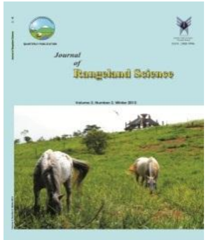
Contents available at ISC and SID

Journal homepage: www.rangeland.ir



Full Length Article:

Herbage and Seed Production of Two Species of *Lathyrus* L. under Rainfed Condition of Borujerd, Iran

Ali Ashraf Jafari[A], Parisa Moazami Godarzi[B], Shahram Nakhjavan[C], Morad Cheshmehnoor[D]

[A]Research Institute of Forests and Rangelands, Tehran, Iran. (Corresponding author). Email: aajafari@rifr-ac.ir
[B]M.Sc of Plant Breeding. Islamic Azad University, Borujerd Branch, Borujerd, Iran.
[C]Assistant Prof., Islamic Azad University, Borujerd Branch, Borujerd, Iran.
[D]Agricultural Applied and Practical Sciences Center, Borujerd, Iran.

Received on: 01/06/2013
Accepted on: 03/08/2013

Abstract. Grass pea (*Lathyrus sativus* L.) has a high potential for forage production in both rangelands and cultivated rainfed areas of Iran. It is well adapted to semi-arid areas of west and north of country where annual rainfall is 250–350 mm. To study the seed and Dry Matter (DM) yield and agronomic traits, six genotypes of *Lathyrus sativus* L. and two genotypes of *Lathyrus inconspicuous* L. were provided by Natural Resources Gene Bank and sown in a randomized block design with three replications in rainfed area of Borujerd, Iran during spring 2011 and 2012. Data recorded included stem number per plant, pods number per plant, seed weight per plant, Dry Matter (DM) yield, seed yield, straw yield, 100 grains weight, flowering date, pod emergence date, maturity date and harvest index over two years. Results showed that the genotype 1554 with average values of 9328 kg ha^{-1} DM yield and 3053 kg ha^{-1} seed yield could be introduced as a promising genotype for cultivation in rainfed area of Borujerd, Iran. It was concluded that selection for improved grass pea varieties in dry condition should focus on increased DM yield, and grain yield coupled with early flowering, more grains per pod, more pod per plant and heavy seeds

Key words: *Lathyrus* L., Seed yield, Forage yield, Rainfed area, Lorestan

1. Introduction

Lathyrus L. (Leguminosae; Papilionoideae) is the largest genus in tribe Vicieae and has an importance as traditional foodstuffs in many cultures worldwide (Kenicer *et al.*, 2005). Grass pea (*Lathyrus sativus* L.) is a diploid (2n=14), self-pollinated and annual species (Zohary and Hopf, 1988). The center of origin and diversification of the *Lathyrus* gene pool is in the Mediterranean region (Zeven and Zhukovsky, 1975). This species has several ecological advantages including optimal growth in arid or semiarid environments, neutral to alkaline soils, heavy clays, and also high resistance to many pests compared to other forage legumes (Palmer *et al.*, 1989). Grass pea is adapted to the non-tropical semi-arid areas of the central and west Asia, and the North African region, where mean annual rainfall is 200–350 mm (ICARDA, 2000; Karadag *et al.*, 2004).

At present, there is little data published about this nearly "forgotten" crop. In grass pea breeding programs for improved DM yield, the knowledge of new varieties seed production and its relationships with forage yield is very important. The published data on grass pea seed yield are different. There have been a number of evaluations of Grass pea germplasm to study the variation in it. For flowering and maturity period, Campbell (1997) reported a wide range from 47 to 94 days to 50% flowering for India collections. Days to maturity trend follows that of days to 50% flowering. For Plant height, he reported a wide range of 15 to 68 cm for small-seeded types from India and the larger seeded lines from Mediterranean region, usually producing taller plants with larger biomass than lines from South East Asia. For pods number per plant Campbell (1997) found wide range of 2.4 to 59 pods per plant. He stated that the larger-seeded types also had more pods per plant. Similarly, Yadov (1995) in Nepal reported that pods per plant varied from 13 to 59 when 72 local germplasm accessions were evaluated. Mehra *et al*. (1995) evaluated 48 accessions from Syria and reported pod length from 3.6 to 4.0 cm while, using 12 accessions from Canada ranged from 3.08 to 4.0 cm in length. Campbell (1997) reported that pod length in India germplasm varied from 1.88 to 5.18 cm. Yadov (1995) from Nepal found a range of 2 to 5 seeds per pod, similarly, Campbell (1997) reported the range of 1 to 4.3 and 1.6 to 4.6 seeds per pod for Canada and India germplasm, respectively. Somaroo (1988) at ICARDA stated that dry matter yield per hectare was found to be 5707 kg ha^{-1} and 2624 kg ha^{-1} in 1980 and 1981, respectively.

