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System Productivity of Rice-Rapeseed Mustard on Terms of Rice Equivalent Yield

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A B S T R A C T

The field experiment were carried out at the Instructional farm of Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal, during the year of 2012-13 and 2013-14 respectively, to study about the System productivity of rice-rapeseed mustard in terms of rice equivalent yield**.** It was pragmatic from the results that date of sowing in 10th November (D_2) recorded significantly the highest seed yield as compared to other dates of sowing and rapeseed-mustard sown on 10th December (D_5) presented the lowest seed yield.

Introduction

Production potentiality of mustard can be fully exploited with suitable agronomic practices and genotypes. Among the different agronomic practices, optimum sowing time and suitable row spacing plays an important role to fully exploit the genetic potentiality of a variety as it provides optimum growth conditions such as temperature, light, humidity and rainfall. The growth phase of the crop should synchronize with optimum environmental conditions for better expression of growth and yield. It is a fact that specified genotypes does not exhibit the same phenotypic characteristics in all environmental conditions. The different genotypes, growth response varies to different environment and their relative ranking usually differ and ultimately decides the selection of genotypes for a particular or different sowing dates for stabilized higher yields (Eberhort and Russel, 1966). The production and productivity of any crop basically depend upon the various factors, viz. environmental conditions, soil conditions, cultivars and agronomic management practices. In *terai* region of west Bengal, the environmental conditions and poor acidic soil conditions which hinder the production of oilseed crop like rapeseed-mustard. The actual problems about the optimum date of sowing choosing as well as suitable cultivars according to the delayed harvesting of *Kharif* rice or late erratic monsoon conditions. As a result the

production and productivity of rapeseed-mustard has been drastically reduced in great extent. The aim of this research programme is to investigate the effects of staggered sowing on the growth, yield, and quality of rapeseed-mustard by adjusting different sowing dates based on different genotypes and to field out the System productivity of rice-rapeseed mustard in terms of equivalent yield to increase the income of the farmers with the inclusion of high yielding rapeseed mustard varieties under *terai* zone of West Bengal.

System productivity (rice followed by mustard)

Tomar and Tiwari (1990) suggested that the dissimilar nature of crops in the cropping system results into better overall nutrient use efficiency and increased system productivity. Shekhawat *et al.,* (2012) also recognized that the tremendous increase in oilseed production is attributed to the development of high yielding varieties coupled with improved production technology, their widespread adoption and good support price. To meet the ever-growing demand of oil in the country, the gap is to be bridged through management techniques. The vertical growth in mustard production can be brought by exploiting the available genetic resources with breeding and biotechnological tools which will break the yield barriers. Horizontal growth in rapeseed-mustard can be brought in those rapeseed-mustard growing areas/districts of the country, wherever, the yield is lower than the national average. Production technologies for different agro-ecological cropping systems, crop growing situations like intercropping, salinity, rainfall, and so forth, under unutilized farm situations like rice-fallows, mustard to be followed. It is estimated that at least 1 million hectares can be brought under cultivation, through adoption of such cropping systems. Proper land preparation, proper time of sowing, selection of better quality seeds, and so forth are always neglected. Fertilizer application is little or nonexistent leading to poor productivity. Effective management of natural resources, integrated approach to plant-water, nutrient and pest management and extension of rapeseed-mustard cultivation to newer areas under different cropping systems will play a key role in further increasing and stabilizing the productivity and production of rapeseed-mustard to realize 24 million tons of oilseed production by 2020 AD.

Materials and Methods

To study the Effect of Cultivars and Date of Sowing on Growth and Yield of Rapeseed/Mustard in Rice-Rapeseed/Mustard Cropping System the field experiments were carried out at farm of Uttar Banga Krishi Viswavidyalaya at Pundibari, Cooch Behar, West Bengal two consecutive season of 2012-13 and 2013-14. The farm is situated at $26^0$19'86"N latitude and $89^0$23'53" E longitude at an elevation of 43 meters above mean sea level. Experiment were Effect of Cultivars and Date of Sowing on Growth and Yield of Rapeseed/ Mustard in Rice-Rapeseed/Mustard Cropping System with Split plot design five main plot [1st November (D_1), 10th November (D_2), 20th November (D_3), 30th November (D_4), 10th December (D_5) and five subplots (B-9 (Benoy) (V_1), Jhumka (V_2), Panchali (V_3), NRCHB-101(V_4), NRCDR-02 (V_5)].

