# ASPECTS CONCERNING THE VARIABILITY OF CERTAINS MORPHOLOGICAL DESCRIPTORS TO SOME COMMON BEAN *(PHASEOLUS VULGARIS)* LOCAL LANDRACES COMING FROM MARAMUREŞ

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*The common bean, originated from Mexic and Guatemala is the most important cultivated species of genus Phaseolus. This species was introduced in our country from the beginning of seventeen century, and in the present the common bean is cultivated on large surfaces.*

*We found the communes variety (climbing variety) only in gardens of the small farmers because it is not properly for mechanized crop system. This variety is preferred by the people from villages because of its plasticity and rusticity, pods quality, of the long harvest period and the superior yield in comparison with yield of the bush bean.*

*It is important to mention that the biggest variability was registered at the descriptor the number of seeds/plant, and at the opus pole was situated the descriptor the protein content.*

*The results of this study emphasize some correlations between the protein content and boiling time, between amino acids content and leafages number and between the numbers of seeds/pod and the seed size.*

***Key words**:* variability, morphological descriptors, bean local landraces

*Phaseolus vulgaris* (common bean), originated from Mexic and Guatemala is the most important crops species of the genus *Phaseolus.* In our country this species was introduced at the beginning of XVII century, but in the present cover very large surfaces [Bilteanu Gh., 1989]. The common bean represents a high economic interest, being the most utilized leguminous species in the human consumption. The seeds of this species are used because of the high protein content which is rich in the essential amino acids. In food the green or dry pods is used too. In some zones people consumes the young shoot like green salad (Japan).

There are a lot o varieties classified after seed shape: *compresus, oblongus, ellipticus, sphaericus,* after grows type*: nanus* (bush bean), *communis* (pole bean) and different intermediary biotypes between varieties. In frame of varieties there is different types function by color, such as: *one single color* (white, black etc.), *punctatus* (point-like), *maculatus* (blotchy), *variegatus* (variegated) and *zebrinus* (striped) [Muntean S., 1995].

The *communis* variety (pole bean), presented in this paper is cultivated only in the gardens of the house holders and in the small farms because this species is not proper for the mechanized crop system. This variety is preferred by rural population because of its rusticity and ecological plasticity, pods qualities, the long period of harvesting and of its superior yields in comparison with bush bean.

In this paper we will analyze the variability of some morphological descriptors conditioned by the genetic factors of this species, emphasizing the main correlation coefficients between them.

## MATERIAL AND METHOD

The biologic material was constituted on 78 local landraces belonged to *Phaseolus vulgaris*, *communis* variety. In the experimental field of Suceava Genebank, on soil cambic chernozomic (3-5%humus) bean accessions were sowed. The blocks length was on 2 m and distances between rows 0.70 m.

In order to emphasize the morphological and phenological differences in field and in laboratory the following descriptors were determined: total leaves number, total flowers number, insertion height of first pod, pod length, pod width, total pods number, seeds number/pod, seeds number/plant, seed length, seed width, total seeds weight/plant, one thousand kernel weight, protein content, amino acids content, boiling time [*Phaseolus* descriptors, Rome,Italy, 1983].

The variability of the studied bean landraces was estimated with support of variation amplitude and variation coefficient. Also, the correlation coefficient between studied traits was determined.

Generally, in biology it is admitted that the frequency distribution which has a variation coefficient smaller then 10%, shows a small variability. When the distribution of frequencies shows a variation coefficient between 10 and 20% it is a middle variability, and when there is a variation coefficient over 20% the accessions have a high variability [Ceapoiu, 1968].

## RESULTS AND DISSCUSIONS

The 78 bean accessions were analyzed for the following descriptors: leafage number, flowers number, and the insertion height of the first pod, pods number, seeds number/plant, seeds weight/plant, one thousand kernel weight, and boiling time. For the mentioned descriptors we obtained a variation coefficient over 20%. Thus all these descriptors have a big variability, the values of each descriptor having a very high dispersion.

For the same accessions the descriptors: pod length, pod width, seeds number/pod, seed length, amino acids content and collecting altitude, we obtained a middle variation coefficient (10-20%), resulting a middle variability.

The variation coefficients for descriptors: seed width and protein content are smaller then 10% showing a small variability and a very low dispersion.

Therefore, taking into consideration the obtained variation coefficient we can estimate that 53.3% from whole studied descriptors have a big variability, 33.3% a middle variability and 13.3% a low variability.

