Evaluation of *Brassica* germplasm under semi cold rain fed conditions

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Abstract

To result, growing canola at the low temperatures, this plant is one of a few oil plants which can plant in fall at cold, semi cold and high areas. This research performanced to identify *Brassica* genotypes accompanied by their agronomy characters in Sararood Agricultural Research Station in semi cold dry land conditions. 139 canola genotypes (*napus*, *rapa* and *juncea*) were compared observational. Each variety was planted in 2 rows with 10 meters length and distance row to row 30 centimeters. In growing season and after harvesting 8 traits recorded. Variation range and coefficient of variation showed observable variation among varieties and species for traits. Seed yield and it's components (No. of pod in plant, No. of seed per pod and thousand seed weight) showed high variation. Factor analysis on the base of eigen value minimum expressed two factors for eight traits. Rate variance was 0.99 for first two factors. Share first factor and second factor was 0.78 and 0.21 respectively. In 1th factor, No. of sub branch and No. of pod per plant had high positive loads which have been named morphological factor. In 2nd factor, seed yield and No. of seed per pod had high positive loads which have been named yield and yield components factor. This results showed, that increasing seed yield do through increasing No. of seed per pod. To generally can express that germplasm under studying had enough genetic variation and this variation can be used for progressing breeding projects. Also No. of seed per pod trait can introduce as positive selection index in rain fed.

Key words: *Brassica*, Germplasm, Genetic Variation, Rain Fed

Introduction:

There are fields watered by rain fed and hidden possibilities for oil seeds in rain fed. Therefore, oil seeds widen as one of country aims to independence. Also, canola can grow at low temperatures that it can plant in cold, semi cold and highest areas (5). Rame and et al. (4) reported that four factors are defining the most variance rate (1th factor phonologic, 2nd factor yield components, 3rd undesired quality and 4th factor desired quality. In other studying, three factor defined the most variance rate. Total variance was 93.18% which have been named yield and yield components for 1th factor, morphologic particularities for 2nd factor and harvesting particularities for 3rd factor (1). Mirmousavi and et al. (3) resulted that factor analysis on the base of eigen value minimum expressed four factors. 1th factor, seed yield, No. of pod per plant, No. of seed per pod, No. of day to beginning flowering, growth period long, flowering period long, shattering resistance rate had high positive loads which have been named yield and its components factor. 2nd factor, germination rate, growth before winter, cold resistance and growth to beginning flowering have been named growth and plant establishment factor. 3rd factor, oil%, thousand seed weight and plant high have been named desired quality factor. 4th factor were oil% and protein% with coefficients of different load. Yield component affected in yield development directly and No. of pod per plant trait affect on yield particularly. These traits can use as selection index for high yield varieties. Introducing high yield varieties is the most important aim breeders for different environments accompanied by high adaptability and stability. There fore, evaluation plant germplasm is very necessary for breeders under rain fed conditions.

Materials and Methods:

139 canola genotypes **(*napus*, *rapa* and *juncea*)** were compared observational under rain fed in Agricultural Research Station of Sararood-Iran (Table 1). Each variety was planted in 2 rows with 10 meters length and distance row to row 30 centimeters in half of October before effective rain in Fall(Table 2). In growing season and after harvesting some traits recorded such as No. of day to end of flowering, No. of day to ripening, plant high, No. of sub branch per plant, No. of pod per plant, No. of seed per pod, thousand seed weight, oil%, seed yield and oil yield per plot. Weeds were deleted by hand (before rosette. and beginning stem). Statistics methods used for traits relative to seed yield were factor analysis with varimax rotation, cluster analysis on the base of group average linkage and traits correlation on the based of pierson.

Result and Discussion:

The results showed that there is high variation among genotypes for traits(Table 3). No. of day to end of flowering and no. of day to ripening traits showed range between 115 to 171 and 197 to 221 days with coefficient of variation 3.63% and 2.66% respectively. Plant high had average 103.69 cm and coefficient of variation 16.76%. Also, No. of sub branch had variation range between 1 and 10.4, mean 3.06 and coefficient of variation 46.73%. Yield and its components (No. of pod per plant, No. of seed per pod and thousand seed weight (TKW)) has been showed high variation too. No. of pod per plant had variation range between 17.6 to 278.2 and coefficient of variation 63.38% with mean 70.87. Other yield component, namely No. of seed per pod, included enough variation and coefficient of variation 24.4% with variation range between 7 to 27 and mean 18.85. Thousand seed weight showed variation range between 0.34 to 4.2, mean 2.97 gr and coefficient of variation

