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STUDIUL DESCENDENȚEI HIBRIDE (F1) LA UNELE GENOTIPURI DE *RIBES* SPP
THE STUDY OF SOME PROGENIES (F1) FROM *RIBES* SPP.

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Abstract

In the study period 2015-2018, 15 progenies (F1) from 5 hybrid families were evaluated to identify the variability and heritability of some quantitative and qualitative characters. So, some mathematical indices were calculated as: average per variance, standard deviation, coefficients of variability and heritability for 9 agrobiological traits, such as: flower size, clusters weight, number of berries/clusters, clusters length, berries size index, fruits soluble solids content, fruits titratable acidity content, number of seeds per berry, weight of 100 seeds. The evaluation revealed the WxT4 genotypes, with 28.09 berries/cluster and the RxJ15 genotype with an average weight of cluster 8.2 grams.

Cuvinte cheie: indicele de mărime, greutate ciorchine, variabilitatea, număr de boabe/ciorchine.
Keywords: size index, clusters weight, variability, number of berries/clusters.

1. Introduction

Around the world breeding improvement programs aim to obtain genotypes with good characteristics such as: higher yield with high quality of fruit and resistance to diseases and pests, too. Lately, very important begun to become for breeding programs the resistance to sudden climate change such as: the late spring frosts, drought and moisture excess. To achieve of these goals, the identifying of genotypes with superior characters is essential, and studying transmission in the progenies, is also very important. On this subject, the information's are limited (Madry et al 2000 and 2010). So, in order to develop the breeding programs, the breeders need valuable information such as genetic gain, variation coefficients, variability composition, and the heritability coefficients values (Zurawicz et al.1996). The heritability coefficients showed how much the phenotypic expression of a character on the selection unit is given by the genetic effect (Hollands et al. 2003 cited by Pluta et al. 2008). Also, Rankonjak et al. 2011, states that improving breeding programs depends on the knowledge of the traits, the knowledge of the genetic and inheritance systems and also the genetic factors that can influence their phenotypic expression. In the present paper work, we presents the results of the evaluation for nine agro biological traits evaluation to 15 progenies and the values for the most important mathematic indices for the breeding activity.

2. Material and methods

The study was conducted during 2015-2018 period at RIFG Pitesti, Romania. Investigations were carried in a currant hybrids plot, from five cross combinations family as: Werdavia x Jankeer van Tets, Red Poll x Jankeer van Tets, Blanka x Werdavia, Blanka x Abunent, Lopper Summer x Red Poll. The hybrids plants were planted in 2012 year, spaced 0,5 m apart in the row and 2.8 m between rows. During the study period, the experimental field was irrigated but no chemical fertilization was used. The soil in the experimental plot is an alluvial soil which on 0-20 cm depth show following properties: clay content, Ø < than 0.007 mm (C) =16.81%; organic matter (H) = 1.51%; pHH2O =5.5. In 2016 year the plants don't have fruits because during the flowering period the temperature was -4.5 Celsius degree. For quantifying the fruit quality characteristics, biometric fruit quality indicators were made: average cluster weight (g) was determined by weighing 100 randomly selected clusters. The number of fruits per cluster and seeds in fruit has made by counting. The length of cluster and the flower size was made by digital caliper. The soluble solids content (% Brix) was determined in berry juice obtained from 30 berries in 3 repetitions by means of digital refract meter (PR Series) and fruits titrable acidity was made with digital titratormeter type HI84533 HANNA. The index size was calculated by ratio between diameter and height of fruits.

The results obtained were statistically analyzed using the analysis of variance (ANOVA). Means were compared using LSD multiple range test at 0.05 probability levels. The different letters from figures are significantly different according to LSD test ($P \leq 0.05$) and the line bar represents standard deviation at level 0.05. The coefficient of variation (CV%) was calculated using the formulae of Burton and De Vane

(1953 cited by Cociu (1989). The heritability in narrow sense (h^2) was calculated according Allard (1960), the genetic gain (GG %) was calculated using the method of Falconer in 1996, all coefficients were calculate in percentage.

