

REGIONAL VARIABILITY IN PHASEOLUS VULGARIS L.

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Within the enlargement of the collections of the Agrobotanical Garden and Herbarium of the Agronomical Institute "Dr. P. Groza" Cluj-Napoca, the regional variability of Phaseolus species (P. vulgaris L. and P. multiflorus Lamk.) cultivated in peasant's plots in different regions of Transylvania (Romania) have been studied, in accordance with the general principles emphasized by national and international organizations (2, 3).

Our Phaseolus collection is represented now by voucher specimens filed in the Agrobotanical Herbarium of the Institute (CIA 25.794-25.919) and more than 1000 seed samples of ecologically adapted (local) populations or recognized agricultural varieties collected for comparison or cultivation. Some of this samples may be placed at the disposal of the interested research workers by Index Seminum Horti Agrobotanici Cluj-Napoca, 1977/1978.

The striking variability of the Phaseolus species is reflected in taxonomy. MANSFELD for example (4) mentions 38 synonyms partly accepted as valid names in the case of P. vulgaris and 21 synonyms in the case of P. lunatus L. The situation is similar with the great majority of other Phaseolus species, and the total number of 150 species recorded for the genus (9, 11) is certainly overestimated. SMART (11) also points out deficiencies regarding the integration of the species with the various sections of the genus and the lack of voucher specimens necessary for a critical, comparative study of the variability.

The variability of common bean is especially high; in the seed lists of the Mid- and East-European germplasm collections (Gatersleben 1975, Leningrad-VIR 1973, Praga-Ruzyne 1973-1975, Radzików-Warszawa 1974, Sofia 1973, Tápíószela/Budapest 1975) 956 agricultural varieties have been recorded for convar. (ssp.) vulgaris and 400 varieties for convar. (ssp.) nanus (L.) Alef.

In Romania, research on the variability of *Phaseolus* on peasant's plots have been carried out by RĂDULESCU (8); on the neighbouring regions recently by A'LBERT and col. (1), SZÜCS (12) and others. Ecologically different groups of local populations important to breeding, frequently cultivated Romanian or foreign varieties are indicated in (6, 9, 13). TOPA and NYÁRÁDY (9) indicate for example 31 varieties and outline the necessity of further research regarding the variability of the species in different districts of the country. This paper may be considered as a step taken in this direction.

Material and method

The variability of the species have been systematically explored on 36 settlements of a well delimited territory (5) and on 20 settlements randomly distributed in different regions of Transylvania. The collected samples have been arranged systematically according to criteria based on seed morphology (7, 10 and others), criteria which are also convenient from the point of view of the seed collection of the Agrobotanical Garden where the samples are preserved respectively. Similar samples belonging to the same convariety and provariety have been considered as "type" (conculita) and have been named by a corresponding vernacular name. Every individual sample has also a collection and - 1 cultivated in the Agrobotanic Garden - a cultivation number. As a first approach of the variability, the frequency of different phenotypes in the collection have been calculated.

With 20 samples, the amino-acid content of the seeds have been analysed using acid hydrolysates by means of paper chromatography, butyl alcohol: acetic acid: water system in two variants - 4:1:1 and 4:0,4:1:1 respectively). The tryptophan was determined in alkaline hydrolysates.

Results

On the systematically studied territory 69 % of the collected samples belong to convar. *vulgaris* and 31 % to convar. *nanus*; these values are for the whole Transylvania 70.7 and 29.4. The frequency of the main phenotypes regarding seed size, shape and seed-coat colour are included in table 1.

The most frequent conculita, represented higher than 1 % in the whole collection are the following (frequency values in % in brackets) convar. *vulgaris*, provar. *sphaericus* (Savi) Alef.: "Măzăruiică albă" (1.8), "Măzăruiică galbenă" (2.2), "Melc mare" (3.6), "Oușoare grănă mici".

