The Pharma Innovation Journal 2018; 7(12): 201-203

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2018; 7(12): 201-203

www.thepharmajournal.com
Received: 13-10-2018
Accepted: 14-11-2018

Raushan Lal
Department of Genetics and Plant Breeding, NDUAT, Kumaganj, Faizabad, Uttar Pradesh, India

Raghvendra Tiwari
Department of Genetics and Plant Breeding, NDUAT, Kumaganj, Faizabad, Uttar Pradesh, India

OP Verma
Department of Genetics and Plant Breeding, NDUAT, Kumaganj, Faizabad, Uttar Pradesh, India

IS Solanki
Directorate of Research, BAU, Sabour, Bihar, India

Correspondence
Raushan Lal
Department of Genetics and Plant Breeding, NDUAT, Kumaganj, Faizabad, Uttar Pradesh, India

Genetic evaluation for seed yield and its contributing traits in *Brassica rapa* (L). Var. yellow sarson

Raushan Lal, Raghvendra Tiwari, OP Verma and IS Solanki

Abstract
The present investigation entitled "Genetics studies for seed yield and its contribution traits in *Brasica rapa* (L.) Var. Yellow sarson" was carried out in two environments timely (E1) and late sown condition (E2) at Research Farm of Genetics and plant breeding department, N.D. University of agriculture and Technology, Kumarganj during rabi, 2010-2011. Observations were recorded on days to 50% flowering, days to maturity, primary branches plant fruiting zone length (cm), number of siliquae on main raceme, seeds siliqua^{-1},1000-seed weight (g) seed yield plant^{-1}, harvest index and oil content.
Estimates of gca and sca variances and revealed that non-additive gene action was important in the expression of different characters in both the environments.
The best five crosses namely NDYS 427 X NDYS 08-01, RAGINI X NDYS 116 -1, YST X NDYS 424 X NDYS 116-1 and Ragini X NDYS 07-02 were identified as good specific combinations for seed yield as well as some other traits. Highest heterosis for seeds yield plant-1 was 25.19% (jagriti X NDYS 08-01) and 115.77% (Ragini X NDYS 07-02) over better parent and standard variety, respectively in timely sown and in case of late sown condition it was highest as 30.62% (YST -151 X NDYS 425) and 91.50% (NDYS 427X NDYS 08-01) over better parent and standard variety respectively high estimates of heritability in narrow sense where observed for days to 50% flowering bracket (72%, 56%) plant height (88%, 82%) primary branches per plant (62%, 64%) fruiting zone length (83%, 85%) number of siliquae on main raceme (74%,71%) seats are siliqua silica 85% 82% seed yield per plant (45% 44%) and Oil content (38%,35%) in both the environment respectively.

Keywords: Seed yield, siliquae, heritability, non-additive gene action

Introduction
India is one of the important rapeseed mustard growing country in the world occupying second position in area after china and third position in production after China and Canada (Anonymous, 2010) [2]. Oilseed are important next to food grains in terms of area, production and value. The diverse agro-ecological condition in the country are favourable for growing the different oilseed crops in India. Most important oilseed crops in India are groundnut, rapeseed -mustard, sesame, linseed, castor, sunflower, safflower, soybean and Niger.
Yellow sarson (*B. campestris*) and Indian mustard (*B. juncea*) are the important species largely grown as oilseed crop in subtropical and tropical countries. Indian mustard (*B.juncea* (Linn) Czern and Coss). Popularly known as rai, raya or laha is one of the most important oil seed crops of the country and its occupies considerably large acreage among the Brassica group of oil seed crops.
Among the biometrical techniques, dillael analysis has been used extensively for deciphering nature of gene action and selection of suitable parents for hybridization. Diallel cross analysis is the only technique, which though evaluates a limiting number of line at a time, yet provides all shorts of genetic information within a short period. Through this technique the detailed genetic architecture of the parental material can be assessed in one generation, whereas several generations are required to be grown in other methods.
The available reports indicates that there is good reservoirs of exploitable economic F1 heterosis of more than 50 per cent in these crops Labana *et al.*, 1975; Banga and Labana, 1984; Dillon *et al*. 1990; Rai, 1979; Kumar and Kumar, 1989).
Heritability and genetic advance are also important selection parameters in predicting the gain under selection. These estimates help the breeder in selection of elite genotypes for diverse genetic populations.