3. Results and discussions

The flower size. This characteristic is very important for breeding activity and has less agronomic importance, but very important for bushes aspect when the genotypes are used in garden use. Statistically, according to the size of the flowers, the studied genotypes were divided in 3 statistical classes, the highest values (9.88 mm) were recorded to the BXA51 genotype, and the lowest value (6.49) to the WXT genotype (fig. 1).

The cluster average weight and the number of berries/cluster. It is an important feature for identifying the genotypes destined for market as fresh fruit consumption. Thus in 2015 year, the genotype LXR56 differed significantly from the other studied genotypes with differences between 4.88-18.24%. In the 2017 year, the highest value (8.12 g) was recorded to the WXT4 genotype, who is differed significantly to other genotypes with differences between 0.37 and 67% (fig. 2). In the 2018 year the values recorded by the genotype RXJ15 (10.04) differ from the other studied varieties, with differences ranging from 9.99-84.2%. (fig. 2). On average over the three years of study the genotypes RxJ15 and WxT4 recorded the highest values of the weight of the cluster of 8.12 g and respectively 10.04 g / cluster. Concerning the number of berries/ clusters in the three years of study, the genotype WXT4 recorded the highest values (28.09 berries/cluster in the 2015 year and respectively 26.21berries/cluster in the 2017year), and in the 2018 year the highest value of the average number of berries/cluster (30,03) was recorded to the genotype RXJ15, between the two genotypes the differences recorded were not statistical assured (fig.3).

The length of the cluster is another important feature for consumers' attractiveness and for marketability, too. Thus the average values recorded in the 2015 year, for this characteristic divided the studied genotypes in four statistical classes, the values being between 6.43 up to 13.15 cm. In the 2018 year the recorded values were between 18.09-5.91, so the difference between the study years was till 22.8%, and the highest values in average for the three years of study were recorded to the genotype WXT4, differentiated versus the others genotypes with differences up to 79.54% in the 2015 year to 69.40% in the 2018 year (fig.4).

The size index, on average over the three years of study, recorded the highest value (14.19) to the genotype RXJ66, differences statistically insured were not recorded for this fruit quality indicator (fig.5).

The soluble solid fruits content (% Brix). Figure 5 shows that in the 2015 year, the recorded average values were between 13.84 -11.60% Brix, in the 2017year the average values ranged between12.11 - 14.51%, and in the 2018 year the average values were between 12.39 -17.39. In the last two years of study, 2017 year and respectively 2018 year, the genotype RXJ66 has recorded the highest average values (17.39 and 14.51), statistically differentiated from the other genotypes studied with differences between 1.02-11.98% in the 2017 year and between 11.11- 14.01% in the 2018 year.

The titratable acidity is the biochemical feature that together with soluble solid contents, can influence the taste of the fruits from sour to sweet, depending to the recorded values. Thus, in the 2015 year, the highest value (49.24%) was recorded to the genotype BxA54, statistically different from the others genotypes with differences up to 19.40%. In the 2017 and 2018 years, the highest values (45.46% and 47.17%), was recorded to the genotype BxA66, statistically differentiated from the other genotypes with differences between 82.61- 89.6% (Fig. 6).

The number of seeds/berry. It is a fruit quality characteristic, but it is important especially for the breeding activity. Thus, for fresh fruit consumers, berries with a few seeds or very small seeds are preferred. As a result of the performed determinations, more than 30 seeds were recorded to four genotypes, while the rest of the genotypes have recorded a number of seeds per berry between 5.91 and 7.07 seeds/berry (Fig. 7).

The weight of 100 seeds is a characteristic with importance for the breeding activity, so the determinations made showed that the highest value (0.194g /100 seeds) was recorded for the genotype RxJ15, and the lowest value genotype (0.037 g / 100seeds) was BxA66 (Fig. 8).