The seed yield of 1802 kg ha^{-1} in 1980 and 698 in 1981 was recorded for Grass pea. Hanbury *et al*. (1995) in Australia, reported a range of 190 to 220 g/1000 seeds weight when 451 lines were evaluated during 1994. In contrast, Robertson and Abd El Moneim (1995) in evaluation of small seeded lines found a range of 34.5 to 225.9 g for 272 accessions (with a mean weight of 86.8 g). Benkova and Zakova (2001) found that the Slovak genetic resource had the higher value of 1000 seed weight and grain yield compared to Syrian germplasm. Robertson and Abd El Moneim (1995), in evaluation of 272 accessions at Syria, found the biomass yield ranged from 516 to 5200 kg ha^{-1} with a mean of 2167 kg ha^{-1}. The straw yield ranged from 440 to 3861 kg ha^{-1} with a mean of 1720 kg ha^{-1}. More recently, Larbi *et al.* (2010) in ICARDA reported that herbage yield ranged from 695 to 3471 kg ha^{-1} and 404 to 2595 kg ha^{-1} in areas with annual total rainfall averaged 283mm and 140 mm during the two growing seasons.

In Iran, semi-arid rangelands cover the majority of the terrestrial areas. According to Badripour *et al.* (2006), 55% of the Iranian land is occupied by rangelands. Sheep and goats are a vital source of income for the rural population, through production of meat, milk, and wool. The main sources of feed for sheep and goats are the natural pastures provided by extensive rangelands, cereal straw and stubble grazing. *Vicia* and *Lathyrus* genus are the major components of rangelands. Drought tolerance, resistance of stored grains to pests, adaptability to nearly all types of soils as well as to adverse climatic conditions and low input environments are considered as the most important traits of *Lathyrus* (Larbi *et al.*, 2010). However, little is known about the yields of herbage, grain and straw, of the promising accessions under on-farm conditions. Such data are needed to select accessions for detail agronomic and animal feeding studies, and subsequent integration into the farming systems.

In many parts of Iran there is a shortage of feed and fodder for livestock. In many cases, the value of the fodder equals or exceeds that of the grain produced. Many factors are known to affect herbage, grain and straw yields and quality of herbage grown under rainfed conditions in dry land farming areas of Iran. Therefore, an on-farm experiment was conducted in west of Iran to evaluate herbage and grain yields, and of promising accessions of grass pea, with the aim of identifying accessions with suitable adaptation for grain and herbage production in specific environments.

2. Material and Methods

2.1. Sites

The research station is located in a flat area in southern part of Borujerd (25 Km). The altitude of station is 1632 m. The rainiest month is March with 104 mm rainfall. The mean annual rainfall is 475 mm and the mean annual temperature is 14.9 °C. The average maximum temperature is 27.8°C in August and minimum temperature is 1.1°C in January (Fig. 1). The climate of this region is moderate semi steppe according to Emberger classification (Badripour *et al.*, 2006). The Embrothemic curve shows that drought period of the station is four months of year and the wet season starts in October and continues until May (Fig. 1).