Table 1

The occurrence (frequency %) of the main seed characters in *Phaseolus vulgaris* L. in Transylvania

Provar.	Total %	Seed size			Seedcoat colour							
		Mi	Mo	Ma	W %	Y	B	R	Vt	Bl	Dm	Vr
I. convar. <i>vulgaris</i> , 549 samples, 70,7 %												
sphaericus	31.7	8.2	20.1	5.6	2.5	3.5	4.3	1.8	-	0.5	11.3	10.2
ellipticus	21.5	8.2	7.7	4.9	2.7	-	6.3	-	1.3	2.7	1.8	9.1
compressus	15.1	0.8	14.2	0.5	6.3	-	2.3	-	-	0.1	0.4	0.9
oblongus	2.4	0.3	1.4	-	0.1	-	-	-	-	0.5	0.1	0.1
II. convar. <i>nanus</i> , 226 samples, 29,4 %												
sphaericus	1.7	0.3	1.2	0.3	0.5	0.5	-	-	-	-	0.8	-
ellipticus	19.6	0.8	9.9	9.5	2.5	0.5	2.7	0.8	-	2.3	0.5	10.1
compressus	2.0	-	1.7	0.3	-	1.7	-	-	-	-	-	-
oblongus	6.1	2.2	3.1	0.8	0.8	1.6	-	-	-	-	0.5	4.4

Mi = microspermus, Mo = mesospermus, Ma = macrospermus, W = white, Y = yellowish, B = brownish, R = redish, Vt = bluish and violet, Bl = black, Dm = dimidiatus, Vr = variegatus.

"Oușoare grane mari" (5.9), "Pălmuite violet" (6.4), "Pălmuite galbene" (2.1); provar. *ellipticus* (Martens) Alef.: "Dulce" (2.3), "Cu bube" (2.0) "Oușoare albe" (2.5), "Bungo" (1.6), "Iulișca" (2.5), "Ceara neagră" (2.3); provar. *compressus* și *subcompressus*: "Șarpe" (3.4), "Albă lată" (7.2); convar. *nanus* (L.) Alef., provar. *ellipticus* "Negru" (1.9), "Gîscă" (2.7), "Grana cloagă" (8.0), "Kisuri" (1.3), "Piștuică" (1.7); provar. *oblongus*: "Bulgăresc" (1.7), "Galben devreme" (1.6); provar. *compressus* "Creasta galbenă" (1.7).

A number of 17 *vulgaris* types and 13 *nanus* types occurred only once in the collection (0.1%); 38 *vulgaris* types and 13 *nanus* types occurred with frequencies between 0.1 - 1%.

Regarding the territorial distribution of the different types (conculita), the most frequents (e.g. "Albă plată" - cultivated usually together with Zea mays!) or the most commonly cultivated Transylvanian garden bean "Grana cloagă" occurred on almost all of the studied settlements. In some places higher variability have been found (e.g. Agirbiciu, Straja, Văleni), in other places less common varieties have been collected (Păniceni, Băbiu); in some of the systematically explored

Table 2
Variability of the aminoacid content (g/16 gN) in the seed
of the analyzed *Phaseolus* samples

Nr. sample	Cysteine	Lysine	Histidine	Arginine	Tyrosine	Valine - Methionine	Phenylalanine	Leucine - Isoleucine	Threonine	Tryptophan	Glutamic acid	Alanine	Essential aminoacids (total)	Total protein g/100 g DM
1.	0.3	7.1	3.0	6.0	4.1	8.6	5.2	16.0	5.2	1.0	17.9	4.8	56.5	26.7
2.	0.3	7.1	2.4	7.1	3.4	7.8	5.1	13.5	5.1	0.9	18.2	4.4	53.1	29.7
3.	0.2	6.4	3.6	4.8	4.0	7.2	4.8	13.5	4.8	1.0	16.3	4.8	50.3	25.1
4.	0.3	7.0	3.3	5.5	4.1	7.4	5.2	14.4	4.8	0.9	17.7	5.2	52.9	27.2
5.	0.2	5.5	3.6	5.5	4.5	7.1	4.5	14.2	4.9	0.9	13.2	3.9	50.0	30.9
6.	0.2	6.8	3.2	5.6	3.6	7.2	5.2	14.0	4.4	0.9	16.4	4.4	51.1	25.0
7.	0.4	7.6	2.4	5.6	4.0	7.2	4.8	13.5	5.2	0.8	17.9	5.2	51.5	25.1
8.	0.2	6.2	2.3	5.6	3.6	7.2	4.6	12.7	3.6	1.0	16.9	3.9	47.3	30.8
9.	0.4	6.9	3.2	4.9	4.5	7.3	5.7	15.4	4.5	1.0	17.0	4.9	53.8	24.7
10.	0.4	6.4	4.4	5.2	4.8	6.8	5.2	14.9	5.6	1.0	18.5	5.2	54.7	24.9
11.	0.4	7.0	3.1	5.4	5.1	7.0	5.4	14.7	4.7	1.2	17.1	4.7	54.0	25.6
12.	0.3	6.4	3.9	5.7	3.9	7.1	5.0	14.5	4.3	0.8	16.3	4.6	51.9	28.2
13.	0.3	7.1	3.4	6.3	4.2	7.1	5.0	13.8	5.0	1.0	17.2	4.2	53.2	23.9
14.	0.3	7.7	3.1	5.6	4.6	7.3	5.6	16.0	4.9	1.1	19.5	4.9	56.0	28.5
15.	0.3	6.9	3.3	5.8	5.1	6.9	5.5	15.3	5.1	1.0	16.8	5.5	55.2	27.4
16.	0.3	6.3	2.4	6.3	3.6	7.2	5.1	15.5	4.2	1.0	18.2	4.8	51.9	33.6
17.	0.2	5.9	3.5	5.9	3.5	7.3	4.9	13.9	4.2	0.9	17.1	4.9	50.2	28.6
18.	0.3	6.8	3.0	5.7	4.2	7.6	4.9	14.7	5.3	0.9	17.0	4.9	53.4	26.5
19.	0.3	7.3	3.6	5.7	4.1	6.9	4.7	13.4	4.1	0.9	17.8	4.5	51.2	24.7
20.	0.3	6.6	2.7	5.7	3.9	7.8	5.1	14.4	4.8	1.3	16.8	4.2	52.6	33.3

