

## Studies on the Variation of Agronomic Traits in Some Faba Bean (*Vicia faba* L.) Landraces from Romania

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**Abstract.** The objective of this study were to evaluate the variation of agronomic characters of some faba bean landraces collected in two different regions (Gheorgheni, Ciuc) from Romania. The seeds of these landraces were collected from local farmers. All accessions evaluated belong to the large-seeded type (*V. faba* var. *major*). The trial was conducted at the Research Centre for Agrobiodiversity, Tápiószele during 2009 cropping season. Two accessions from Gheorgheni (Lăzarea, Remetea) and four accessions from Ciuc regions (Mihăileni, Ineu) were included in the trial. Two local varieties of faba bean from Hungary (Onga, Békéscsaba) were used as standards. Agronomic traits were evaluated according to the Faba bean Descriptors (IBPGR, 1985, Bioversity International, ICARDA, 2009) during the growing season. These investigations included phenophasic morphological and agronomic characters. Results showed differences among landraces for phenophasic, morphological and agronomic traits. These investigations revealed differences among the landraces for all characters studied. The variation in phenophases length was attributed to differences among agro-ecological zones. Faba bean landraces collected from two different climatic zones represent new and potentially valuable genetic resources for breeding programs.

**Keywords:** faba bean landraces, variation, phenophasic, morphological and agronomic traits

### INTRODUCTION

Faba bean (*Vicia faba* L.) is the traditional grain legume in Romania. In the last decades its cultivation is declining appreciably due to change of growing systems in many areas wherever in the past it has been cultivated. The broad bean (var. *major*) frequently grown as a home-garden crop, among the types (*minor*, *equina*, *major*) which are grown in Romania (Samuil, 2007). At present the main faba bean producing regions in Romania are Bucovina, Oltenia and Maramures (Ciofu, 2008, Saghin, 1997). Several investigations have been conducted to acquire informations regarding the diversity of faba bean landraces in Romania (Pálfalvi, 1987, Stana-Ghizdavu, 1991). The objective of this study was to analyse variation of the main agronomic traits in six locally adapted varieties from two regions (Gheorgheni, Ciuc) of Romania. These landraces of faba bean were collected in 2008 from 4 sites (Lăzarea, Remetea, Mihăileni, Ineu) as a part of bilateral Scientific and Technological Programme between Romania and Hungary (Vörösváry *et al.*, 2009, 2011).

## MATERIALS AND METHODS

The studies were focused on six landraces of faba bean, which were collected in autumn of 2008 from two regions with different ecological conditions (Gheorgheni, Ciuc). These landraces are grown by local farmers in home gardens at altitudes from 708 to 763 m asl. For comparison, two local varieties (Onga, Békéscsaba) from Hungary were used (Tab. 1). The seeds of each accessions were sown in spring (March 2009) in the experimental plots of the Research Centre for Agrobiodiversity in a single row each, 1.5 m long and 70 cm apart. During the growing period, data related to phenology, morphological and agronomic traits were characterized in accordance with the IPGRI descriptor list (1985, 2009). We considered other morphological descriptions of faba bean, which can be found in literature (Hebblethwaite, 1983, Bond *et al.*, 1985, Duc, 1997). Characters were recorded on five randomly selected plants. The following phenophasic parameters were analysed: number of days from emergence to flowering, number of days from flowering to maturity, number of days from emergence to maturity. To determine morphological variation among the landraces plant height, stem thickness, pod length, height of lowest pod-bearing node, number of pod per node, number of seeds per pod, 100-seed mass (g), seed characters (shape, testa colour, length, width, thickness) were recorded. Seeds characters were determined on 15 seed per plot.

Tab. 1

The passport data of evaluated faba bean landraces

Accession number	Collecting sites	Region	Country of origin	Latitude	Longitude	Elevation (masl)
5781/08	Lázarea	Gheorgheni	ROM	46°43'28"	25°35'49"	763
5892/08	Remetea	Gheorgheni	ROM	46°47'53"	25°25'45"	716
5705/08	Mihăileni	Ciuc	ROM	46°28'00"	25°49'00"	730
5706/08	Mihăileni	Ciuc	ROM	46°28'00"	25°49'00"	730
5069/09	Ineu	Ciuc	ROM	46°32'60"	25°46'00"	708
5070/09	Ineu	Ciuc	ROM	46°32'60"	25°46'00"	709
5307/80	Onga	Borsod-Abauj-Zemplén	HUN	48°07'00"	20°55'00"	114
5073/84	Békéscsaba	Békés	HUN	46°40'60"	21°06'00"	89