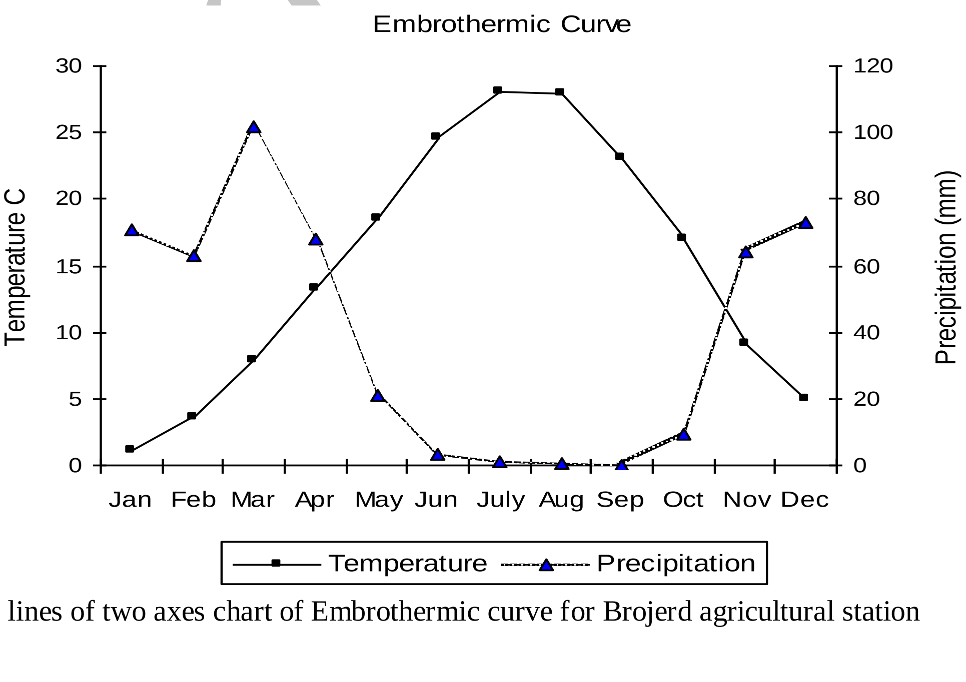


Fig. 1. The lines of two axes chart of Embrothermic curve for Brojerd agricultural station

2.2. Experimental design and management

Six genotypes of *Lathyrus sativus* L. and two genotypes of *Lathyrus inconspicuous* L. (Table 2) were provided from Natural Resources Gene Bank and sown in a randomized block design with three replications in spring 2011 and 2012 in rainfed area of Borujerd, Iran. Seeds of accession with a local accession (Broujerd as control) were sown in Mid-March 2011. Seeds were sown in four drilled lines of 2 m in length by a plot drill at a rate of 120 kg ha^{-1} and a row spacing of 25 cm. No irrigation was applied. Weeds were controlled mechanically and fertilizing schedule was based on scientific advices and recommendations.

2.3. Sampling method for yield and agronomic traits

Herbage and grain yield were estimated at maturity stage. At harvest, plants were cut at ground level, and the following traits were measured at the same time:

1. Flowering date: The number of days from 21 March to 50 percent flowering was recorded.
2. Pod emergence date: The number of days from 21 March to 50 percent pod formation was recorded.
3. Maturity date: The number of days from 21 March to physiological maturity of plants was recorded.
4. Stem length: Five plants of each plot were selected and the mean of their heights were recorded.
5. Stem number: The average number of stems number of a 50 cm row planting of each plot was recorded.
6. Pods number per plant: The mean number of pods of five plants was recorded in each plot.
7. Seed weight per plant: At the time of maturity, 5 plants were cut, dried, trashed and cleaned, and the average seed yield was calculated on each plant based on g $plant^{-1}$.
8. Total Dry Matter (DM) yield: At the time of maturity, all plants of 2 middle lines out of 4 lines in each plot were cut and air-dried. The total DM yield was expressed in kg ha^{-1}. Thus, this represents the above-ground biological yield.
9. Seed yield: Total biological yield was trashed and cleaned, and the average seed yield was calculated on each plot based on kg ha^{-1}.
10. Straw yield: Was estimated as total DM yield minus seed yield.
11. Hundred grains weight: A sample of 100 clean seeds was weighed.
12. Harvest index was calculated as the ratio of seed yield to total biological yield.