Data of the samples: Tab.2., Fig.1.: *Phaseolus vulgaris* convar. *vulgaris*, provar. *sphaericus*: 1. "Măzăruiică albă", 630 (thousand seed weight in grams) prod.(productivity; indicated just for categories "high" and "low") high, orig./origin of the sample; if not indicated the district the settlement is in jud. Cluj/ Agirbiciu; 2. "Măzăruiică albă (mică)", 670, orig. Jebucu, jud. Sălaj; 3. "Măzăruiică galbenă", 390, Căpușul Mic; 4. "Ougoare grană mari", 750, Jebucu, jud. Sălaj; 5. "Măzăruiică albă", 270, prod. high, Văleni; 8. "Măzăruiică galbenă", 430, prod. high, Văleni; provar. *ellipticus*+*subcompressus*: 6. "Ougoare albe", 305, prod. very high, Căpușul Mic; 7. "Ochiș", 560, Agirbiciu; 9. "Dulce", 804, Mera; 10. "Sarpe", 328, Mera; 11. "Sarpe", 360, Căpușul Mare; 12. "Sarpe", 540 prod. low, Macău; provar. *compressus*: 13. "Auriu", 390, prod. low., Căpușul Mic; 14. Segregated hybrid, 310, prod. low, Izvorul Crișului; 15. "Auriu", 565, prod. low, Babiu, jud. Sălaj. convar. *nanus*; provar. *ellipticus*-*subcompressus*: 16. "Gișcă", 540, prod. low, Mera; 17. "Gișcă", 740, prod. high, Văleni; 18. "Grana oloagă", 546, Corneghi; 19. "Sulf", 470, Văleni.
Check sample: 20. *Phaseolus aborigineus* Burk., PHA 8020172/1975, Gatersleben, DDR.