For descriptor seeds number/plant there is a variation coefficient on 67% that mean a very big variability for this trait. Also, we identified a high variability for seeds weight/plant (64%) and for the descriptor pods number/plant (53%). For descriptors: seeds width and protein content, the variation coefficient was 9% that mean a very low variability (*table 1*).

Tablel 1

**Dispersions indexes for the analyzed traits at the studied common bean landraces (Suceava 2007)**

| Descriptors | Minim | Maxim | Variation amplitude | Variation coefficient % | Variance | Standard deviation |
|---|---|---|---|---|---|---|
| Protein content % d.s. | 17,37 | 26,75 | 9,38 | 9 | 5,38 | 2,3 |
| Amino acids content % d.s. | 0,45 | 1,55 | 1,1 | 14 | 0,08 | 0,28 |
| Leafage number/plant | 12 | 89,5 | 77,5 | 38 | 277,9 | 16,9 |
| Flowers number/plant | 3,83 | 30,2 | 26,19 | 41 | 29 | 5,3 |
| Pods number/plant | 4,26 | 71,65 | 67,39 | 53 | 138,7 | 11,7 |
| Seeds number/pod | 3,8 | 8,4 | 4,6 | 14 | 0,6 | 0,8 |
| Seeds number/plant | 13,85 | 404 | 390,15 | 67 | 1844,5 | 42,9 |
| The insertion height of the first pod (cm) | 6 | 44 | 38 | 34 | 80,4 | 8,9 |
| Pod length (cm) | 8,5 | 27,16 | 18,66 | 20 | 6,8 | 2,6 |
| Width pod(mm) | 0,84 | 1,92 | 1,08 | 16 | 0,05 | 0,2 |
| One thousand kernel weight (g) | 136,96 | 850 | 713,04 | 26 | 16441,8 | 128,22 |
| Collecting altitude (m) | 187 | 635 | 448 | 20 | 8238,3 | 90,7 |
| Boiling time (min.) | 26 | 108 | 82 | 31 | 260,5 | 16,1 |
| Seed length(mm) | 10,2 | 19,5 | 9,3 | 12 | 3,2 | 1,8 |
| Seed width(mm) | 6,9 | 11,3 | 4,4 | 9 | 0,7 | 0,8 |
| Seeds weight/plant (g) | 5,54 | 177,76 | 172,22 | 64 | 644,9 | 25,39 |

In *table 2* are presented the correlation coefficients and the significances between analyzed traits.

In the table 2 we notice that from 24 simple correlations between analyzed descriptors, 17 are very significant, one correlation is distinct significant and 6 are significant.

From among distinct and very significant correlations, the following correlations were mentioned: the protein content and boiling time, the amino acids content and leafage number/plant and the correlation between the seed width and the seeds number/pod.

Table 2

**The simple correlation coefficients, statistical assured, between analyzed traits at 78 common bean local landraces (Suceava 2007)**

| No. crt. | Correlated traits | Correlation coefficient | Signification |
|---|---|---|---|
| 1 | Leafage number/plant x flowers number/plant | 0.80 | *** |
| 2 | Leafage number/plant x amino acids content | 0.32 | ** |
| 3 | Leafage number/plant x seeds weight/plant | 0.60 | *** |
| 4 | Leafage number/plant x seeds number/plant | 0.52 | *** |
| 5 | Flowers number/plant x pods number/plant | 0.51 | *** |
| 6 | Flowers number/plant x seeds number/plant | 0.59 | *** |
| 7 | Flowers number/plant x seeds weight/plant | 0.56 | *** |
| 8 | Pod length x pod width | 0.36 | *** |
| 9 | Pod length x seeds number/pod | 0.43 | *** |
| 10 | Pod length x seed length | 0,52 | *** |
| 11 | Pod width x seed width | 0.29 | * |
| 12 | Pod width x amino acids content | - 0.39 | ooo |
| 13 | Pods number/plant x seeds number/plant | 0.79 | *** |
| 14 | Pods number/plant x seeds weight/plant | 0.75 | *** |
| 15 | Seeds number/pod x seed width | - 0.39 | ooo |
| 16 | Seeds number/pod x one thousand kernel weight | - 0.27 | o |
| 17 | Seeds number/plant x seed width | - 0.26 | o |
| 18 | Seeds number/plant x seeds weight/plant | 0.88 | *** |
| 19 | Seed length x seed width | 0.51 | *** |
| 20 | Seed length x one thousand kernel weight | 0.29 | * |
| 21 | Seed width x one thousand kernel weight | 0.59 | *** |
| 22 | one thousand kernel weight x amino acids content | 0.27 | * |
| 23 | Protein content x boiling time | - 0.8 | ooo |
| 24 | Boiling time x amino acids content | 0.29 | * |