Figure 9 illustrates **the variability coefficient** values for 6 fruit quality characters. This coefficient, when recording values below 10, is considered to be small, when the values are between 10 and 20, the variability is considered to be medium, and when the values are above 20 the variability is considered high (Cociu, 1980). Thus, the genotypes from this study for all 6 characters which this coefficient of variability was calculated, recorded a small values, with the exception of the genotype RxJ66, which at the weight of the cluster character had registered 29.21 value, so variability is high in this case.

The genetic gain. The values recorded to this coefficient showed that in the case of the weight of the cluster the values above zero were recorded to the following genotypes: RxJ15 (15.17%); WxT8 (10.25%); WxJ21 (10.10%) WxT (14.60%); WxT (13.81%). In the case of the clusters length the values

higher than zero were recorded to the following six genotypes: LxR56 (2.84%); RxJ43 (4.08%); WxJ21 (29.04%); RxJ15 (49.30%); WxT4 (50.57%), WxT (31.94%). The genetic gain calculated for the soluble dry substance showed values between + 3% and + 12% for the following five genotypes: LxR24 (3.76%); RxJ43 (6.27%); RxJ66 (12.27%); BxA51 (1.39%); BxA54 (3.61%). In the case of the fruits titratable acidity, the calculated genetic gain recorded values above zero, to 6 from the 15 studied genotypes.

Figure 10 illustrates the values of the **heritability** coefficient in a narrow sense, and after Falconer 1996 and Cociu, 1989, when the values of this coefficient are near the 1 value, chances of transmitting the studied character in the future progenies are considerably. Thus values above 0.80 were recorded for 3 characters: berry size index, seed number / berry and soluble solids fruits content.

4. Conclusions

The heritability index values near the 1 value were recorded for three fruit quality characteristics (berry size index, seeds number / berry and soluble solids fruits content)

The values above zero of the genetic gain were recorded to the weight of the cluster at 5 genotypes, in the case of the cluster length at 6 genotypes and in the case of soluble solids fruits content to 5 genotypes. Of these 5 genotypes, 3 of them (RxJ15, WxT4 and WxT) recorded values over 0 for 2 quality fruits characteristics: cluster weight and cluster length. From the 15 studied genotypes, 4 from them present interest for future activities in the breeding programs: RxJ15, WxT4, WxT and RxJ66.