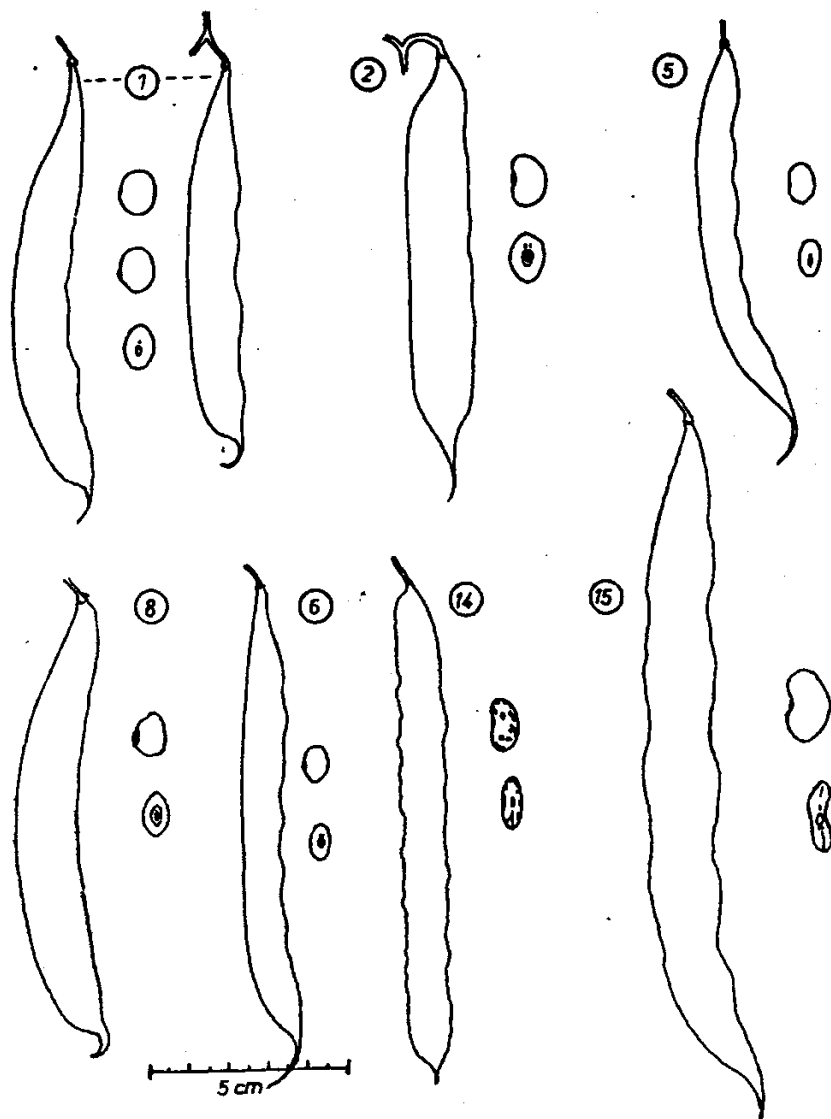


Fig.1. Seed and pod characters with some of the samples analyzed in table 2.

1. "Măzăruiică albă (mare)" from Agirbiciu; 2. "Măzăruiică albă (mică)" from Văleni; 6. "Ougoare albe" from Căpușul Mic; 8. "Măzăruiică galbenă" from Văleni; 14. Local, hybrid, from Izvorul Crișului; 15. "Auriu" from Babiu.

settlements the species is lacking (mountain climatic conditions!).

The amino-acid content of the analyzed samples is presented in table 2; morphological characters of seven of the consulted in Fig.1.

Conclusions

1. The general frequency of convar. vulgaris and convar. nanus in Transylvania is strikingly similar to the frequency found in the examined germplasm collections.

2. The most frequent seed shape in the collection is spherical-sub spherical (33.4 %), the most frequent seedcoat colours belong to variegatus (35,8 %) and dimidiatus (15,4 %) types.

3. The protein content of the analyzed seed samples varies between 24.7 - 33.6 g/100 g DM, being generally higher, than the average value indicated by GIOSAN and CEAPOIU (3).

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RECHERCHES CONCERNANT LA GERMINATION DES SEMENCES DE HOUBLON (HUMULUS LUPULUS L.)

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Dans des conditions normales les semences de houblon germent avec un faible pourcentage à peine 3-5 %. Sur le plan mondial, certaines études ont été faites afin de déterminer les causes occasionnant cette faible germination. Malgré tout, les résultats obtenus pratiquement ne s'avèrent pas encourageants (2, 3, 4).

Concernant les semences entières, la germination d'une façon spéciale intéresse l'enveloppe seminale imperméable à l'eau et à l'oxygène. La température dans les différents phases de germination joue aussi un rôle très important (1, 2, 5, 6).

Parlant toujours des semences de houblon, on considère que la germination est inhibée par des substances amères et des résines contenues dans le péricarpe empêchant ainsi, la pénétration de l'eau et de l'oxygène jusqu'à l'embryon (2, 3).

Ayant abordé ce thème dans un sens complexe et à l'égard de tout ce qui précède, l'amélioration de la germination, des semences obtenues par hybridation, devient une nécessité.

Matériel et méthode

L'étude de la germination a été faite sur les semences de houblon obtenues des croisements dirigés entre les différentes variétés. Pour la détermination de la germination des semences de houblon on a utilisé les germoirs Linhard, capsules Petri et le papier du filtre stérilisé.

Des expériences ont été faites notamment sur l'influence de la température, de l'humidité, des substances chimiques, des traitements physiques et mécaniques sur l'énergie et la faculté germinatives.

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