Evaluation of proteaginous *Pisum sativum* L. cultivars in the region of Castelo Branco

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1. Introduction

The pea crop (*Pisum sativum* L.) is a convenient source of plant protein for animal feeding, an area where there is a production deficit in European Union [1]. After obtaining new cultivars through plant breeding it is important to evaluate their agronomic performance in different regions.

This study aimed to evaluate the agronomic performance of 20 cultivars of proteaginous *Pisum sativum* L., listed in the Community Catalogue of varieties of agricultural plant species [2] (Table 1), in the region of Castelo Branco, Portugal.

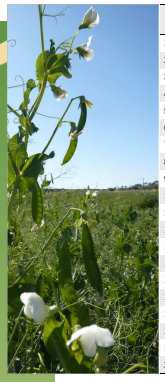

Table 1 – Cultivars studied.

	Cultivar	*Country of admission and number of responsible for the maintenance*	*Cycle type*
1	ALEZAN	FR 8174	Spring
2	ALHAMBRA	ES 225	Autumn
3	ARTHUR	FR 11539	Spring
4	AUDIT	FR 13262	Intermediate
5	CARTOUCHE	FR 9295, UK 182	Autumn
6	CORRENT	IT 2	Intermediate
7	CHEROKEE	FR 11553	Autumn
8	ENDURO	FR 8444	Autumn
9	GREGOR	DE 147, FR 9295, UK 6136	Spring
10	GRISEL	PT 2	Autumn
11	GUIFILO	ES 9	Spring
12	GUIFREDO	IT 332	Autumn
13	IDEAL	ES 2041	Intermediate
14	ISARD	FR 9504	Autumn
15	JAMES	FR 9295	Intermediate
16	KLEOPATRA	DE 7627	Spring
17	LIVIA	FR 8451	Spring
18	LUMINA	FR 13262	Spring
19	ONIX	FR 9295	Spring
20	PIXEL	PT 2	Autumn

2. Material and Methods

A field trial was implanted in Escola Superior Agrária de Castelo Branco. Sowing took place on November 2009 in plots with 12.0 m² in a randomized complete block design with four replications. A density of 110 plants per m² was used (Fig. 1).

Some parameters related to plant growth and yield were studied, such as seed yield (kg/ha), seed moisture content (%), weight of 1000 seeds (g), number of days to flowering, number of days to harvest, lodged plants (%), dehiscence (%), plant height (cm), dry matter weight, biological weight, number of plants per m², number of seeds per m², height of first pod (cm), number of pods per plant, number of seeds per pod and seed number per plant. The seed protein content was also studied but only for the 10 highest yielding cultivars.

The statistical analysis was performed using IBM SPSS Statistics vs. 19 software. Analysis of variance (ANOVA) for significance level p=0.05 and the mean comparison by Duncan test application were conducted. For some yield components we calculated the Pearson correlation coefficient.

Fig. 1 – Proteaginous pea field trial.

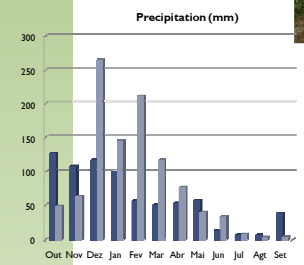

Fig. 2 - Precipitation values for 1986-2005 period and for the agricultural year 2009-2010 (data from October 2009 to September 2010).

3. Results and Discussion

The cultivars studied showed significant differences in all quantitative traits studied. With regard seed yield, there were values greater than 6,000 kg/ha for 10 cultivars (Cartouche, Enduro, Arthur, Audit, Corrent, Alhambra, Cherokee, Isard, Livia and Gregor) and 16 cultivars showed productions above 4,000 kg/ha (Fig 3 and Table 2). However, these results cannot be dissociated from the precipitation values recorded, well above the normal for the region (Fig. 2).

Among the best cultivars, Enduro and Cartouche are those with the lowest percentage of lodged plants. The cultivars Arthur, Corrent, Cherokee, Livia, Pixel, Ideal, Guifilo, Guifredo, Lumina and Grisel, showed a strong tendency to lodging (Table 2).

In general there is a positive correlation between seed yield and other quantitative variables, except the weight of 1000 seeds. The positive correlations were highest to the number of seeds per m² (0.847), biological weight (0.787) and harvest index (0.857). The seed protein content (%) ranged between 23,7 and 20,6 (Table 3).