21.21%. Seed yield was affected by these three components. Seed yield had coefficient of variation 42.68%. accompanied by high variation range (0.19 to 1.87 Kg/plot) and mean 0.82 Kg/plot. Genetic variations were reported among canola genotypes for more agronomic traits and yield components researchers (2,6). Then, to attention to variation range and coefficient of variation can understand that there are variation among genotypes and this variation can be used for progressing breeding project. Factor analysis on the base of eigen value minimum expressed two factor eight traits (Table 3). In watered experiments have been reported four factors and three factors for traits under studying by other researchers (1,3,4). Eigen value was 9.46 and 2.56 for 1 th and 2 nd factors respectively. Rate variance was 0.99 for first two factors. Share first factor and second factor was 0.78 and 0.21 respectively. In 1 th factor, No. of sub branch and No. of pod per plant had high positive loads (0.98523 and 0.66495 respectively) which have been named morphological factor. Also, In 1 th factor, thousand seed weight and No. of seed per pod showed near by medium negative loads (-0.3286 and -0.37495 respectively). In 2 nd factor, seed yield and No. of seed per pod had high positive loads (0.324 and 0.9271 respectively) which have been named yield and yield components factor. 1 th factor explained the most variation rate. To attention loads in 1 th factor, increasing No. of sub branch and No. of pod per plant cause reducing thousand seed weight and No. of seed per pod. Namely, there is negative relative for mentioned traits. Traits correlations confirm it too. Loads in 2 nd factor showed that increasing seed yield was done by increasing No. of seed per pod. To generally can express that germplasm under studying had enough genetic variation and this variation can be used for progressing breeding projects. Hopper variety *{napus* species) andj-98-102-51, BP-1285, BP-4 varieties (*juncea* species) can be used in back cross as donor parent because of earliness. Also, No. of seed per pod trait can introduce as positive selection index in rain fed.

References

1. Abbas Dokht, H. and S. Ramezan Pour. 2002. Correlation and path analysis in fall rapeseed varieties. Proceedings of The 7 th Iranian Crop Sciences Congress, Seed and Plant Improvement Institute, Karaj, Iran. P.422.
2. Gupta, M.L., K.S. Labana and S.S. Badwal. 1987. Correlation and path coefficient of metric traits contributing towards oil yield in Indian mustard. 7th International rapeseed congress, Poznan, Poland. 107.
3. Mirmousavi, S. A., H. Zeinalee Khanghah, A. H. Hosseinzadeh and S. A. Peighambari. 2004. Factor analysis and cluster analysis in fall rapeseed varieties. Proceedings of The 8 th Iranian Crop Sciences Congress, Guilan University, Rasht, Iran. P.110.
4. Rameh, V. A., A. M. Rezai and GH. A. Saeedi. 2002. Factor analysis for quantitative and quality particulars in rapeseed. Proceedings of The 7 th Iranian Crop Sciences Congress, Seed and Plant Improvement Institute, Karaj, Iran. P.389.
5. Robbelen,G.,R.K.Downey and A.Ashri.1989.Oil crops of the world.Mc Graw Hill Publications.
6. Shipway, P.A. 1981. Factors controlling yield of oilseed rape (*Brassica* napus L.). Journal of Agricultural Science 96:389-416.

Table 1: Climate situation in dry land agricultural researches station – Sararood – Iran

Longitude	47°,19'
Latitude	34°,20'
Elevation	1351.6 m
Annual rainfall mean	478 mm
Maximum rainfall	783 mm
Minimum rainfall	241 mm
Annual temperature mean	+13.8°c
Temperature absolute maximum	+44°c
Temperature absolute minimum	-27°c
Topography	Undulate
Soil	Silt Clay Loam
Climate	Semi Cold
Location	Northern Zagross Mountains Range

Table 2: Crop growing season meteorological details for Sararood station - Iran (2002-2003)

Evaporation (mm)	Average Rel Humidity %	No. of days Below(0)	Average Temp	Mean.Temp		Abs.Temp		Rainfall (mm)	Month
				Max	Min	Max	Min		
230.99	32.81	0	18.02	27.32	9.25	33.2	2.8	8.3	OCT
201.9	58.87	4	9.3	15.88	4.07	21.6	-3.6	55.7	NOV
0	72.18	14	3.28	7.87	-0.44	16.2	-9.8	58.7	DEC
0	67.5	26	2.35	7.77	-2.45	16.4	-7.2	85.2	JAN
0	64.71	17	3.98	9.21	-0.8	15.4	-7.2	78.5	FEB
0	54.19	14	7.75	14.1	1.02	19.2	-5.2	66.7	MAR
142.91	54.25	1	13.88	20.22	6.08	27	-2.2	48.4	APR
265.36	36.32	0	19.71	26.6	8.35	30.2	0.8	22.9	MAY
343.42	23.05	0	25.51	33.14	11.97	36.4	5	0	JUN

Date of first rain in fall: Oct.27.2002 Date of final rain in spring: May.31.2003
Date of final effective rain in spring: Mar.26.2003 Date of final freezing in spring: Apr.2.2003

Table 3: Measured statistics on the traits under studying in rapeseed

Traits	Loads		Minimum	Maximum	Mean	Std	CV%
	1th	2nd					
DEF	-0.016	-0.0046	115	171	162.86	5.91	3.63
DR	-0.0401	0.0001	197	221	208.14	5.54	2.66
PH	0.0641	0.1663	52.5	167	103.69	17.38	16.76
SB	0.9852	0.1712	1	8.4	3.06	1.43	46.73
PP	0.665	0.1261	17.6	278.2	70.87	44.92	63.38
SP	-0.375	0.9271	7	27	18.85	4.6	24.4
TSW	-0.3286	0.1655	0.34	4.2	2.97	0.63	21.21
OIL%	-0.1036	0.0383	0.43	0.55	0.5	0.002	0.4
OY	0.0658	0.3098	0.09	0.89	0.41	0.18	42.83
SY	0.0799	0.324	0.19	1.87	0.82	0.35	42.68

DEF=No. of day to end of flowering, DR=No. of day to ripening, PH=Plant high,
SB=No. of sub branch, PP=No. of pod per plant, SP=No. of seed per pod, SW=Thousand seed weight, Oil%=Oil percentage, OY= Oil yield, SY=Seed yield