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Figures

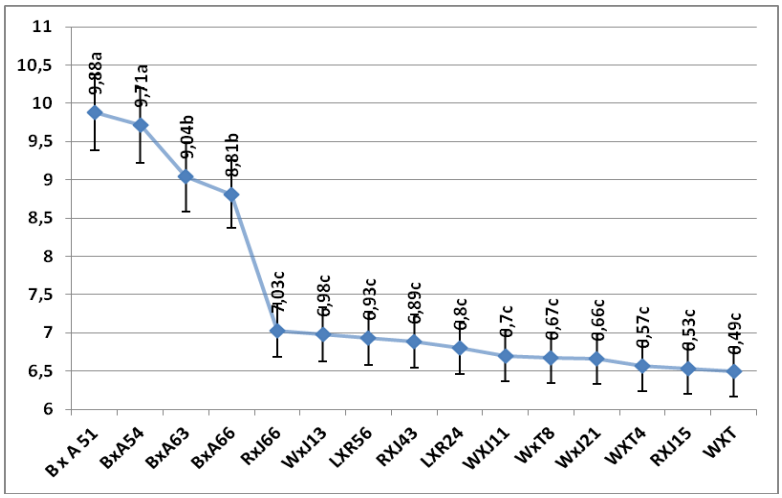

Fig. 1. The average flowers size

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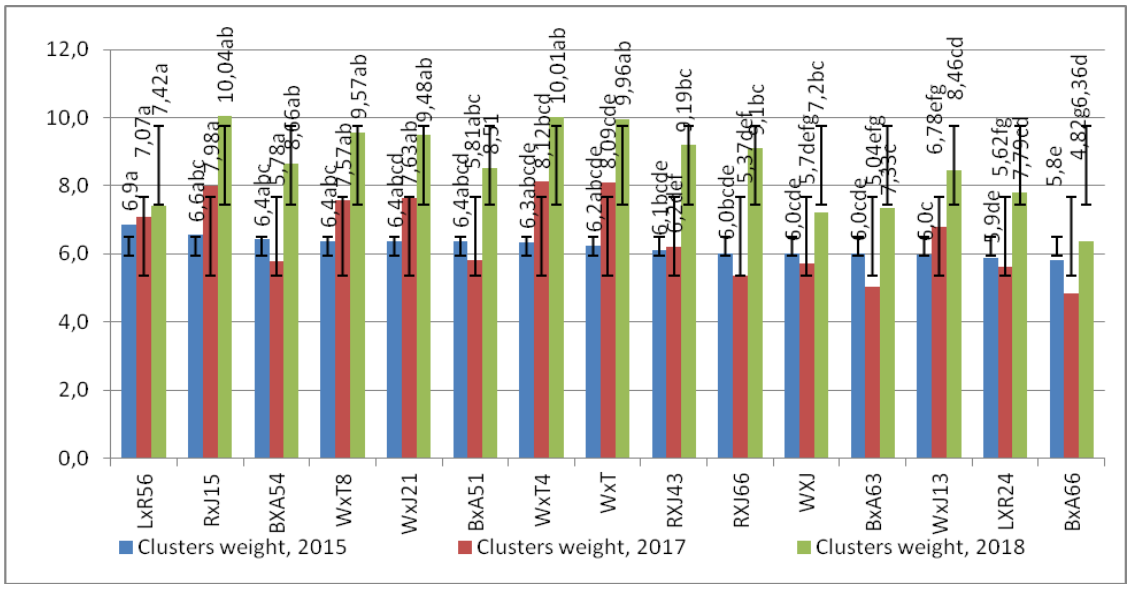

