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Morphological and nutritional properties of some *Lathyrus* species

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SUMMARY – In this study morphological and chemical properties of *Lathyrus* species (*Lathyrus hirsutus* L., *L. ochrus* L. (DC), *L. aphaca* L. var affinis, *L. laxiflorus* ssp. laxiflorus, *L. annuus* L., *L. sphaericus* Retz.) grown naturally were investigated in 2003 and 2004 .Some plant properties varied as follows: plant height between 32.50 and 131.00 cm, dry yield/plant between 0.32 and 22.16 g/plant, crude protein of hay between 15.00 and 21.00%.

Key words: *Latyhrus*, crude protein, nutritional properties.

RESUME – *"Propriétés morphologiques et nutritionnelles de certaines espèces de* Lathyrus*". Dans ce travail, nous avons étudié les caractéristiques morphologiques et chimiques de certaines espèces de* Lathyrus *qui poussent spontanément dans la nature (*L. hirsutus *L.,* L. ochrus *L. (DC),* L. aphaca *L. var affinis,* L. laxiflorus *ssp. laxiflorus,* L. annuus *L.,* L. sphaericus *Retz.) en 2003-2004. La taille de la plante varie entre 32,50 et 131,00 cm, le rendement sec par plante, entre 0,32 et 22,16 g/plante, la proportion de protéine de l'herbe sèche varie entre 15,00 et 21,00 %.*

Mots-clés : Lathyrus*, protéine brute, particularités nutritionnelles.*

Introduction

The genus *Lathyrus* is a large genus with 187 species. Centers of diversity for ancient periods are Asia Minor and the Mediterranean region (Allkin *et al*., 1983).

Lathyrus genus includes 61 species in Turkey (Davis, 1970). These species are widespread in all Turkey. But, only *L. sativus* and *L. cicera* have been cultivated widely for forage and less for food crop in the country (Genc and Sahin, 2001). Tosun, (1974) also mentioned that *L. hirsutus* had been cultivated especially in Central Anatolia, during 1960s.

In this study, some morphological and nutritional properties of six *Lathyrus* species grown naturally in Kurupelit Campus of Ondokuz Mayıs University were investigated.

Materials and methods

Six *Lathyrus* species (*Lathyrus hirsutus* L, *L. ochrus* L.(DC), *L. aphaca* L. var affinis, *L laxiflorus* ssp laxiflorus, *L. annuus* L., *L. sphaericus* Retz.) grown naturally in Kurupelit Campus of Ondokuz Mayis University were collected in 2003 and 2004 years. L. *sphaericus* Retz. and *L. annus* L. are not common in campus area and these species were not found in 2003.

In the campus, altitude ranges from 24 to 197m and soil depth varies from 10 to 120 cm and, the annual mean precipitation is 669.6 mm. In the growing season (from January to August) total precipitation was 322.6 mm in 2003 and 578 mm in 2004.

Observations were recorded in randomly selected 10 plants collected from natural lands in the campus area. Plant height, dry yield/plant, crude protein (CP), crude ash and mineral matter contents (K, Ca, Mg, Fe, Zn and Mn) were measured for the plants harvested in 50 % flowering. For dry yield/plant and chemical analysis, plants were dried at 70ºC for 24 h. Some statistical parameters for plant height and dry yield/plan, such as; mean, standard error and probability confidence (at 0,05

levels) were calculated (Tosun, 1998). Crude protein content was assessed by Kjeldhal method, mineral contents by using atomic absorption spectrophotometer (Kacar, 1972).

Results and discussion

Among *Lathyrus* species it was determined that average plant height ranged from 32.50 cm in *L. laxiflorus* ssp. laxiflorus to 131.00 cm in *L. hirsutus* L., and dry yield/plant ranged from 0.32 g/plant in *L. aphaca* L. var. affinis to 22.16 g/plant in *L. ochrus* L.(DC) (Table 1). Inter-intra species plant height, and dry yield/plant values generally were higher in 2004 than in 2003. Climatic conditions affected these features since the precipitation and temperature were not the same between the years, especially precipitation was higher in 2004 than in 2003 growing season.

