5	-1.4	-0.6	-3.2	66.3	76.1	69.0
March	83.4	69.9	45.7	0.1	3.7	0.9	71.9	72.3	68.0
April	78.8	26.9	56.6	8.4	6.9	7.4	73.0	66.4	62.0
May	6.4	68.7	45.0	14.5	12.4	13.0	64.2	67.8	56.0
June	50.2	3.1	18.5	18.2	18.5	18.0	61.5	57.8	50.0
July	-	2.0	5.2	23.1	21.4	22.2	53.4	52.7	44.0
August	15.7	-	3.4	22.8	22.2	21.8	56.2	46.5	41.0
Total	503	349.7	385.7						
Average				9.8	9.9	9.0	63.5	67	57

*Taken from the recording of Meteorological Department in Van.

to encourage of pea plants. The study was carried out as in 2002-2003 and 2003-2004 vegetation period in Yüzüncü Yıl University experiment lands.

Some properties of the soils of the experiment lands in the first and the second year represented in Table.1 Temperate climatic condition is ruled in the region.

The soil has sandy loam texture and low organic matter and medium phosphorus rich potassium and lime content and is strongly alkaline (Table 1).

Long period average precipitation is 385.7 mm, average temperature is 9°C. Relating to 2002-2003 and 2003-2004 total precipitations are 503 and 349.7. Average relative humidity are 63.5% and 67% in the first and the second vegetation periods (Table 2).(Anonymous 2004).

RESULTS AND DISCUSSIONS

Results of variance analysis relating to each vegetation seasons were shown in table 3. According to

Table 3 differences of among characteristics were significant in 0.01 probability level.

Results tested in variance analysis and means were grouped in Duncan Multiple Comparison Test in Table 4.

Plant height: The highest plant height were obtained from 4. genotype as 87.08 cm but the lowest from 11 genotype as 56.08 cm (Table 4).

Ekinci^[7], noticed that plant height for low height peas 20-60 cm, for high height peas 100-200 cm. According to Ekinci^[6] this genotypes involve in semi low height peas group. Akçin^[8] also separated to three group according to plant height. According to Akçin^[8] the peas which plant height are 20-50 cm are low heights, which plant heights are 51-90 cm are semi low height and which plant heights are high from 91 cm are great height peas.

Apan^[9] determined 37.85-78.05 cm pea plant height in the study which carried- out with 8 pea varieties. Khvostova^[10] also determined 29.9 cm-151 cm plant height

Table 3: Relating to some features of pea genotypes variance analysis results.

	Years	Plantheight	The first bean height	Pod number	Grain number	Yield	Biological yield	Thousand grain weight
Blocks	The first year			*	*	*	**	
	The second year			*	*			
	United years	*		*			**	
Lines	The first year	**	**	**	**	**	**	**
	The second year	**		**	**	**	**	**
	United years	**	**	**	**	**	**	**
Years		**	**	**	**	**	**	**
interactions (LinexYear)		**	**		**	**	**	

* Significant in 0.05 probability level
 ** Significant in 0.01 probability level

Table 4: Mean and compared values relating to some features of pea genotypes and Duncan Comparing Test.

Years	Genotype	Plant height (cm)	The first pod height (cm)	Number of Pod per plant (no)	Number of seed per plant no.	Grain yield (kg ha ⁻¹)	Biological yield (kg ha ⁻¹)	1000 Seed weight (gr)
The first year	1	80.95 bc	35.03 d	8.2 e	38.25 cdef	130.85 de	470.53 bc	172.56 bc
	2	78.9 bc	29.85 f	9.45 cde	44.9 bcd	182.85 bc	528.95 ab	180.88 bc
	3	87.7 b	39.675 c	11.45 bc	26.65 g	91.56 ef	306.73 def	233.25 ab
	4	97.2 a	43.93a	8.78 de	32.45 efg	66.18 f	236.19 f	180.56 bc
	5	83.45 b	39.01 c	12.31 b	49.85 ab	223.93 ab	590 a	186.38 bc
	6	79 bc	33.2 e	7.6 e	36.15 defg	85.05 ef	234.46 f	160.19 c
	7	65.125 e	24.25 i	11.35 bc	48.51 abc	185.7 bc	491.18 bc	225.06 b
	8	57.9 e	21.18 j	12.15 b	41.54 bcde	160.25 cd	413.38 cd	214.44 bc
	9	72.13 cd	27.38 g	10.98 cd	29.64 fg	118.4 de	362.08 def	285.19 a
	10	71.55 cd	25.93 h	7.55 e	34.35 defg	99.83 ef	383.15 de	105.13 d
	11	87.75 b	42 b	9.2 cde	38.1 cdef	68.83 f	260.5 ef	99.23 d
	12	83.1 b	35.25 d	14.95 a	56.08 a	233.25 a	547.3 ab	196.4 bc
The second year	1	59.8 fg	20.95 d	3.98 g	17.5 fg	88.63 e	222.68 b	120 f
	2	51.83 i	19.08 b	4.98 e	22.79 e	107.25 d	166.48 ab	129.38 ef
	3	63.9 cd	22.05 b	7.13 d	15.72 g	68.1 f	214.03 bc	180.25 b
	4	76.95 a	24.98 b	4.53 ef	15.82 g	62 f	216.63 b	138.63 de
	5	65.15 c	21.95 b	10.13 b	38.4 a	142.75 b	226.23 b	132 def
	6	59.2 g	20.18 b	3.88 g	18.68 f	89.03 e	226.13 b	137.25 de
	7	61.25 ef	16.93 b	7.18 d	29.52 c	121.75 c	293.08 a	169.88 b
	8	54.25 h	16.98 b	10.08 b	32.8 b	94.2 de	224.5 b	146.38 c
	9	51.7 i	17.88 b	9.03 c	27.26 d	99.4 de	250.05 b	209.63 a
	10	53.18 i	19.23 b	3.78 g	15.9 g	65.58 f	174.78 cd	99.25 g
	11	67.18 a	23.28 b	4.08 fg	16.4 g	64.13 f	142.35 d	88.75 g
	12	62.73 de	20.98 b	11 a	39.9 a	159.98 a	231.85 b	144.25 cd

Table 4: Continued.