Results and Discussion

System productivity of rice-rapeseed mustard in terms of rice equivalent yield

System productivity of rice mustard indicated the superiority of the cultivar *NRCHB-101* sown under 10th November in terms of rice equivalent yield.

Table.1 System productivity of rice-rapeseed mustard in terms of rice equivalent yield

System Productivity of Rice-Rapeseed mustard								
Treatment	**2012-13**				**2013-14**			
Date of sowing and Cultivar	**Rice yield (A) (Kg/ha)**	**Mustard Yield (B) (Kg/ha)**	**Mustard yield in terms of rice (C) (Kg/ha)**	**System yield (A+C) (Kg/ha)**	**Rice yield (A) (Kg/ha)**	**Mustard Yield (B) (Kg/ha)**	**Mustard yield in terms of rice (C) (Kg/ha)**	**System yield (A+C) (Kg/ha)**
D_1V_1	3950	1050	2405	6355	4075	1127	2527	6602
D_1V_2	3950	987	2260	6210	4075	1040	2332	6407
D_1V_3	3950	917	2100	6050	4075	997	2236	6311
D_1V_4	3950	1492	3417	7367	4075	1693	3797	7872
D_1V_5	3950	1283	2938	6888	4075	1357	3043	7118
D_2V_1	3950	1360	3115	7065	4075	1485	3330	7405
D_2V_2	3950	1250	2863	6813	4075	1430	3207	7282
D_2V_3	3950	1133	2595	6545	4075	1210	2714	6789
D_2V_4	**3950**	**1830**	**4191**	**8141**	**4075**	**2167**	**4860**	**8935**
D_2V_5	3950	1703	3900	7850	4075	1987	4456	8531
D_3V_1	3950	1120	2565	6515	4075	1340	3005	7080
D_3V_2	3950	1060	2427	6377	4075	1292	2898	6973
D_3V_3	3950	1020	2336	6286	4075	1063	2384	6459
D_3V_4	3950	1650	3779	7729	4075	1823	4088	8163
D_3V_5	3950	1503	3442	7392	4075	1583	3550	7625
D_4V_1	3950	880	2015	5965	4075	890	1996	6071
D_4V_2	3950	763	1747	5697	4075	763	1711	5786
D_4V_3	3950	650	1489	5439	4075	600	1346	5421
D_4V_4	3950	1273	2915	6865	4075	1417	3178	7253
D_4V_5	3950	1090	2496	6446	4075	1077	2415	6490
D_5V_1	3950	703	1610	5560	4075	707	1586	5661
D_5V_2	3950	627	1436	5386	4075	600	1346	5421
D_5V_3	3950	503	1152	5102	4075	450	1009	5084
D_5V_4	3950	1087	2489	6439	4075	1067	2393	6468
D_5V_5	3950	860	1969	5919	4075	933	2092	6167

This system achieved a yield of 8141 and 8935 kg ha^{-1} of total system yield in year 2012-13 and 2013-14, respectively (Table 1). The same cultivar, *i.e.*, *NRCHB-101* sown under 20th November resulted in the next best system yield (7729 and 8163 kg ha^{-1} in year 2012-13 and 2013-14, respectively). It was reflected that the system yield decreased with delay in sowing beyond 20th November. As rice yield was constant for the system, the higher system yield was actually due to the better performance of a rapeseed mustard cultivar under optimum date of sowing. *NRCHB-101* which exhibited higher yield performance under 10th November sowing, which in turn reflected the superiority of the system with inclusion of *NRCHB-101* as rapeseed-mustard under in terms of rice equivalent yield.

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