2.4. Statistical analysis

Collected data over two years were analyzed using the GLM Univariate method (SAS, 2004). Duncan test was used for determination of superior genotypes and species. Phenotypic correlations among characteristics were estimated for all pair-wise combinations.

3. Results

3.1. Analysis of variance and means comparisons

The results of ANOVA showed significant differences among genotypes for all traits except maturity date ($P<0.01$). Effect of year was also significant for all traits except 100 grains weight and maturity date ($P<0.01$), and genotype by year interaction effects were significant for all traits except stem length, pods per plant and maturity date (Table 1).

The result of mean comparisons of simple effect of genotype and genotype-by-year interaction effect using Duncan multiple range test are shown in (Tables 2 and 3).

In comparison between genotypes within *L. sativus* species, the genotype 1554 with average values of 9328 kg ha^{-1} DM yield and 3053 kg ha^{-1} seed yield was introduced as a promising genotype for cultivation in rainfed area of Borujerd, Iran. In contrast, this genotype had lower average values for 100 grains weight, flowering date and pod emergence date (Table 3). For the two genotypes in *L. inconspicuous*, the means of traits were lower than those in *L. sativus* except for harvest index (Table 2). The effect of year was significant for all traits except for 100 grains weight and maturity date ($p<0.01$). The higher mean values for all traits except for harvest index, 100 grains weight, flowering date and pod emergence date were obtained in the first year (Tables 2 and 3).

3.2. Relationships between yield and agronomic traits

DM yield was positively correlated with seed yield, stem length, stem number, pods number, straw yield, 100 grains weight, and maturity date. Whereas, seed yield was positively correlated with stem length, stem number, pods number, DM yield, straw yield, 100 grains weight and negatively correlated with flowering date and pod emergence date (Table 4).

Table 1. Summary of combined analysis and the level of significant mean squares

SOV	DF	Stem Length (cm)	Stem No.	Pods per Plant	Seed Weight (g/plant)	Seed Yield (kg ha^{-1})	Harvest Index	100 Grains Weight	DM Yield (kg ha^{-1})	Straw Yield (kg ha^{-1})	Flowering Date	Pod Emerge Date	Maturity Date
Genotype	7	2512**	60711**	2191**	15902**	118075**	0.07**	202.2**	718343**	295341**	535**	536.2**	283.24
Error1	16	70.71	1521.56	42.04	490.75	2784.77	0.001	0.43	14883.57	9972.28	2.61	5.01	3.63
Year	1	818**	7039**	5038**	410753**	403093**	0.03**	0.95	1599700**	554794**	3131*	2067**	18.75
Genotype x Year	7	30.84	1570*	319.70	12895**	51966**	0.08**	5.71**	76010**	40089**	21.1**	13.9*	109.56
Error2	16	28.42	550.31	135.66	387.39	2758.17	0.001	0.46	13163.74	6842.56	1.72	5.54	4.71
CV%		8.65	8.74	24.97	17.89	25.85	13.21	6.51	19.84	22.31	2.19	3.31	2.26

*significant at the 0.05 probability level, ** significant at the 0.01 probability level.

Table 2. Mean comparison among 8 genotypes of *Lathyrus* for stem length, stem number, pods per plant, seed weight per plant, seed weight per ha and harvest index