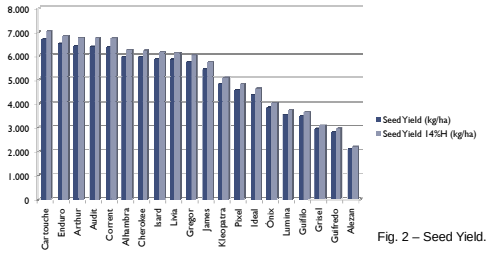

Fig. 2 – Seed Yield.

Table 2 – Seed production and some yield parameters.

Cultivar	Cycle type*	Seed Yield (kg/ha)	Seed Yield 14%H (kg/ha)	Separation of means (Duncan test, p=0,05)							Moisture content (%)	Weight of 1000 seeds	Nº of days to flowering	Number of days to harvest	Plant height (cm)	Nº of plants/m² at harvest	Lodged plants (%)
Cartouche	A	6.670	7.003	A							9,68	192	139	190	50,3	99	28
Enduro	A	6.509	6.828	A							9,77	201	139	192	45,3	99	4
Arthur	S	6.416	6.730	A	B						9,79	258	133	190	30,8	97	80
Audit	I	6.400	6.728	A	B						9,59	230	127	190	48,8	98	36
Corrent	I	6.374	6.708	A	B						9,47	230	139	190	45,3	102	100
Alhambra	O	5.933	6.244	A	B	C					9,49	223	137	190	44,5	100	57
Cherokee	A	5.920	6.230	A	B	C					9,50	184	135	190	33,5	98	98
Isard	A	5.846	6.164	A	B	C					9,32	187	135	190	30,0	101	54
Livia	S	5.822	6.113	A	B	C					9,70	257	128	190	39,5	101	100
Gregor	S	5.736	6.013	A	B	C					9,83	251	127	190	39,0	105	53
James	I	5.435	5.723	A	B	C					9,45	191	135	190	40,0	96	29
Kleopatra	S	4.825	5.051		B	C	D				9,95	240	126	190	42,8	103	10
Pixel	A	4.572	4.816			C	D				9,42	228	130	192	31,3	83	100
Ideal	I	4.380	4.619			C	D	E			9,27	250	126	190	37,5	94	100
Ónix	S	3.813	4.011				D	E	F		9,51	247	127	190	40,8	97	38
Lumina	S	3.527	3.716				D	E	F	G	9,28	254	131	194	30,3	96	100
Guifilo	S	3.467	3.642				D	E	F	G	9,64	216	127	190	35,2	87	100
Grisel	A	2.929	3.078					E	F	G	9,65	243	139	194	36,0	94	100
Guifredo	A	2.810	2.938						F	G	10,10	249	135	194	24,8	92	100
Alezan	S	2.094	2.193							G	9,97	140	131	190	34,5	82	74
Mean		4.974	5.227								9,6	224	132	191	38,0	96	
CV (%)		33,1	33,1								3,8	20,6	3,7	1,2	25,9	8,1	
Minimum		6.670	7.003								9,27	140	126	190	24,8	82	
Maximum		2.094	2.193								10,1	258	139	194	50,3	105	

*A – Autumn; S – Spring; I – Intermediate.

Table 3 – Seed protein content for some cultivars.

Cultivar	Seed protein content (%)
Cartouche	20,9
Enduro	20,6
Audit	21,9
Corrent	23,7
Alhambra	22,7
Cherokee	22,2
Isard	22,7
Livia	21,7
Gregor	22,5
James	21,0
Mean	21,9
CV (%)	4,40
Minimum	20,6
Maximum	23,7

4. Conclusions

The culture of proteaginous pea in autumnal sowing, if carried out in suitable soils, has high yield potential and it should be considered in crop rotation systems.

Although the results of seed yield are very interesting, it is necessary to conduct additional trials to evaluate the agronomic performance of pea cultivars in order to obtain more consistent results.

However, the results allow us to elect a group of cultivars with high seed yield and good adaptability to the region of Castelo Branco. Among the best are cultivars Cartouche, Enduro, Arthur and Audit.

Acknowledgment

The present study was financially by the EU within the POCTEP – "Programa Operacional de Cooperação Transfronteiriça Espanha - Portugal", Project 0186_AGROCELE_3_E.

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[1] Parlamento Europeu (2011) Relatório de 4 de Fevereiro de 2011 sobre o défice de proteínas na UE: que solução para um problema antigo? Comissão da Agricultura e do Desenvolvimento Rural. http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+REPORT+A7-2011-0026+0+DOC+XML+V0//PT

[2] Official Journal of the European Union (2010) Common Catalogue of Varieties of Agricultural Plant Species.