EFFECT OF SOWING DATE VIS-A-VIS VARIETY OF RAPESEED AND MUSTARD ON GROWTH, YIELD AND APHID INFESTATION IN GANGETIC PLAINS OF WEST BENGAL

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INTRODUCTION

Oilseed and oil has assumed an importance of their own in the economy of the country as well as in the life of people for balanced nutrition. Among the different oilseed crops, rapeseed and mustard holds a key place in Indian agriculture. In West Bengal, it is the most important oilseed crop occupying an area of 4.1 lakh hectares with a production of 4.20 lakh tonnes (Anonymous, 2012). The predominant rapeseed and mustard varieties of West Bengal are B-9 and B-85 respectively with an average yield of 1021 kg ha⁻¹ (Anonymous, 2012). These varieties are very old and needed to be replaced by the new high yielding varieties. In Gangetic plains of West Bengal where winter is short and cropping intensity is high, the choice of rapeseed and mustard variety is very critical. In this case cultivation of improved short duration high yielding varieties of rapeseed and mustard can be the solution to increase the production (Ozer and Oral, 1997; Sharma and Manchanda, 1997) and make the rapeseed and mustard cultivation more profitable.

Production potentiality of a genotype can be fully exploited by adopting suitable agronomic practices. Among the different agronomic practices, optimum sowing time plays a great role to fully exploit the genetic potentiality of a variety as it synchronises the optimum environmental conditions such as temperature, light, humidity, rainfall etc. with the different growth phases of the crop and results in better expression of the crop in terms of growth and yield (Salmasi et al., 2006). It is a fact that a specified genotypes does not exhibit the same phenotypic characteristics in all environmental conditions. The different genotypes, growth responses varies to different environment and eventually decides the selection of a genotypes for a particular or different date of sowing for stabilizing higher yields.

The aphid (Lipaphys erisimi) is an important insect pest of mustard (Aslam, 2005) and causes heavy yield losses worldwide (Shylesha et al., 2006; Thakur et al., 2009). They suck the sap from the plant and hamper the plant nutrition to a great extent. As a result, plant loses their vigour and their growth is hampered which ultimately affects the yield of the crop. The yield losses may be 10-90% depending upon the severity of damage and the stage of the crop (Dhaliwal et al., 2004; Rana 2005 and Parmar et al., 2007).

From the above points it is clear that varieties, date of sowing and aphid plays a great role in the production of the rapeseed and mustard. However, very few works has been done on rapeseed and mustard crop integrating all these components in Gangetic plains of West Bengal. Hence the present studies was carried out to find out new high yielding varieties of rapeseed and mustard and

ABSTRACT

In a field experiment six varieties of rapeseed (NC-1, B-9) and mustard (SEJ-2, NPJ-112, JD-6, and NRCHB 101) were sown in three different dates (first-20th October, second- 5th November and third-20th November). The mustard variety NRCHB-101 achieved highest yield (1.54 t ha⁻¹) and net monetary return (Rs. 46,103.50 ha⁻¹) with a benefit-cost ratio of 3.00 followed by the other mustard varieties NPJ-112, JD-6, and SEJ-2 respectively... Among the different dates of sowing, first one (20th October) showed its supremacy obtaining an yield and net monetary return of 1.35 t ha⁻¹ and Rs. 39405.58 ha⁻¹ respectively while the last one showed its inferiority. Severity of aphid (Lipaphys erisimi) infestation was more on rapeseed varieties and increased progressively (4-9.5 times and 6-17 times for 2nd and 3rd date of sowing respectively over 1st date of sowing) with the delay in sowing resulting in considerable yield loss (4-11%) during both the years of experiment.

KEY WORDS

Rapeseed and Mustard
Variety
Date of sowing
Aphid infestation
Yield

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their suitable sowing time to augment the production of this highly important oilseed crop in this region and also to find out the relative susceptibility of these high yielding cultivars to the aphid infestation.

MATERIALS AND METHODS

Experiment site and soil
The field experiment was conducted during the winter (rabi) season of 2011-12 and 2012-13 at the research farm (latitude-22°43' N, longitude-88°34' E) of Bidhan Chandra Krishi Viswavidyalaya, West Bengal. The land situation of the field was medium. The experimental soil was sandy loam in nature having sand, silt and clay content 44.21, 31.68 and 24.11 percentage respectively as determined by the Robinson’s pipette method (Piper, 1964). The chemical properties of the soil are characterized in the Table 1.

Experimental design
The experiment was laid out in split plot design with 3 replications and comprised of 3 dates of sowing (first-20th October, second- 5th November and third-20th November) as main plot treatment and six varieties of rapeseed (B-9 and NC-1) and mustard (SEJ-2, NPJ-112, JD-6, and NRCHB 101) as sub plot treatment.

