RESEARCH ON THE MAIN PRODUCTIVITY FEATURES IN AN ASSORTMENT OF RUNNER BEAN (*PHASEOLUS COCCINEUS* L.) IN THE ENVIRONMENTAL CONDITIONS FROM NE ROMANIA

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Abstract

This paper presents an assessment of the main features of productivity in an assortment of runner bean (*Phaseolus coccineus* L.), in the conditions from Northeastern Romania. The research was carried out during 2012 and 2013 years, on a number of 10 populations of runner bean, collected from the United Kingdom, Iași, Bacău, Suceava, Vaslui, Galați and Botoșani counties. The following yield features were determined: vigour of the plant, the number of branches / plant, the pod size, the seed size, the number of seeds / pod, number of seeds / plant, weight of 1000 grains (MMB), yield measured per plant and per unit of area (ha). The plants were voluble in all local populations of runner bean and the size was over 2 m. The plant vigour, at the whole range was medium to large. A special feature is that the color of flowers is correlated with the color of seeds: the plants with white flowers have white seeds and the plants with red flowers had violet + black seeds; the plants with red flowers and white wings had beige seeds with a brown design. The vegetation period varied between 130 and 140 days to the entire range of runner bean. The earliest population was Coccineus 2, with a period of 106 – 113 days, from sunrise to seed maturation. A thousand grain weight (MMB) ranged from 1115 g (Coccineus 2) and 1310 g (Coccineus 4), with an average of 1207,1 g. The evaluated seed yields ranged from 1735,2 kg / ha at the Coccineus 12 population and 13745, 7 kg / ha at Coccineus 9 population, with a mean of 2613,4 kg / ha.

Key words: runner bean, phenology, evaluated yield

Runner bean (*Phaseolus coccineus* L.) has been cultivated since 9000-7000 BC (Smartt, 1976), in the region bounded by Mexican mountains - Puebla, Oaxaca and Chiapas states. In Europe, the first mention in literature appears in "Herball" by Gerard Johnson (1633), which is named as an ornamental plant introduced by John Tradescant (Munteanu, 2005). In Romania, the runner bean was brought in the eighteenth century with the common bean (*Phaseolus vulgaris* L.), the first one is often confused with the common bean (Stan et al., 2003).

First significant signal on runner bean, especially the importance of culture and cultivation technology, is performed by Munteanu (1985). Since 2000, the runner bean has been detail investigated (Popa, 2010). Cultural practices still poses many problems because this species requires cool and humid climate.

Agro value means to achieve qualitative and quantitative yields, under average normal production. At the runner bean, this quality is determined by the vigour of the plant, number of flowers, number of fruits, number of seeds and pods weight (for pod shapes) and beans weight (for beans shapes). Also very important are the resistant to diseases and pests, drought resistance, resistance to weeds, ecological plasticity etc.

An evaluation of the production is a mandatory step to promote production or know how improvement or other purposes. Thus, in our work we decided to do an agroproductivity assessment on a local populations of the runner bean assortment. As a result, in the Northeastern of Romania, during 2012-2013 years, a collection of 10 local populations was analyzed, regarding to the morphological, phenological and agroproductivity features.

MATERIAL AND METHOD

The research was conducted within the discipline of Vegetable growing collection on a 10 local populations *(tab. 1)*: V1 - Coccineus 10/Iaşi, V2 - Coccineus 17/Iaşi, V3 - Coccineus 4/Bacău, V4 - Coccineus 9/Bacău, V5 - Coccineus 1/Marea Kingdom, V6 - Coccineus 2/Marea Britain V7 - Coccineus 5/Vaslui V8 - Coccineus 12/Botoşani, V9 - Coccineus 3/Galaţi, V10 - Coccineus

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16/Suceava, during 2012-2013 in the experimental field of the Horticulural Research Center from the Agricultural University – Iasi.

The experiment was settled in a linear device shelfs, each representing an experimental type. Establishment culture was performed by direct seeding.The distance between lines was 80 cm and between plants in the row 45 cm. To achieve the objectives of the experience, determination and observations were made on the main morphological, physiological and phenological of the assortment. To have a description of the agroproductivity was organized a field of comparative cultures.

In order to study the productivity elements there were made the following measurements: the vigor of the plants, the number of branches, the size of beans, pod size, number of seeds / pod, the number of seeds / plant, weight of 1000 grains (MMB), measured on the plant output and the unit area (ha).

Tabelul 1

Experimental assortment of runner bean

Variant		Source
No.	specification	
1.	Coccineus 10	Iași County
2.	Coccineus 17	Iași County
3.	Coccineus 4	Bacău County
4.	Coccineus 9	Bacău County
5.	Coccineus 1	United Kingdom
6.	Coccineus 2	United Kingdom
7.	Coccineus 5	Vaslui County
8.	Coccineus 12	Botoșani County
9.	Coccineus 3	Galați County
10.	Coccineus 16	Suceava County

RESULTS AND DISCUSSIONS

Table 2 presents the results related to morphological features of the runner bean, but also the general characterization.

The plants were voluble in all populations. The plant height is over 2 m to all variants. The number of branches/ plant varied between 2 and 6. The plant vigour is high (17 Coccineus populations, Coccineus 4, Coccineus 1, Coccineus 2, Coccineus 5, Coccineus 3, Coccineus 16) and average (Coccineus populations 10, Coccineus 9, Coccineus 12). The size of the clusters of widely varying length between 9.5 and 20.4 cm and a width of 1.7 to 2.3 cm.

