Studying the Relationship between Different Traits in Canola using Components Analysis in Moghan Plain

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Abstract: We studied 8 rape genotypes in random block design with three replications on a farm in Moghan plain in 2013 to realize the interrelations of traits and determine the explaining factors, studied characteristics in rape varieties. In this research five traits were studied including plant height, sheath number per plant, grain number per sheath, 1000 grain weight and grain yield. In the factor analysis, two factors with higher Eigen values were selected which had 75.207% initial data variance. According to the factor analysis, common coefficients of most characteristics is high and these results show that the number of selected factors is appropriate and the selected factors have been able to justify the changes of traits ideally. In the first factor including the most of data changes (39.47%) the traits such as sheath numbers per plant, grain number per sheath and 1000 grain weight had a large positive coefficient. So this factor can be introduced as the yield components factor. Finally the second factor justified the 35.73% changes and the traits such as plant height and grain yield influenced this factor and this factor was called as a yield factor. Generally these two factors evaluated a unique trait against other traits.

Keywords: *Brassica napus*, grain yield, factors analysis

1. Introduction

Canola (*Brassica napus* L.) is a one year old plant and has two different types spring and autumn in terms of ecological conditions of different regions. Spring varieties are naturally low yield and short. But autumn varieties are high yield, tall and are resistant to cold and draught (Ahmadi, 1996). Canola plays a critical role in supplying food for world population. Today some varieties of rapeseed oil having more than 48% seed dry weight, supplies 12% of world population needs to vegetable oils so is in the third place in this regard. China is one of the world's largest producers of rapeseed having more than 5 million tons. China and India produce more than 42 % rape concurrently. But almost all of their production is consumed domestically. The world's largest supplier of rapeseed is Canada which exported about 1.5 million tons (50% its own rape production) abroad in 1985 (Zavvarzadeh Moqaddam, 2012). The grain yield is a complex issue which is affected by several physiological and morphological process and environment conditions, the genetic structure of plants and their interactions can affect crop yield (Monneveux and Belhassen, 1996). According to Bouchereau et al (1996), yield and drought resistance are controlled by a separate gene locations on canola. Therefore modifying drought resistance includes the identifying and transferring genes which are responsible for controlling physiological traits affecting drought resistance and thus indirectly increase crop yield and produce good varieties. The yield components controlling genes may have severe connections or be due to effect of different genes. So when choosing any of the yield components is done in a specific population it's positive or negative reactions are found on other components (Kjear and Jensen, 1996). Analyzing to factors is one of the effective statistical methods in reducing the number of correlated variables to a few presumed main factors (Moghadam and et al, 1993). This method was applied effectively to understand

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the relation between structure and function of components and morphological traits of crop plants (Toosi Mojarrad, et al, 2005). The purpose of this research is to find how various traits are related to grain yield to take advantage of them in selection and presentation of varieties.

Materials and methods

This study was conducted on8 soybean genotypes in a random complete block design with 3 replications in Maughan plain in 2013. In this study the traits such as plant height, sheath number per plant, grain number per sheath, 1000 grain weight and grain yield were studied. The mentioned genotypes were placed in 30 cm from each other in plots including 8 rows of 2cm. necessary care, such as combating weeds during tillering was done with chemical pesticides. At harvest time, the harvest was done after removal of margin plots of an area with 3 square meters. SPSS software was used in this study for factors analysis.

Table 1 - genotypes used in this study

Number	Name of genotype	Number	Name of genotype
1	Hyola 401	5	Zargol
2	Quantum	6	Talaye
3	Heros	7	Sarigol
4	Hyola42	8	Hyola 308

Results and Discussion

Considering the fact that the relations among traits are complicated, the final deduction cannot be made based on simple correlation analysis and it requires multivariate statistical methods to understand the relationships between traits much better. Among all, analyzing to factor is an effective statistical way in reducing the amount of data and draw conclusions from data that show high correlation between the original variables. The analysis on the measured traits was performed by main components method. Then the factor rotation was performed using Varimax method. As can be seen in Table 3, the factor analysis was done based on Eigen values greater than one, and taking into account four factors. These 2 factors generally explained and justified 74.839 percent of the dada variation in this scenario. It should be noted that the obtained KMO values and the meaningfulness of the Sphericity Bartlett test (Table2) indicate adequate amounts of correlation between the variables for using analyzing to factor. The criterion of selecting these factors was the number of roots larger than 1 and since the number of basic variables used in analyzing to factor was 5, according to the formula $F< (P+1)/2$ (In which P And F represent the number of variables and factors respectively), 2 factors for this experiment were appropriate according to the presented principles (Toosi Mojarrad, et al, 2005). The traits with a same mark in a subset of one factor, all are under the influence of an unknown factor with a same direction and in other words they affect that factor with unknown nature and with a same direction. Every factor has not an individual existence; however, it is the result of all traits and processes that affect that particular factor (Mansuri and Soltani Najafabadi, 2004).