United years	1	70.38 cd	27.99 d	6.09 ef	27.87 c	109.74 de	346.6 abc	146.28 e
	2	65.36 ef	24.46 f	7.21 e	33.85 b	145.05 bc	347.71 abc	155.13de
	3	75.8 b	30.86 c	9.29 d	21.18 d	79.84 f	260.38 def	206.75 b
	4	87,08 a	34.45 a	6.65 ef	24.14 cd	64.09 f	230.66 ef	159.59 de
	5	74.3 bc	30.51 c	11.21 b	44.12 a	183.34 a	407.71 a	159.19 de
	6	69.1 de	26.69 e	5.74 f	27.41 c	87.04 ef	223.69 ef	148.72 e
	7	63.19 f	20.59 h	9.26 d	39.01 b	153.73 b	389.61 ab	197.47 bc
	8	56.08 g	19.08 i	11.11 bc	37.17 b	127.22 cd	320.88 abcd	180.41 bcd
	9	61.91 f	22.63 g	10 cd	28.45 c	108.9 de	303.36 bcde	247.41 a
	10	62.36 f	22.58 g	5.66 f	25.12 cd	82.7 f	287.99 cdef	102.19 f
	11	77.46 b	32.64 b	6.64 ef	27.25 c	66.48 f	207.65 f	93.99 f
	12	72.9 bcd	28.11 d	12.98 a	47.99 a	196.61 a	385.98 ab	170.33 cde
Mean of years								
The first year		78.73 a	33.06 a	10.33 a	39.71 a	137.22 a	402.97 a	186.6 a
The second year		60.59 b	20.37 b	6.64 b	24.22 b	96.9 b	215.73 b	141.3 b

*Difference indicated with same letter are non significant

in 21 pea varieties. Present results are in line with these studies.

The first pod height: The highest first pod height mean height was determined as 34.45 cm in genotype 4. The lowist pod height was determined as 19.08 cm in genotype 8 (Table 4). The mean biological yield determined as 3208.8kg ha⁻¹ in genotype 8 . The highest biological yield was obtained from genotype 5 as 4077.1 kg ha⁻¹ with 30.51 cm the first pod height. Önder and Ceyhan^[11] determined the relation (0.222**) between grain yield and the first pod height. Present results are in line as partly Önder and Ceyhan^[10]s results.

Number of pod per plant: According to the United years the most pod per plant were obtained as 12.98 from genotype 12. This genotype followed by genotype 5 with 11.21. The lowist pod per plant were obtained from genotype 10 with 5.66 (Table 4).

Vural^[12] were obtained 13.9-16.6 pod per plant from Wundervon-Kelvedon pea variety in İzmir ecological conditions. Present results is closed this results. Its possible that differents grewed out of dissimilar conditions.

Number of seed per plant: According to the United years the most grain number were obtained from genotype 12 with 47.99. This genotype followed by genotype 5 with

44.12 number. The lowist grain number per plant were obtained from genotype 3 with 21.18 number (Table 4).

Özkaynak^[13] were obtained from three groups pea varieties as 35-171 grain number in Ankara. Present results different from these. Its possible that differences were grewed out of dissimilar conditions.

Grain yield: The most grain yield were obtained from genotype 12 with 1966.1 kg.ha⁻¹ as mean of two years. This genotype followed by genotype 5 with 1833.5 kg.ha⁻¹. The lowist grain yield were obtained from genotype 4 with 640.9 kg.ha⁻¹ (Table 4).

Açkgöz *et al*^[14], carried out a study. They obtained 1500-2000 kg.ha⁻¹ grain yield from 36 hybrid pea genotypes.. Özalp^[15] obtained 1538 -1578 kg.ha⁻¹ grain yield from Rondo and sprinter varieties. Önder and Ceyhan^[10], obtained 1609 kg.ha⁻¹ grain yield in Konya. Gülümser^[16], obtained 1126-1921 kg.ha⁻¹ grain yield in Erzurum.

Sing and Yadav^[17], carried out a study in five pea varieties. They obtained 600- 2090 kg.ha⁻¹ grain yields. . Present results similar to these results.

Biological yield: Riepma^[18], declared that yield there are three type yields in pea. These are total yield, pod yield and grain yield. He obtained 6800 kg.ha⁻¹ biological yield in a study. Present results different from this. Its possible that differences grewed out of dissimilar conditions.

1000 seed weight: Kutevin and Türke¹⁹¹ declared that 1000 grain weight exchanges between 100 g-500 g . Akçin (1988)⁸¹, determined as 90-240 g 1000 grain weight in 20 pea varieties. Present results are in line with these studies.

Some of these pea varieties (2,5,7,12) are different as grain yield and biological yield from the others. These varieties are recommended in Van ecological conditions.

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