Crop management
The crop was sown with a fertilizer dose of 80:40:40:: N:P:K kg ha⁻¹. Full dose of phosphorus and potassium were applied as basal and nitrogen was applied in three splits - half of the nitrogen was applied as basal, 1/4th as first top dressing at 25 DAS (days after sowing) and rest 1/4th at 45 DAS. Three irrigations were given for better growth and development of the crop. No plant protection measure was taken.

RESULTS AND DISCUSSION

Varieties
There was significant difference among all the varieties with respect to their performance in the field. The variety JD-6 achieved maximum plant height (180.32) and it was statistically similar with the variety SEJ-2 and NRCHB-101 respectively (Table 2). The variety NC-1 recorded lowest plant height. Regarding seed yield, the variety NRCHB-101 showed its supremacy (1.54 t ha⁻¹), while the interior grain yield (0.95 t ha⁻¹) was achieved with the variety B-9. The maximum number of siliqua plant⁻¹ was also recorded in NRCHB-101 (146.10), followed by JD-6 (140.59). But the lowest number of siliqua plant⁻¹ (71.99) was observed with NC-1. Maximum branches per plant (6.79), test weight (3.87 g) and seeds per siliqua (30.93) were recorded with the variety NPJ-112, SEJ-2 and NC-1 respectively. It was also found that different yield and yield component of the mustard varieties were higher compared to the rapeseed varieties. This may be due to the fact that mustard varieties have slightly longer duration (110-115 days) than the rapeseed varieties (95-100 days), which favours more translocation of photosynthates from source to sink. It was found that the oil content of the rapeseed varieties were more compared to the mustard varieties and rapeseed variety B-9 recorded maximum oil content (42.55 %). This may be due to genetical characteristics of the varieties. Findings of this
experiment are in accordance with the results obtained by Rana and Pachauri (2001) and Guohuai et al. (2002).

**Dates of sowing**

Different dates of sowing significantly influenced the growth characteristics and yield components of the cultivars used in the experiment. Among the three dates of sowing, first one (20th October) proved to be superior over others (Table 2). Highest values of plant height (156.68 cm), branches per plant (6.07), silique per plant (125.74), seeds per silique (18.09), and test weight (3.68g) were achieved when the crop was sown on 20th October (1st date of sowing). However, interior values of all the growth and yield component were registered with the third date of sowing. Similar type of results also found for all the growth and yield component were registered with the third date of sowing. Similar type of results also found (77.49 and 108.10 numbers plant\(^{-1}\)) in the experiment. Among the three dates of sowing, first one (20th October) proved to be superior over others (Table 2). Highest values of plant height (156.68 cm), branches per plant (6.07), silique per plant (125.74), seeds per silique (18.09), and test weight (3.68g) were achieved when the crop was sown on 20th October (1st date of sowing). However, interior values of all the growth and yield component were registered with the third date of sowing. Similar type of results also found (77.49 and 108.10 numbers plant\(^{-1}\)) in the experiment. Among the three dates of sowing, first one (20th October) proved to be superior over others (Table 2).

**Table 3: Effect of varieties of rapeseed and mustard and dates of sowing on aphid intensity (number plant\(^{-1}\))**

<table>
<thead>
<tr>
<th>Varieties</th>
<th>2011-12</th>
<th>2012-13</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20th Oct</td>
<td>5th Nov</td>
</tr>
<tr>
<td>B-9</td>
<td>9.14</td>
<td>82.64</td>
</tr>
<tr>
<td>SEJ-2</td>
<td>7.05</td>
<td>68.55</td>
</tr>
<tr>
<td>NP-112</td>
<td>6.30</td>
<td>59.69</td>
</tr>
<tr>
<td>JD-6</td>
<td>6.67</td>
<td>63.97</td>
</tr>
<tr>
<td>NRCHB -101</td>
<td>5.35</td>
<td>52.44</td>
</tr>
<tr>
<td>NC-1</td>
<td>7.86</td>
<td>74.05</td>
</tr>
<tr>
<td>Mean</td>
<td>7.06</td>
<td>66.89</td>
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</table>

<table>
<thead>
<tr>
<th>CD (P=0.05)</th>
<th>Varieties</th>
<th>Date of sowing</th>
<th>D X V</th>
<th>V X D</th>
<th>Date of sowing</th>
<th>Varieties</th>
<th>V X D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>JD-6</td>
<td>5.736</td>
<td>10.81</td>
<td>10.82</td>
<td>1.751</td>
<td>NC-1</td>
<td>4.171</td>
</tr>
<tr>
<td></td>
<td>B-9</td>
<td>6.074</td>
<td>11.22</td>
<td>11.23</td>
<td>1.807</td>
<td>Mean</td>
<td>4.278</td>
</tr>
</tbody>
</table>

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