ON THE AGROBIOLOGICAL VALUE OF SOME LOCAL POPULATION OF RUNNER BEAN

VALOAREA AGROBIOLOGICĂ A UNOR POPULAȚII LOCALE DE FASOLE MARE (*PHASEOLUS COCCINEUS* L.)

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Abstract. *Runner bean (Phaseolus coccineus L.) is a less studied species in Romania, though it is highly spread on the territory of the country. In these circumstances, an agrobiological study in the Romanian environment is important to accumulate knowledge on the biodiversity features botanical and phenological ones). Also, this study provides information on the ecological plasticity. Research was carried out at the University of Agronomy from Iasi, on a collection of 24 local populations from Northeast part of Romania and some foreign varieties.*

The paper offers information on the main botanical characteristics (growth type, vigor, color of foliage, color of flowers, pods and seed etc.) and phenological feature (duration of different growth and development stages).

Rezumat. *Fasolea mare (Phaseolus coccineus L.) este o specie mai puțin studiată în Romania, în ciuda unei largi răspândiri pe teritoriul țării. În aceste circumstanțe, un studiu agrobiologic în mediul înconjurător al României este important pentru acumularea cunoştinţelor legate de trăsăturile botanice şi fenologice ale biodiversității. De asemenea, acest studiu oferă informații referitoare la plasticitatea ecologică. Cercetarea s-a realizat la Universitatea Agronomică din Iaşi, pe o colecție de 24 de populații locale din nord-estul României şi câteva varietăți străine.*

Lucrarea oferă informații asupra caractersiticilor botanice (tipul de creştere, vigoare, culoarea foliajului, a florilor, păstăi, semințe etc.) şi trăsături fenologice (durata diferitelor stadii de creştere şi dezvoltare).

Phaseolus coccineus L. (Runner bean) is a less studied species in Romania (4). A more complete and complex knowledge is possible by an agrobiological study. This study ensures a better knowledge on the botanical diversity and some phenological features of the some local populations and ecological forms. Also, the study offers information on the ecological plasticity and, mainly, on the resistance/susceptibility reaction to the main specific pathogens (1,2,3). The results of this study also, could be used in plant breeding and farming of this specie.

The paper presents the results on the main morphological, physiological and ecological characteristics of an assortment of local populations and some varieties.

MATERIAL AND METHOD

Biological material consists of a collection of 26 local populations and foreign varieties. The local populations were collected from different zones of Moldova (Suceava, Botoşani, Neamț, Bacău, Galați, Vrancea counties).

The experiment was organized in the research field of the Experimental Station of the University of Agricultural Sciences and Veterinary Medicine Iaşi, during 2004-2006 period.

Study method consists in observations and biological determinations on the main morphological, physiological and phenological characteristics of the assortment. Morphological characteristics were as following: growth type, plant height, number of branches, leaf color, vigor, inflorescence type, number of flowers/inflorescence, flower color, shape, color and dimension of pods, shape, color and size of grain. The main biological and phenological features were: sprout type, spring duration, number of days to the first true leaves and branches, the datum of blossoming, pod setting, seed maturation, duration of vegetation cycle etc.

Experimental data were comparatively analyzed, emphasizing on the differences and similarities and also, on the some agronomical performances of the most valuable populations.

RESULTS AND DISCUSSIONS

The obtained results are presented in table 1. The data from the table refer to the main morphological characteristics, which confer distinctibility, and to phenological ones, which indicate ecological adaptability.

Referring to morphological characteristics, the results show that:

- growth type is valuable at the most of population, with exception of population C_2, which is determinate;
- plant sprouting is hypogeic one at all the variants (only hypocotyl is sprouted at the soil surface and the cotiles remain in soil);
- plant height at the voluble plant is over 2,0-2,5 m, but at non-voluble one, it is about 40-50 cm;
- number of plant branches, varies between 2 and 5;
- plant vigor is, generally, high (14 variants) and medium (eight variants) and very high (for three variants) or very small (one variant);
- foliage color is dark green or green;
- flower color is white to majority of variants (16 of them), carmine red (seven variants) or carmine red with white wings (one variant);
- seed color is white (for 16 variants), violet with black arabesques (nine variants) and beige with brown arabesques (one variant);

- high correlation is evident between flower color and seed color: white flowers with white grains, red flowers with violet grains and red and white flowers with beige grains;
- pod size varies between large limits: 9-20 cm length and 1,3-2,1 cm width; usually, the pod length is positively correlated with the grain number;
- seed size (as length on the greatest dimension) varies between 15-22 mm; it is remarkable that the biggest pods produce the greatest seed;

The phenological features present a reduced variability. Having in view the great diversity of the places for collecting (plane, hill, submountain zones), it would be expected to have a larger ecological variability. It is supposed that some "ecological races" could not appear because of a too short period of cultivation (about 100 years), high circulation of seeds and high alogamy.

Phenological features can be observed in the table 1.

- sprouting duration was, constantly, of 12-15 days; some expected differences have been reduced by the relatively high average temperature of the sprouting period;
- duration from the plant sprouting to the blossoming varies between reduced limits, of 30-35 days;
- duration from the plant sprouting to pod setting varied between 60-75 days.