Tab. 2

Phenological characters of the evaluated faba bean landraces

Accession number	Collecting sites	Number of days from emergence to flowering	Number of days from flowering to maturity	Number of days from emergence to maturity
5781/08	Lázarea	46	57	103
5892/08	Remetea	63	45	108
5705/08	Mihăileni	46	58	104
5706/08	Mihăileni	63	44	107
5069/09	Ineu	63	44	107
5070/09	Ineu	63	44	104
5307/80	Onga	46	58	104
5073/84	Békéscsaba	46	58	104

## RESULTS AND DISCUSSION

A moderate variability was observed among the landraces in terms of phenophasic and morphological traits. Beginning of flowering, end of flowering and maturity stage are the important traits for evaluation of faba bean (Tamas *et al.*, 1998). The landraces performed a range of variation from 103 to 108 days from emergence to flowering. Variation regarding the

flowering dates among landraces was 17 days. Data on phenological characters are summarized in Tab. 2.

The mean plant height observed was 51.6 cm with a range of 43.9 cm to 62.9 cm. Among the accessions the landrace from Mihăileni (5706/08) had the highest value for plant height (62.9 cm). The landraces showed variation for stem thickness from 0,6 cm to 1 cm. The number of leaflets per leaf varied from 4 to 5 (Tab. 3). The flowers are 1.5-2.5 cm long, with the wing petals white with a black spot (Fig. 1). The number of pods per node varied from 1 to 3. The mean pod length recorded was 7.5 cm with a range from 4 cm to 10 cm. The colour of the pod at maturity blackish-brown (Fig. 2). The average number of seeds per pod varied between from 2 and 4 .The range of variation for height of lowest pod-bearing node at harvest was 4 cm to 13 cm. (Tab. 4).

Tab. 3

The plant morphological characters of the evaluated faba bean landraces

Accession number	Collecting sites	Plant height (cm)	Stem thickness (cm)	Number of leaflets per leaf
5781/08	Lăzarea	56.1	0.7	4
5892/08	Remetea	51	0.8	5
5705/08	Mihăileni	54.7	1	4
5706/08	Mihăileni	62.9	1	4
5069/09	Ineu	43.9	0.7	5
5070/09	Ineu	55.7	0.9	4
5307/80	Onga	45	0.7	4
5073/84	Békéscsaba	44.2	0.6	4

The main differences observed between local landraces were in agronomic components (Tab. 5). All seeds are large and irregular, flattened. Seed testa colour varied from green to brown. (Fig. 3, 4).



Fig. 1. The flowers of faba bean from Lăzarea (5781/08)

Fig. 2. The pods of faba bean from Remetea (5892/08)

Fig. 3. The seeds of faba bean from Mihăileni (5705/08)

Fig. 4. The seeds of faba bean from Remetea (5892/08)

The 100-seed mass changed between 50-79.8 g. The landraces from Lăzarea (5781/08) and Mihăileni (5705/08) had the highest 100-seed mass with 79.8 and 57.7 g respectively. Notable differences in average seed sizes (length, width, thickness) between accessions were measured (Tab. 5).

Tab. 4

The pod morphological characters of the evaluated faba bean landraces

Accession number	Collecting sites	Pod length	Height of lowest pod bearing node	Number of pods per node	Number of seeds per pod
		(cm)	(cm)		
5781/08	Lăzarea	8	10	3	3
5892/08	Remetea	8	7	1	3
5705/08	Mihăileni	10	8	1	4
5706/08	Mihăileni	8	13	1	3
5069/09	Ineu	6	5	2	2
5070/09	Ineu	5	5	1	2
5307/80	Onga	4	4	2	2
5073/84	Békéscsaba	6	6	2	2

Tab. 5.

The seed morphological characters of the evaluated faba bean landraces

Accession number	Collecting sites	Seed shape	Seed testa colour	100-seed mass (g)	Seed dimension		
					Length (mm)	Width (mm)	Thickness (mm)
5781/08	Lăzarea	flattened	light brown	79.8	15.9	11	5.04
5892/08	Remetea	flattened	brown	54	18.3	12.8	5.38
5705/08	Mihăileni	flattened	green	57.7	16.5	11.3	4.96
5706/08	Mihăileni	flattened	light green	55.5	17.9	12	4.69
5069/09	Ineu	flattened	light brown	53.3	16.6	11.6	5.27
5070/09	Ineu	flattened	brown	50	20.2	13.9	5.82
5307/80	Onga	flattened	brown	53.3	11.4	9.6	5.75
5073/84	Békéscsaba	flattened	brown	50.3	14.2	10.9	5.64

According to these evaluations, plant height, height of the lowest pod-bearing node, pod length and 100-seed mass, were important discriminating characters among the landraces from geographical regions.

## CONCLUSIONS

These preliminary results of agronomic properties of some faba bean landraces from Romania revealed variability that could be offer potentially valuable genetic resources for selection and improvement of this crop.

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