Material and Methods
The experimental material consisting 56 treatments (45 F1 s + 10) parents +1 standard variety

NDYS 2) where sown in randomized block design with three replications in 2 environment (timely sown and late sown) on 26th October even and 27th November (E2) respectively during Rabi 2010-11 each entry was sown in a single row of 5m length with inter and intra row spacing of 45 cm and 10 cm respectively. The distance between plant to plant was maintained by thinning after 15 days of flowering. To avoid the border effects the plot falling on the border where is surrounded by none experimental rows of varieties strains. Recommended agronomic practices were adopted to raise a good crop.

The fertilizers were applied @ 120 kg N, 60 kg P2O5 and 60kg K2O per hectares under timely even and late sown condition (E2) half of Nitrogen and full dose of phosphorus (P2O5) and potash (K2O) applied as basal application remaining half of Nitrogen was applied after first irrigation.

Results and Discussion

For days to 50% flowering, the value of t2 was found to be significant in (9.21) E1 which invalidated assumptions of diallel cross analysis and in (0.75) E2 the value of t2 was non-significant that fulfils the assumptions of diallel cross analysis.

The non-significant value of t2 for days to maturity confirmed the validity of assumptions of diallel cross analysis in both the environments. The addictive (D) and dominance (H1 and H2) components were found significant in both the environments.

For number of siliquae on main raceme, t2 value was found to be non significant which indicated the validity of assumptions pertaining to diallel cross analysis in both the environments.

The value of H1 (7.28, 7.08) and H2 (7.60, 6.98) lower than D (15.32, 16.17), indicates additive gene action in both E1 and E2 environments.

For number of seeds per siliquae, t2 value was found to be non-significant which indicated the validity of assumptions pertaining to diallel cross analysis in both the environments.

Out of forty five crosses, twenty three crosses had significant heterosis for late flowering, while one cross exhibited significant desirable heterosis for early flowering *viz*. NDYS116 -1 X Pusa Gold (-4.84%).

Out of forty five crosses, eleven crosses had significant heterosis for late maturity, while three crosses exhibited significant desirable heterosis for early maturity *viz*. NDYS 424X NDYS 07-02 (4.79%), YSYST-151 X pusa Gold (-3.62%), NDYS 424 X Pusa Gold (-3.37%) respectively.

Out of forty five crosses, 11 cross combinations showed significant negative heterosis for number of siliquae on main raceme, while only one cross NDYS 427 X NDYS 08-01 (21.59%) exhibited significant positive heterosis for number of siliquae on main raceme.

Out of forty five crosses, thirty two crosses had significant negative heterosis for test weight, while eleven crosses *viz*. Jagriti X Ragini (21.23%), YST-151 X NDYS 08-01 (20.79%), Ragini X NDYS 116-1 (19.23%), Ragini X pusa Gold (16.54%), jagriti X NDYS 427 (13.82%), NDYS 427 X NDYS 08-01 (13.61%), Ragini X NDYS 427 (12.66%), NDYS 424 X NDYS 08-01 (10.89%), NDYS 424 07-02 X Pusa Gold (9.59%), respectively exhibited significant positive heterosis for this trait.

Table 1: Crosses showing highest heterosis over standard variety in E1 and E2 environments

Characters	Timely sown	Late sown
Days to 50% flowering	Ragini X NDYS 116-1 (-5.69%)	Ragini X NDYS 116-1 (-8.29%)
Days to maturity	Jagriti X NDYS 07-02 (-5.38%)	Ragini X pusa Gold (-6.35%)
Plant height	YST-151 X NDYS 425 (18.84%)	YST -151 X NDYS 425 (21.07%)
Primary branches /plant	Ragini X NDYS 07-02 (31.55%)	Ragini X NDYS 427 (38.56%)
Fruiting zone length	YST-151 X NDYS 427 (28.83%)	RH YST -151 X Jagriti (23.99%)
Number of siliquae on main raceme	YST- 151 X jagriti (46.13%)	NDYS 427X NDYS 08-01 (40.48%)
Seeds/siliquae	NDYS 424 X Ragini (28.13%)	NDYS 424 X Ragini (36.45%)
1000-seed weight	Jagriti X Ragini (44.37%)	NDYS 424 X Pusa Gold (46.79%)
Biological yield per plant	NDYS 427 X NDYS 116-1 (65.77%)	NDYS 424 X NDYS 08-01 (71.85%)
Seed yield per plant	Ragini X NDYS 07-02 (115.77%)	NDYS 427 X NDYS 08-01 (91.50%)
Harvest index	Ragini X NDYS 07-02 (71.83%)	YST -151 X jagriti (61.13%)
Oil content	Ragini X NDYS 07-02 (7.98%)	Ragini X NDYS 07-02 (6.02%)