Fig. 2. The average clusters weight

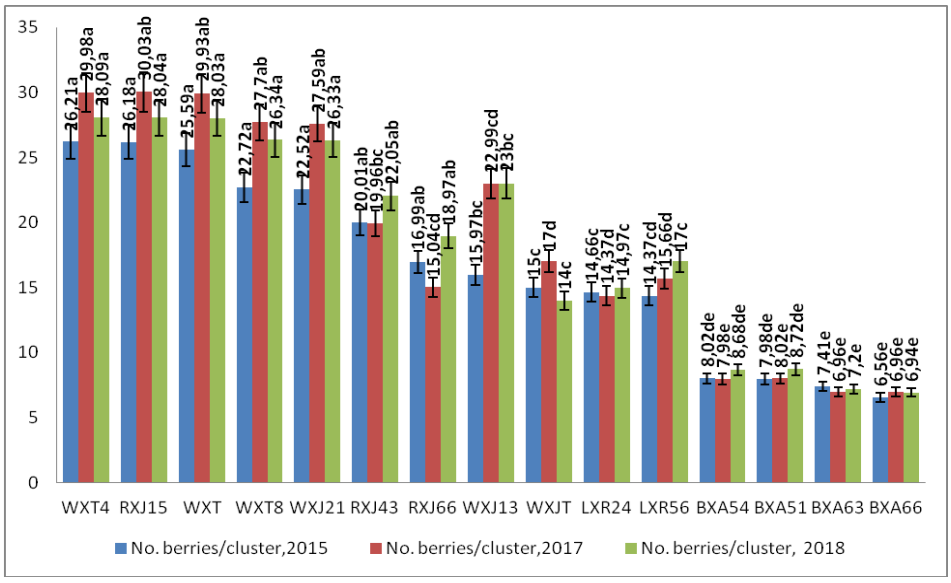

Fig. 3. The average number of berries/cluster

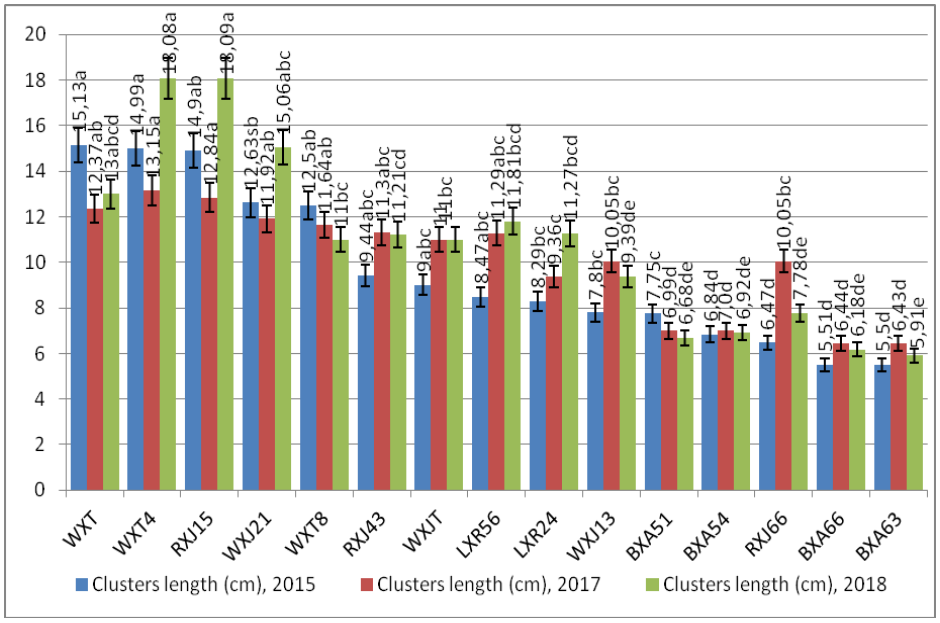

Fig. 4. The average clusters length (cm)

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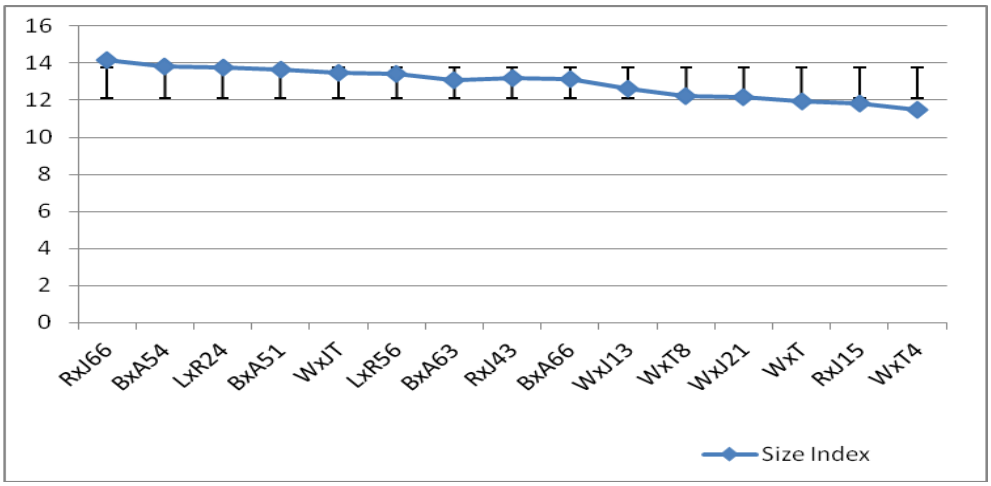