In the first factor containing the highest data change (39.47%) the traits such as sheath number per plant, grain number per sheath and 1000grain weight included a large positive coefficient so this factor can be considered as the yield components factor. Finally the second factor justifies 35.73% changes, plant height and grain yield influenced this factor and this factor was called as a yield factor. Mir Musavi et al (2006) reported that in analyzing to the factors the minimum rooted character traits demonstrates the adequacy of 4 factors for 14 strange traits. In this analysis, the four independent factors explained 75.207 percent of the variation of the total data.

Table 3 – KMO varieties and Sphericity Bartlett Test

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0.58	Kaiser-Meyer-Olkin Measure of Sampling Adequacy(KMO)	
65.25	Approx. Chi-Square	Bartlett's Test of Sphericity
26	df	
0.001	Sig.	

Table 2 – Factor coefficient of investigated traits in 8 varieties of Canola for the first and second factors

Traits	Factor		Communalities
	1	2	
plant height	-0.34	0.882	0.893
number of pods per plant	0.898	-0.054	0.810
grains per pod	0.882	0.089	0.786
1000 grains weight	0.498	-0.275	0.8
grains yield	0.159	0.96	0.948
Total	1.974	1.787	
% of Variance	39.473	35.734	
Cumulative %	39.473	75.207	

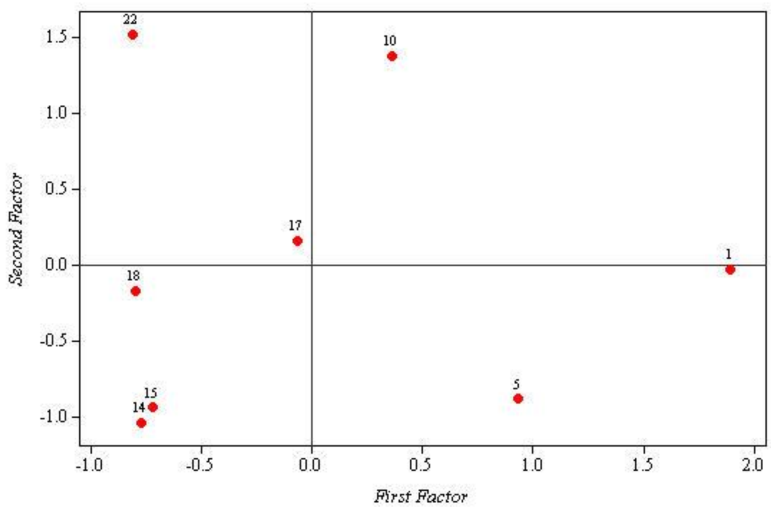

Figure 1 - Distribution of genotypes based on the two first and second factors

Reference

1. Ahmadi, MR. 1996. Important oilseed crop in beekeeping. Olive Magazine. No. 125. Pages 10 to 15.
2. Bouchereau, A., Clossais- Besnard, N., Besnard, A., Leport, L. and Renard, M. 1996. Water stress effects on rapeseed quality. J. Agronomy, 5: 19-30.
3. Kjear, B. and Jensen, J. 1996. Quantitative trait loci for grain yield components in a cross between a six rowed and two rowed barley. Euphytica, 90: 39-48.
4. Mansouri S. Soltani najaf Abadi M. 2004. Evaluation and systemic analysis of yield relationship between its components for breeding of sesame (Sesamum indicum L.). Seed and Plant Journal. 20(2): 167-149.
5. Mir Musavi .S. A., h. Zeinali Khaneghah and A. Hosseinzadeh. 2006. Investigation of Genetic correlation between grain oil percent and some quantitative and qualitative traits of canola by multivariate statistical

(DOI: dx.doi.org/14.9831/1444-8939.2014/2-SI/MAGNT.3)

analysis. Of Agricultural Sciences, 1385. 1-37

6. Monneveux, P. and Belhassen, E. 1996. The diversity of drought adaptation in wide. Plant Growth Regulation, 20: 85-92.
7. Tousi Mojarad M, Ghanadha M, Khodarahimi M, Shahabi S 2005. Factor analysis for grain yield and other traits of wheat. Journal of Pazhohesh and Sazandegi. 67: 9-16.
8. Zvarzadh Moghaddam, H. 2012. Selection of drought tolerant genotypes of rapeseed in the presence of potassium Hvmat. Breeding M.Sc. thesis. Islamic Azad University of Ardabil. 92 pages.

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