The number of seed in the pod ranged from two to seven and the size of the seed, taken through the long axis length, varied between 16 and 22 mm.

The color of flowers was white (at local populations: Coccineus 10, Coccineus 4, Coccineus 9, Coccineus 1, Coccineus 2, Coccineus 5, Coccineus 3), red (at local populations: Coccineus 16 and Coccineus 17) and red with white wings (Coccineus 12).

The color of seeds was white (Coccineus 10, Coccineus 4, Coccineus 9, Coccineus 1, Coccineus 2, Coccineus 5, Coccineus 3), violet with black design (Coccineus 16, Coccineus 17) and beige with brown design (Coccineus 12 population), there is a correlation between flower color and seed color.

The studied populations presents the phenological characteristics with no significant differences amoung one population to another.

Recording to the period between sowing to the rising, this one ranged between seven and ten days, the period from rising to the first leaf with three lobes ranged between four and nine days, the period from rising to the first flower ranged between 31 and 36 days, the period from rising to the first pods ranged between 60 and 70 days and the period from rising to the end of vegetation varied between 130 and 140 days.

Table 4 presents the main elements of productivity. The obtained results allow evaluation assortment studied as follows: the number of seeds/plant varied within quite wide, from 37 (Coccineus 4) to 69 seeds/plant (Coccineus 2), with an average of 51.5, and the weight of a thousand beans (MMB) ranged from 1115 g (Coccineus 2) and 1310 g (Coccineus 4), with an average of 1207.1, production evaluated ranged on average between 1735.2 kg / ha (12 Coccineus) and 3745.7 kg / ha (Coccineus 9).

Table 2

Morphological characterization of the assortment (average data, 2012-2013)

Variant		Morphological characters						
no.	specification	number of ramifications	vigour	pod size (L / L) (cm)	number of seeds in pod	seed size (mm)	flower color	seed color
1.	Coccineus 10	3-4	average	9,5/1,8	2-4	21	white	white
2.	Coccineus 17	3-5	high	12,5/1,8	3-4	18	red	violet + black
3.	Coccineus 4	2-4	high	9,8/1,7	3-4	17	white	white
4.	Coccineus 9	2-3	average	10,3/1,7	2-3	18	white	white
5.	Coccineus 1	3-5	high	20,4/1,8	4-7	22	white	white
6.	Coccineus 2	4-6	high	17,5/1,9	3-6	20	white	white
7.	Coccineus 5	2-4	high	10,3/1,9	3-4	20	white	white
8.	Coccineus 12	2-3	average	11,2/2,3	2-4	20	red with white wings	beige and brown design
9.	Coccineus 3	3-4	high	10,5/2,1	3-4	18	white	white
10.	Coccineus 16	3-4	high	9,8/1,8	2-4	16	red	violet + black

Table 3

Phenological characterization of the assortment (average data, 2012-2013)

Variant		Phenological characters (days no.)					
no.	specification	sowing - rising	rising - the first leaf with three lobes	rising - first flowers	rising - first pods	rising - maturing seeds	rising - the end of vegetation
1.	Coccineus 10	7-10	6-7	31-34	62-66	110-117	130-140
2.	Coccineus 17	7-10	5-6	31-34	63-67	111-118	130-140
3.	Coccineus 4	7-10	4-7	32-35	67-70	114-121	130-140
4.	Coccineus 9	7-10	5-8	33-36	62-66	110-118	130-140
5.	Coccineus 1	7-10	7-8	33-36	63-67	111-118	130-140
6.	Coccineus 2	7-10	8-9	33-36	60-64	106-113	130-140
7.	Coccineus 5	7-10	5-7	32-36	65-69	113-120	130-140
8.	Coccineus 12	7-10	5-6	31-33	63-67	111-118	130-140
9.	Coccineus 3	7-10	5-7	32-35	66-70	114-122	130-140
10.	Coccineus 16	7-10	5-7	32-35	63-67	111-118	130-140

Table 4

Characterization of agro-productivity during 2012-2013

Variant		The number of seeds / plant	MMB	Evaluated yield (seeds) (kg / ha)
nr. crt.	specification			
1.	Coccineus 10	56	1251	2787,8
2.	Coccineus 17	59	1215	2879,2
3.	Coccineus 4	37	1310	1985,4
4.	Coccineus 9	57	1225	3745,7
5.	Coccineus 1	66	1120	3022,4
6.	Coccineus 2	69	1115	3185,7
7.	Coccineus 5	52	1210	2783,9
8.	Coccineus 12	38	1185	1735,2
9.	Coccineus 3	40	1240	2006,3
10	Coccineus 16	41	1200	2002,4
Average		51,5	1207,1	2613,4

CONCLUSIONS

The assortment of runner bean is remarkable, in particular, both for the correlation between flower and seed color but also for the plant height which exceed 2 m.

In terms of phenology, the assortment has no significant differences, the period from sowing to rising ranging between seven and ten days.

Productivity and production elements varies quite large, ranging from production estimated 1735.2 kg / ha at the Coccineus 12 population and 3745.7 kg / ha at Coccineus 9 population.

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