The present investigation was undertaken to unfold the nature and magnitude of genetic variation combining ability heterosis heritability and genetic advance in diallel cross for yield and its contributing characters for efficient and result oriented crop improvement approach in brassica rapa awards yellow Sarso dial in analysis a it evolve from the early work of Schmidt (1919), Yates (1947) and Haymaking(1954a & 1954 b) and Jinks (1954) is widely used methodology which rationalizes genetic study of quantitative characters.

Components of variation showed that both additive and dominance gene action played an important role in Inheritance of days to 50% flowering days to maturity, plant height, number of primary branches/plant, seed yield per plant harvest index, Oil content in both conditions and seeds per siliqua in late sown condition were dominant gene action played an important role in Inheritance of biological yield plant in both condition and 100 seed weight in late sown condition.

For rapid genetic improvement through understanding about the pattern of Inheritance of variation in different plant characteristic is an essential pre-requisite for plant breeder. The information on different genetic component of variation example additives, non additive, epistasis and linkage may be useful to develop an appropriate selection protocol while handling the segregating generation. Diallel cross technique is commonly used by the breeder to collect the genetic information for the plant material at hand. The analyses of the data reported in this investigation provided valuable information about the mechanism of genetically controlled variation in some quantitative character of *Brassica* plant.

Significant variances where observed for both general and specific combining ability for all the 12 characters under both the conditions. Estimates of GCA and SCA variances revealed that non- additive gene action was important in the expression of different characters in both the conditions.

High value of Sca variance and the average degree of dominance were revealing there by over dominance, for all the characters in both timely and late sown conditions.

In general, considerable amount of heterosis over parent was observed for all the character study. Highest heterosis over better parent was observed for all the character study. Highest heterosis over better parent for days to 50% flowering was found in cross NDYS 116-1 X PUSA GOLD (-4.84%) in timely sown condition and NDYS 427X NDYS 116-1 (-1.11%) in late sown condition; for days to maturity NDYS 424X NDYS 07-02 (-4.79%) in timely sown condition and Ragini X pusa Gold (-5.69%) in late sown condition. For seed yield per plant Jagriti (21.09%) in timely sown condition and YST-151 X jagriti (36.89%) in late sown condition; for oil content Ragini X NDYS 07-02 (2.71%) in timely sown condition and NDYS 424 X Pusa Gold (2.41%) in late sown condition.

Genetic analysis show that additive and non additive gene effects where predominant for yield and its contributing traits. Previous workers have reported difficulties in studying single plant is due to both inconsistency of result and generally low heritability. Yield its and attribute have shown considerable amount of additive as well as non-additive genetic variance improvement of such character should be based on the simultaneous exploitation of both additive as well as non-additive components of genetic variances the presence of dominant also suggest the possibility of improving and its components by heterosis breeding.

Table 2: Best crosses showing highest heterosis over better parent in E1 and E2 environment.