Species/Genotypes	Stem Length (cm)		Stem No.		Pods No /Plant		Seed Weight (g/plant)		Seed Yield (kg ha^{-1})		Harvest Index	
	Year1	Year2	Year1	Year2	Year1	Year2	Year1	Year2	Year1	Year2	Year1	Year2
L. inconspicuous												
2050	33.33 c	28.5 c	131.0 c	162.3 d	36.33 b	13.7 d	175.3 d	5.7 c	287 b	181 d	0.46 a	0.74 a
2074	32.10 c	24.3 c	242.3 b	225.5 c	23.20 b	14.0 d	93.4 e	4.7 c	150 b	117 d	0.34 b	0.64 a
L. sativus												
587	74.33 ab	63.4 b	367.0 a	338.0 ab	67.86 a	43.3 b	230.1cb	31.8 a	4760 a	1573 a	0.45 a	0.31bcd
608	82.10 a	68.8 b	374.5 a	314.5 ab	73.95 a	41.4 b	248.4 b	19.7 b	4800 a	1765 a	0.41 a	0.38 bc
1554	82.70 a	79.5 a	340.6 a	352.0 a	82.86 a	45.5 b	322.6 a	17.9 b	5040 a	1067 c	0.41 a	0.18 d
20425	75.60 ab	64.0 b	350.6 a	298.3 ab	60.80 a	59.7 a	187.2 d	24.3 ab	4370 a	1717 a	0.44 a	0.37 bc
Borujerd	64.57 b	62.8 b	104.3 c	79.0 e	29.46 b	27.5 c	48.3 e	13.0 bc	183 b	1283 bc	0.07 c	0.45 b
Esfahan	81.37 a	68.7 b	333.6 a	280.7 bc	80.58 a	46.1 b	314.9 a	23.3 ab	3987 a	1220 c	0.36 b	0.30 cd
Means	65.76	57.50	280.4	256.2	56.88	36.40	202.53	17.55	2947.1	1115.3	0.37	0.42

The means of the genotypes with same small letters were not significantly different based on DMRT method P<0.05

Table 3. Mean comparison among genotypes for 1st Pod height, Pods/plant, Grains/ pod and Pod length

Species/Genotypes	100 Grains weight		DM Yield (kg ha^{-1})		Straw yield (kg ha^{-1})		Flowering date		Pod emerge date		Maturity date	
	Year1	Year2	Year1	Year2	Year1	Year2	Year1	Year2	Year1	Year2	Year1	Year2
L. inconspicuous												
2050	2.15 f	2.2 e	625 c	413 d	337 b	62 d	52.0 c	74.3 b	66.0 b	83.0 b	82 c	91.0 cd
2074	2.08 f	2.1 e	438 c	349 d	287 b	76 d	55.0 b	75.7 b	68.0 b	82.7 b	82 c	90.3 d
L. sativus												
587	12.41 bc	14.0 b	10050 ab	5213 b	5750 a	3505 b	45.3 gf	61.0 d	54.0 e	68.7 d	101 b	91.3 cd
608	11.60 cd	14.7 b	10360 a	5275 b	5860 a	3748 b	47.5 ef	58.7 e	60.0 dc	68.0 d	100 b	93.0 cd
1554	10.78 de	7.3 d	11830 a	6827 a	6740 a	4910 a	48.3 ed	63.0 c	63.3 bc	77.0 c	106 a	102.3 b
20425	12.71 b	14.1 b	9740 ab	5128 b	5370 a	3605 b	44.2 g	59.7 de	57.3 de	66.3 d	101 b	91.7 cd
Borujerd	19.37 a	18.5 a	7120 b	3581 c	6930 a	1763 c	71.6 a	88.3 a	83.0 a	97.3 a	100 b	109.0 a
Esfahan	10.71 e	11.0 c	10680 a	4868 b	6960 a	3387 b	50.6 cd	63.3 c	64.0 bc	77.7 c	101 b	95.0 c
Means	10.23	10.49	7605.3	3956.7	4779.2	2632.0	51.81	68.00	64.45	77.59	96.63	95.45

The means of the genotypes with same small letters were not significantly different based on DMRT method $P<0.05$

Table 4. Correlation analysis between grain yield and agronomical components in 8 genotypes of *Lathyrus*