Table 1. Plant height (cm), dry yield/plant, CP (%) and CASH (%) values of *Lathyrus* species at time of 50 % flowering

Species	Year	Plant height (cm)	Dry yield/plant (g)	CP (%)	CASH (%)
		Mean ± CL	Mean ± CL		
L. hirsutus	2003	101.41± 9.41	11.14 ± 3.17	17.78	7.06
	2004	131.00 ± 8.98	18.80 ± 8.66	16.28	7.32
L. ochrus	2003	83.80 ± 21.35	22.16 ± 8.10	15.18	8.32
	2004	89.10 ± 8.37	12.66 ± 3.31	16.90	9.96
L. aphaca	2003	48.25 ± 3.22	0.32 ± 2.02	16.23	10.82
	2004	58.05 ± 5.75	3.50 ± 1.05	18.21	8.70
L. laxiflorus	2003	32.50 ± 3.54	1.31 ± 0.53	15.00	7.80
	2004	36.83 ± 3.07	2.05 ± 0.55	17.28	7.81
L. annuus	2003	-	-	-	-
	2004	100.4 ± 15.68	7.98 ± 2.58	20.60	9.40
L. sphaericus	2003	-	-	-	-
	2004	34.22 ± 3.63	2.55 ± 1.03	21.00	8.70

CP: Crude Protein; CASH: Crude ash; CL: Confidence limits (P≤0.05).

While crude protein contents of hay varied between 15.00 and 21.00%, ash contents varied from 7.06 to 10.82%. The highest crude protein (21%) was determined in *L. sphaericus* Retz. and the highest crude ash (10.82%) was determined in *L. aphaca* L. var. affinis (Table 1). Acar *et al*., (2001) also reported that CP contents varied from 15.03 to 20.66% and, ash content varied from 8.79 to 9.50% in the same *Lathyrus* species. Their results are approximately near to our findings.

In hay, among to species and years, K content ranged from 1.20 % in *L. hirsutus* to 3.15 % in *L. aphaca*, Ca content ranged from 1.08 % in *L.hirsutus* to 3.10 % in *L. ochrus*, Mg content ranged from 0.11 % in *L. ochrus* to 0.50 % in *L. hirsutus*, Fe content ranged from 38.40 ppm in *L. hirsutus* to 72.76 ppm in *L. annuus*, Zn content ranged from 14.36 ppm to 56.61 ppm in *L. ochrus* and Mn content ranged from 38.20 ppm in *L. hirsutus* to 75.84 ppm in *L. annuus* (Table 2).

It is suggested that K ratio of hay is to be 0.8 % as a minimum (NRC, 1980). Ca ratio is to be 0.3 % and Mg ratio is to be 0.1-0.2 % as a minimum for the ruminants (Kidambi *et al*., 1989). Also Fe, Zn, Mn levels are to be 50 ppm (Lamand, 1975). In this respect; K, Ca and Mg ratios are enough but, Fe (in *L. hirsutus* L), Zn (in *L. hirsutus L., L. aphaca* L. var. affinis, *L. laxiflorus* ssp. laxiflorus, *L. annuus* L. and *L. sphaericus* Retz.), Mn ratios (in *L. aphaca* L. var. affinis and *L. sphaericus* Retz.) are lower than suggested levels

Conclusion

There are excessive inter/intra species variation in terms of investigated morphological and

nutritional features for 6 naturally grown *Lathyrus* species. Inter species variation has been expected case because of genetic differences. Intra species variation may be due to different soil and climatic conditions. In addition intra species genetic variation had high probability. As a result of this study, especially *L. ochrus* L. (DC), *L. hirsutus* L. and *L. annuus* are thought as promising materials for breeding studies which will be carried out in the near future.

Table 2. Average K, Ca, Mg, Fe, Zn, Mn contents of *Lathyrus* species at time of 50 % flowering

Species	Year	K (%)	Ca (%)	Mg (%)	Fe (ppm)	Zn (ppm)	Mn (ppm)
L. hirsutus	2003	1.20	1.08	0.50	46.75	24.07	38.20
	2004	1.65	1.18	0.32	38.40	36.45	60.00
L.ochrus	2003	1.52	3.10	0.11	60.45	14.36	47.86
	2004	1.48	2.75	0.43	43.40	56.61	66.28
L.aphaca	2003	2.20	2.68	0.16	58.32	30.00	48.65
	2004	3.15	2.70	0.16	42.84	40.36	40.03
L. laxiflorus	2003	1.89	1.92	0.15	46.43	19.04	61.40
	2004	1.50	1.77	0.28	50.00	28.01	65.78
L. annuus	2003	-	-	-	-	-	-
	2004	2.72	1.59	0.30	72.76	39.60	75.84
L. sphaericus	2003	-	-	-	-	-	-
	2004	3.09	1.72	0.14	52.00	32.82	45.28

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