Characters	Timely sown	Late sown
Days to 50% flowering	NDYS 116-1 X Pusa Gold (-4.84%)	NDYS 427 X NDYS 116-1 (-1.11%)
Days to maturity	NDYS 424 X NDYS 07-02 (-4.79%)	Ragini X pusa Gold (-5.69%)
Plant height	YST- 151 X NDYS 425 (3.69%)	Ragini X NDYS 427 (8.16%)
Primary branches /plant	Ragini X NDYS 08-01 (2.50%)	NDYS 424X NDYS 425 (13.54%)
Fruiting zone length	YST-151 X NDYS 08-01 (2.50%)	YST- 151 X jagriti (3.89%)
Number of siliquae on main raceme	YST-151 X Jagriti (6.07%)	NDYS 427X NDYS 08 01 (21.59%)
Seeds/siliquae	YST-151 X jagriti (3.14%)	YST-151 X NDYS 425 (14.08%)
1000-seed weight	Jagriti X Ragini (21.23%)	NDYS 424 X NDYS 07 02 (14.08%)
Biological yield per plant	YST-151 X NDYS 427 (35.69%)	NDYS 116-1 X NDYS 07-02 (50.11%)
Seed yield per plant	Jagriti X NDYS 08-01 (25.09%)	YST-151 X NDYS 425 (30.62%)
Harvest index	YST-151 X JAGRITI (21.09%)	YST-151 X jagriti (36.89%)
Oil content	Ragini X NDYS 07-02 (2.71%)	NDYS 424 X Pusa Gold (2.41%)

Conclusion

Diallel cross analysis using 10×10 diallel crosses (excluding reciprocal) was done to find out the the genetic architecture of various quantitative traits, heterosis and combining ability, heritability and genetic advance. The experiment consists of 10 diverse parents *viz*.YST151, jagriti, NDYS 424, NDYS 425, Ragini, NDYS 427, NDYS 116-1, NDYS 08-01, NDYS 07-02 and Pusa Gold in half diallel fashion design were selected on the basis of variability for various characters from the germplasm maintained at oilseed section of Department of Genetics and plant breeding. A total of 56 treatments (45 F1 s +10 parents + 1 standard variety NDYS 2) were grown in Randomized block design in three replications.

Diallel cross analysis revealed the role of both additive and non additive gene action for all the characters in both the environment (E1 and E2), except for 1000- seed weight in even and biological field for plant in E2, where dominant gene action played significant role.

The proportion of h2/H2 suggested that dominant alleles were mainly governed by one major gene except biological yield/plant in late sown condition.

On the basis of GCA effects parent YST-151 was found good general combiner for plant height length of fruiting zone, number of siliquae on main raceme.

In general, considerable amount of heterosis over better parent was observed for all the character under study. Highest heterosis over better parent for days to 50% flowering was found in cross NDYS 116-1 X Pusa Gold (-4.84%) in Timely sown condition and NDYS 427X NDYS 116-1 (-1.11%) in late sown condition.

Highest heterosis over standard variety for days to 50% flowering cross Ragini X NDYS 116-1 (5.69%) in timely sown condition and Ragini X NDYS 116-1 (-8.29%) in late sown condition.

Reference

1. Alard RW. The analysis of genetic environmental interaction by means of diallel crosses, 1956b.
2. Anonymous. Economic survey of India. Economic division, Ministry of finance, Govt. of India, 2011.
3. Choudhary VK, Kumar R, Sah JS. Variability studies in Indian mustard [*Brassica junacea* (L.) Czern and Coss]. J Appl. Bio, 2003.
4. Chauhan JS, Meena SS, Yadav JS. Segregation pattern and estimation of genetic parameters in F2 population of Indian mustard, 2001.
5. Comstock RE, Robinson HF. Estimation of average dominance of genes. In: Heterosis. J.W. Gowen Iowa State college press, 1952.
6. Das B, Rai B. Heterosis in inter varietals crosses of toric. Gupta, P.C and Shiv Narayan. Potential crossed for development of hybrid varieties in Indian mustard, 1972-2005.
7. Hayman BI. The theory of analysis of diallel crosses, 1954a.
8. Niagam R, Alka. Combining ability analysis for yield and its components in Indian mustard, 2008.
9. Parmar MB, Patel KM, Prajapati KP. Assessment of genetic worth of parents and hybrids in Indian mustard, [*Brassica juncea* (L.) Czern and Coss], 2004.
10. Singh SK, Singh AK, Kumar K. Heterosis for yield and yield attributes in Indian mustard [*Brassica juncea* (L.) Czern and Coss], 2007.
11. Varshney SK, Shah MDZ, Sah JN. Variability and head process for Seedling characters among F1 hybrid of Indian mustard, 2000.
12. Verma OP, Kumar K, Bhajan R, Maurya KN, Singh HK, Singh NK. Heterosis in relation to combining ability for seed yield, components traits, oil and protein content in yellow sarson [*Brassica rapa* Var. Yellow sarson], 2009.