Traits name	Stem length (cm)	Stem No.	Pods per plant	Seed weight (g/plant)	100 grains weight	DM yield (kg ha^{-1})	Seed yield kg ha^{-1})	Straw Yield (kg ha^{-1})	Flowering date	Pod Emergence date	Maturity date
Stem No.	0.60										
Pods No /plant	0.90**	0.83**									
seed weight (g/plant)	0.66	0.80*	0.87**								
100 grains weight	0.73*	0.08	0.43	0.02							
DM yield (kg ha^{-1})	0.99**	0.68*	0.93**	0.70*	0.69*						
Seed yield (kg ha^{-1})	0.88**	0.87**	0.96**	0.79*	0.49	0.92**					
Straw yield (kg ha^{-1})	0.99**	0.55	0.86**	0.61	0.77*	0.98**	0.84**				
Flowering date	-0.42	-0.92**	-0.76*	-0.79*	0.11	-0.50	-0.78*	-0.35			
Pod emerge date	-0.35	-0.89**	-0.67	-0.66	0.07	-0.44	-0.75*	-0.28	0.98**		
Maturity date	0.85**	0.17	0.56	0.30	0.81*	0.81*	0.53	0.89**	0.08	0.15	
Harvest index	-0.80*	-0.20	-0.51	-0.24	-0.78*	-0.76*	-0.48	-0.85**	-0.13	-0.19	-0.95**

*significant at the 0.05 probability level, ** significant at the 0.01 probability level

4. Discussion

The means of genotypes of *L. sativus* were ranged from 3581 to 11830 and 183 to 5040 kg ha^{-1} for herbage DM yield and grain yield, respectively (Table 3). However, the overall means of this result were much higher than those reported by Robertson and Abd El Moneim (1995) in Syria, obtaining 2167 kg ha^{-1} and 445 kg ha^{-1} herbage and seed yield, respectively and Larbi *et al.* (2010) in Syria (ICARDA), obtaining herbage yield ranged from 695 to 3471 kg ha^{-1} and 404 to 2595 kg ha^{-1} in area with annual total rainfall averaged 283 mm and 140 mm.

Differences in herbage yield might relate to seasonal variations in the amount and distribution of rainfall and their effects on plant growth. In semiarid areas of Syria, annual total rainfall was 283 mm, but the climate of present trial was moderate semiarid with annual total rainfall 475 mm.

Herbage yield, grain and all other agronomic traits of the accessions in the first growing year were higher than those of the second year partly due to the higher amount of rainfall in the first year compared to the second year. The presence of genotype by year interaction effects and differences among the genotypes for herbage and grain yield suggests that genotype 1554 with average values of 9328 kg ha^{-1} DM yield and 3053 kg ha^{-1} seed yield could be introduced as a promising genotype for cultivation in rainfed area of Borujerd, Iran. The other agronomic traits differed among the accessions of *L. sativus*. The results were within the reported range of other authors (Campbell, 1997; Yadov, 1995; Somaroo, 1988; Hanbury *et al.*, 1995; Robertson and Abd El Moneim, 1995; Benkova and Zakova, 2001 and Larbi *et al.*, 2010). DM yield was positively correlated with seed yield, stem length, stem number, pods number, straw yield, 100-grains weight and maturity date (Table 4), which is consistent with the results of Campbell (1997), finding correlation between pods per plant and plant height. This was normally also associated with later maturity and increased plant biomass. Seed yield was positively correlated with stem length, stem number, pods number, DM yield, straw yield, grains weight and negatively correlated with flowering date and pod emerge date (Table 4) which corresponds with the results of Campbell (1997), Kumar and Dubey (2001), Benkova and Zakova (2001), finding positive correlations among the number of pods per plant and plant weight and number of grains seeds per plant with the seed yield.

There was negative correlation of both flowering and podding date with seed yield, indicating that the selection of early flowering accessions led to increasing seed size. Pod number was positively correlated with seed and herbage yield and other agronomic traits. 100 grain weight was positively correlated with herbage DM yield. These results correspond to the results of Mehra *et al.* (1995) for crop improvement programs, desiring to increase yield and seed size at the same time. Campbell (1997) suggested that increased seed size usually is highly correlated with higher yield. Plant breeders might want to consider increasing seeds per pods in larger-seeded types as an effective means of increasing yield.