The last two features could offer information on the earliness, but this aspect was not revealed because of a large ecological plasticity. In the same time, it is possible that relatively high temperatures (very suitable for the respective vegetation stages) made uniform the behavior of studied variants.

The growth period was interrupted during 1-10 October period, by stopping the crop, technically justified by the necessity for land preparation for the future crop from the next year.

Table 1

Morphological and phenological characteristics of the biological material studied at Iaşi, 2004-2006

Variant	Collecting place	Morphological characters								Phenological features (number of days)				
		Branches number	Foliage color	Vigor	Flower color	Pod size (L/l) (cm)	Number of seeds/pod	Seed size (mm)	Seed color	Sowing-sprouting	Sprouting-first trifoliate leaf	Sprouting-first flowers	Sprouting - first pods	Sprouting-end of vegetation
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C_1	Great Britain	3-4	dark green	high	white	20 / 1,7	5-7	22	white	12-15	7	35	71	120-125 (1-10 oct)
C_2	Great Britain	4-7	dark green	high	white	17 / 1,9	4-6	20	white	12-15	8	35	66	120-125
C_3	Galaţi	3-4	green	high	white	10 / 1,9	2-3	17	white	12-15	3	34	74	120-125
C_4	Bacău	3-4	green	high	white	10 / 1,8	2-3	17	white	12-15	3	34	74	120-125
C_5	Vaslui	2-3	dark green	high	white	10 / 1,9	2-3	19	white	12-15	3	35	73	120-125
C_6	Iaşi	2-3	green	medium	white	9 / 1,7	2-3	22	white	12-15	4	35	72	120-125
C_7	Neamţ	2-3	green	medium	white	12 / 1,7	2-3	22	white	12-15	6	34	73	120-125
C_8	Iaşi	2-3	green	medium	white	9 / 1,7	2-3	17	white	12-15	6	34	72	120-125
C_9	Bacău	2-3	green	medium	white	10 / 1,8	2-3	18	white	12-15	4	35	70	120-125
C_{10}	Iaşi	2-3	green	medium	white	9 / 1,7	2-3	20	white	12-15	4	33	70	120-125
C_{11}	Vaslui	3-4	green	medium	white	10 / 1,3	2-3	17	white	12-15	4	33	71	120-125
C_{12}	Botoşani	2-3	dark green	medium	red with white wings	11 / 2,3	3-4	19	beige with brown arabesques	12-15	6	32	71	120-125
C_{13}	Iaşi	2-3	dark green	medium	carmin red	9 / 1,9	2-3	17	violet with black arabesques	12-15	6	33	71	120-125
C_{14}	Galaţi	3-4	green	high	carmin red	11 / 1,7	2-3	20	violet with black arabesques	12-15	4	34	73	120-125

Table 1 (continuation)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C_{15}	Vrancea	3-4	dark green	high	carmin red	11 / 1,5	3-4	16	violet with black arabesques	12-15	6	35	72	120-125
C_{16}	Suceava	3-5	dark green	high	carmin red	10 / 1,9	2-3	17	violet with black arabesques	12-15	6	34	71	120-125
C_{17}	Iaşi	3-5	dark green	high	carmin red	12 / 1,6	3-4	17	violet with black arabesques	12-15	4	33	71	120-125
C_{18}	Bacău	3-4	dark green	very high	carmin red	9 / 2,1	1-3	21	violet with black arabesques	12-15	3	33	71	120-125
C_{19}	Botoşani	4-5	dark green	high	carmin red	12 / 1,3	2-3	15	violet with black arabesques	12-15	6	33	72	120-125
C_{20}	Vaslui	3-4	dark green	high	carmin red	12 / 1,7	2-3	16	violet with black arabesques	12-15	6	33	72	120-125
C_{21}	Suceava	2-3	dark green	small	carmin red	10 / 1,7	2-3	20	violet with black arabesques	12-15	6	33	72	120-125
C_{22}	Bacău	4-5	green	very high	white	10 / 1,8	2-3	22	white	12-15	6	35	71	120-125
C_{23}	Iaşi	4-5	green	very high	white	10 / 1,3	2-3	21	white	12-15	6	35	71	120-125
C_{24}	Neamț	3-4	green	high	white	12 / 1,4	2-3	17	white	12-15	7	34	72	120-125
C_{25}	Brăila	3-4	dark green	high	white	12 / 1,5	2-3	22	white	12-15	6	33	73	120-125
C_{26}	Brăila	3-5	green	high	white	13 / 1,7	3-4	22	white	12-15	6	34	72	120-125

CONCLUSIONS

1. The study emphasized a great morphological diversity of the 24 Romanian local population of runner bean, expressed, mainly by the plant vigor and branching, color of flowers and seeds, the size of pods and seeds and number of seeds/pod.

2. Studied local populations, though come from rather different ecological zones, do not show evidently great phenological differences, referring to plant sprouting, blossoming, pod setting and maturation period. This aspect could be as an explanation of a great ecological plasticity of the studied populations.

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