Fig. 5. The average size index

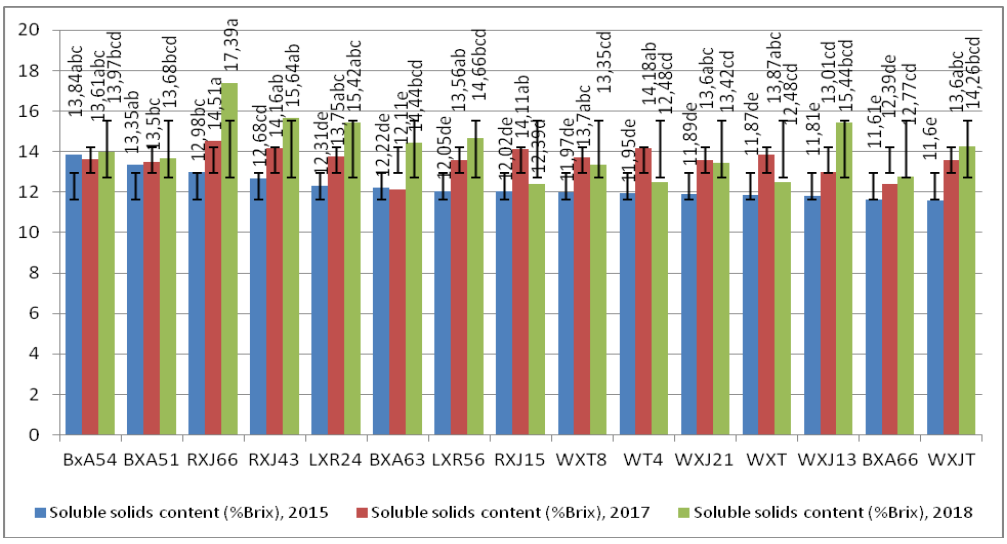

Fig. 6. The average soluble solids fruits content (%Brix)

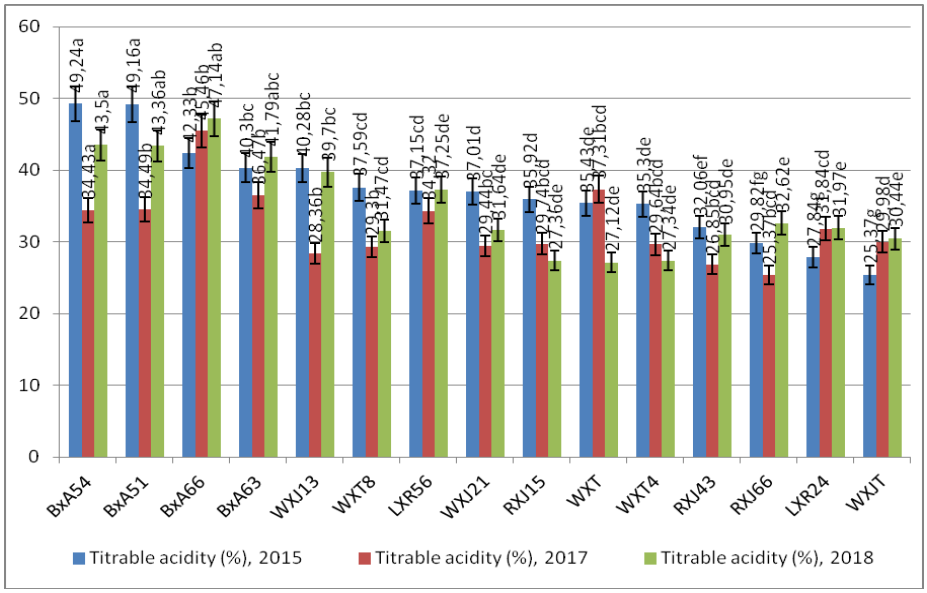

Fig. 7. The average titrable acidity fruits content (%)

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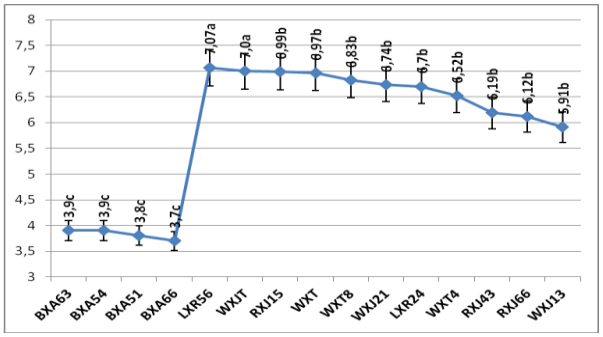