5. Conclusions

Herbage yield and seed yield of grass pea varied under on-farm conditions under dryland farming system in moderate semiarid areas in Iran and they could be used to select grass pea accessions for herbage production. The overall means of all of genotypes of grass pea was 7558 and 2648 kg ha^{-1} for DM yield and seed yield, respectively. For *L. sativus* species, the genotype 1554 with average values of 9328 kg ha^{-1} DM yield and 3053 kg ha^{-1} seed yield was introduced as a promising genotype for cultivation in rainfed area of moderate semiarid area of Iran with mean annual rainfall of 500 mm. Selection in drought condition should focus on increased DM yield, and grain yield coupled with early flowering, more grains per pod, more pod per plant and heavy seeds.

References

Badripour, H., Eskandari, N., and Rezaei, S. A., 2006. "Rangelands of Iran, an Overview". Ministry of Jihad-e-Agriculture, Forest Range and Watershed Management Organization, Technical Office of Rangeland, Tehran, Iran, Pooneh. (In Persian).

Benkova, M. and Zakova, M., 2001. Evaluation of selected traits in grass pea (*lathyrus sativus* L.) genetic resources. *Lathyrus lathyrism* News letter. **2:** 27-30.

Campbell, C. G., 1997. Grass Pea. *Lathyrus sativus* L. Promoting the conservation and use of underutilized and neglected crops. 18. Institute of Plant Genetics and Crop Plant Research, Gatersleben/International Plant Genetic Resources Institute, Rome.

Hanbury, C. D., Sarker, A., Siddique, K. H. M. & Perry, M. W., 1995. Evaluation of Lathyrus germplasm in a Mediterranean type environment in south-western Australia. Occasional Paper No. 8. Co-operative Research Centre for Legumes in Mediterranean Agriculture.

ICARDA, 2000. Forage Legume Germplasm Improvement for Increased Feed and Food Production and System Productivity in Dry Areas. Germplasm Program Annual Report. International Center for Agricultural Research in the Dry Area (ICARDA), Aleppo, Syria, pp. 255–283.

Karadag, Y., Iptas, S., Yavuz, M., 2004. Agronomic potential of grass pea (*Lathyrus sativus*) under rainfed conditions in semi-arid regions of Turkey. Asian J. Plant Sci. **3:** 151–155.

Kenicer, G. J., Kajita, T., Pennington, R. T., Murata J., 2005. Systematics and biogeography of Lathyrus (Leguminosae) based on internal transcribed spacer and cpDNA sequence data, *American Jour. Botany,* **92:** 1199–1209.

Kumar S, and Dubey, D.K. 2001.Variability, heritability and correlation studies in grass pea. (*Lathyrus sativus L*.) Lathyrus Lathyrism News letter. **2:** 79-81.

Larbi, A., Hssan, S., Kattash, G., Abd El-Moneim, A.M., Jammal, B., Nabil, H., Nakkul, H., 2010. Annual feed legume yield and quality in dryland environments in north-west Syria: 1. Herbage yield and quality. Anim. Feed Sci. Technol. **160:** 81–89.

Mehra, R. B., Raju, D. B., and Himabindu, K.., 1995. Evaluation and utilization of Lathyrus sativus collection in India. Pp. 37-43 in Lathyrus Genetic Resources in Asia. Proceedings of a Regional Workshop, 27-29 December 1995, Indira Gandhi Agricultural University, Raipur, India (R.K. Arora, P.N. Mathur, K.W. Riley and Y. Adham, eds.). IPGRI Office for South Asia, New Delhi, India.

Palmer V. S., Kaul A. K., and Spencer, P. S., 1989. International Network for the Improvement of *Lathyrus sativus* and the Eradication of Lathyrism INILSEL: A TWMRF initiative. In: Spencer P. (Ed.), The Grass Pea: Threat and Promise Proc of the International Network for the Improvement of Lathyrus sativus and the Eradication of Lathyrism. Third World Medical Research Foundation, New York. Pp219-223.

Robertson, L. D., and Abd el Moneim, A. M., 1995. *Lathyrus* germplasm collection, conservation and utilization for crop improvement at ICARDA. In: Proceedings of *Lathyrus* genetic resources in Asia, 27-29 December 1995, Indira Gandhi Agricultural University, Raipur, India.