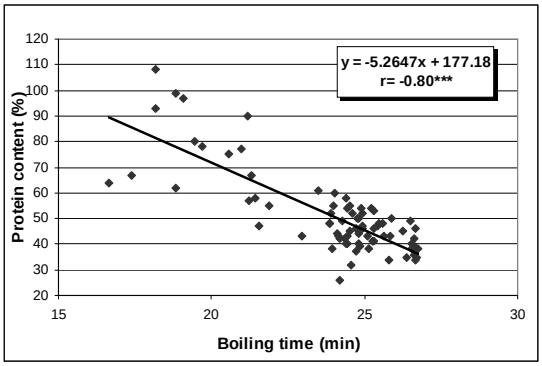


Figure 1 **The regression line for correlation between proteins content and boiling time**

The regression lines from *graphics 1, 2 and 3* emphasize the sense and intensity of correlations between analyzed traits. Thus, the regression line between proteins content and boiling time (*fig. 1*) shows the negative sense of the link between theses two characters. If the protein content is higher the boiling time is

lower. The regression line between amino acids content and the leafage number/plant (fig.2) emphasize a positive significant correlation where the values of X variable (amino acids content) grows in the same sense with values of the Y variable (leafage number/plant) The regression line referring to correlation between seed width and seeds number/pod (*fig. 3*), shows a negative very significant correlation. If the values of X variable (seed width) are much higher the values of Y variable (seeds number/pod) are lower.

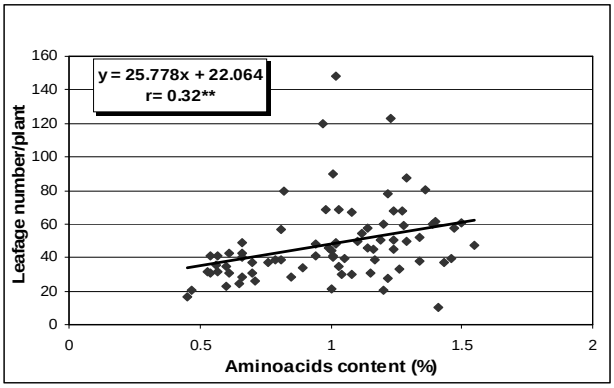


Figure 2 **The regression line for correlation between amino acids content and leafage number/plant**

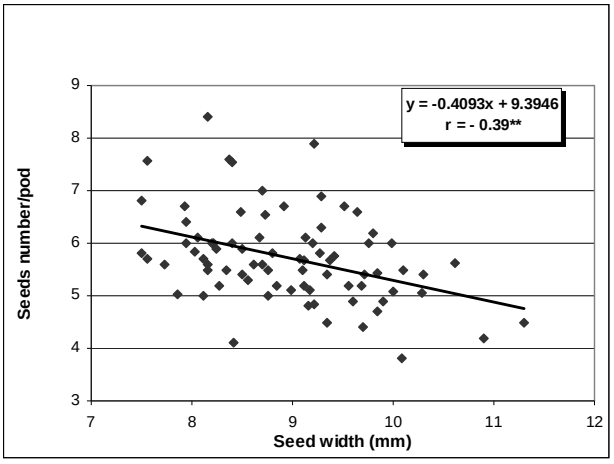


Figure 3 **The regression line for correlation between seed width and seeds number/pod**

## CONCLUSIONS

1. The studied bean local landrace represent a diversified biologic material with a high variability, having genetic value in the breeding work.

2. The biggest variability of the studied local population for descriptor the seeds number/plant and the lowest variability for protein content were observed.

3. The simple correlations between analyzed traits emphasize significant correlations, unmentioned in the scientific literature; between protein content and boiling time, between amino acids content and leafage number/plant and between seed width and seeds number/pod.

4. Collecting altitude was not influenced any morphological descriptor at the analyzed bean landraces that mean the characterized traits are not influenced by the collecting place.

5. The regression lines between the protein content and the boiling time and between seed width and the seeds number/pod emphasize the very significant negative correlations for these traits. Also, the regression line between amino acids content and leafage number/plant shows the positive link for these two descriptors.

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