Fig. 8.The average number of seeds/ berry

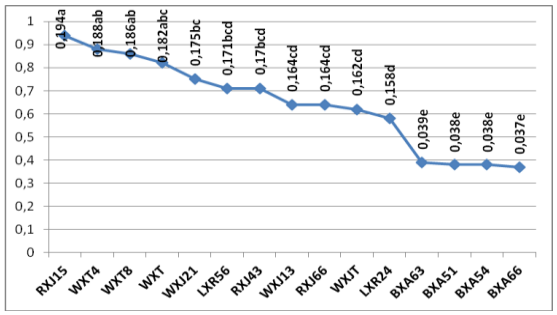

Fig. 9.The average weight of 100 seeds

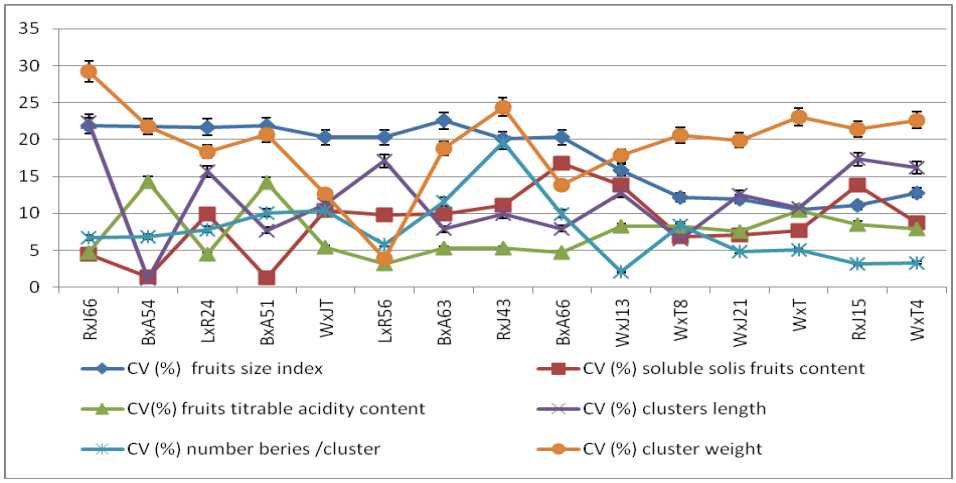

Fig. 10.Coeficient of variability for nine traits

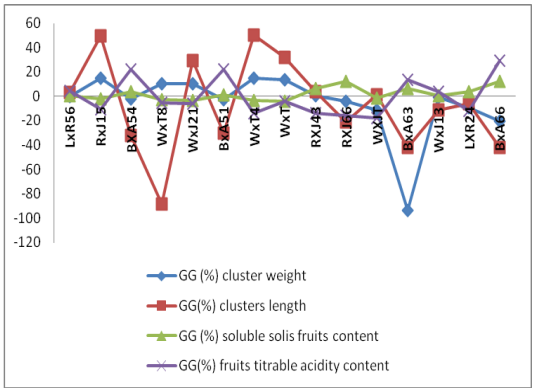

Fig. 11.The genetic gain for some traits

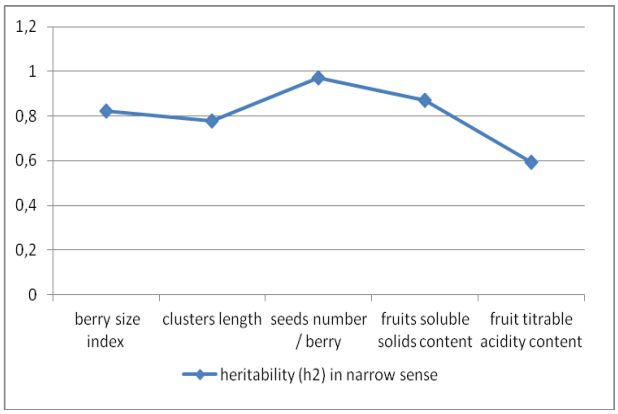

Fig. 12.The heritability for some traits