Somaroo, B. H., 1988. Relationship between dry matter yield, seed yield, and flowering time in annual forage legumes under dry conditions. *Jour. Appl. Seed Prod.* **6:** 31-35.

Yadov, C. R., 1995. Genetic evaluation and varietal improvement of grass pea in Nepal. Pp. 21-27 in *Lathyrus* Genetic Resources in Asia. Proceedings of a Regional Workshop, 27-29 December 1995, Indira Gandhi Agricultural University, Raipur, India (R. K. Arora, P. N. Mathur, K. W. Riley and Y. Adham, eds.). IPGRI Office for South Asia, New Delhi, India.

Zeven, A. C., and Zhukovsky, P. M., 1975. Dictionary of cultivated plants and their centers of diversity. Centre for Agricultural publication and Documentation, Wageningen, The Netherlands.

Zohary D, Hopf, M., 1988. Domestication of Plants in the Old World. Oxford Science Publications. Clarendon Press. (In Persian).

بررسی عملکرد علوفه و تولید دانه در ژنوتیپ‌های دو گونه خلر ***(Lathyrus)*** در شرایط دیم بروجرد

علی اشرف جعفری، استاد موسسه تحقیقات جنگل‌ها و مراتع کشور تهران (نویسنده مسئول)
پریسا معظمی گودرزی، دانش آموخته رشته اصلاح نباتات دانشگاه آزاد اسلامی واحد بروجرد
شهرام نخجوان، استادیار دانشگاه آزاد اسلامی واحد بروجرد
مراد چشمه نور، کارشناس ارشد مرکز آموزش علمی کاربردی بروجرد

چکیده

جنس خلر (*Lathyrus*) دارای پتانسیل بالایی از لحاظ تولید علوفه در مراتع و مزارع دیم کشور می‌باشد. خلر سازگاری خوبی به مناطق نیمه خشک کشور و دامنه‌های البرز و زاگرس که دارای بارندگی بین ۲۵۰ الی ۳۵۰ میلیمتر هستند دارد. به منظور بررسی عملکرد دانه و تولید علوفه و صفات زراعی تعداد ۸ ژنوتیپ (۶ ژنوتیپ از گونه ***L. sativus*** و دو ژنوتیپ از گونه ***L. inconspicuus***) از جنس خلر از بانک ژن منابع طبیعی تهیه شدند و بذر آنها در بهار ۱۳۹۰ و ۹۱ در مرکز آموزش کشاورزی بروجرد در قالب طرح بلوک‌های کامل تصادفی در سه تکرار کشت شدند و به مدت دو سال از لحاظ صفات عملکرد بیوماس، عملکرد کاه، عملکرد دانه، تعداد ساقه در بوته، تعداد غلاف در بوته، وزن دانه در بوته، وزن صد دانه، تاریخ گلدهی، تاریخ غلاف‌دهی، تاریخ رسیدن و شاخص برداشت مورد ارزیابی قرار گرفتند. نتایج تجزیه واریانس داده‌های دو سال نشان داد که میانگین عملکرد علوفه ژنوتیپ ۱۵۵۴ معادل ۹۳۲۸ کیلوگرم در هکتار علوفه و ۳۰۵۳ کیلوگرم در هکتار دانه بود و بعنوان ژنوتیپ امید بخش برای زراعت دیم در منطقه بروجرد معرفی گردید. نتایج بدست آمده از این تحقیق نشان داد که برای اصلاح و معرفی ارقام جدید خلر در شرایط دیم بایستی گزینش همزمان بر روی عملکرد علوفه و دانه انجام گیرد و علاوه بر این ژنوتیپ‌های زودرس که دارای تعداد دانه در غلاف و تعداد غلاف در بوته و وزن هزار دانه بیشتری دارند انتخاب شوند.

کلمات کلیدی: خلر ***(Lathyrus)***، عملکرد دانه و علوفه، زراعت دیم استان لرستان