PROBLEMS AND PROSPECTS OF RAPE AND MUSTARD PRODUCTION IN INDIA*

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India is the second (next to China) largest producer of Rape and Mustard in the world.

The important cultivated crop species in the country are mustard (Brassica juncea), yellow sarson (B. campestris var. yellow sarson), brown sarson (B. campestris var. brown sarson), toria (B. campestris var. toria), and rocket (Eruca sativa). Among these, mustard has a dominant position because of its higher yield potential and tolerance to aphid and rost damage. Toria is grown as a catch crop after maize or other short duration monsoon season crops under both rainfed as well as irrigated conditions, whereas rocket is grown only as a rainfed crop on hillocks and undulating sandy loam soils.

Among the group, mustards are most important and predominantly grown in the States of Uttar Pradesh, Madhya Pradesh, Haryana, Punjab, Gujrat and Orissa. Yellow sarson is grown on considerable area in Punjab, West Bengal and Uttar Pradesh, whereas rocket is predominant in Rajasthan and part of Uttar Pradesh and Madhya Pradesh.

The major growing states are Uttar Pradesh, Rajasthan, Madhya Pradesh, Assam, Haryana, Gujrat, Orissa, West Bengal, and Punjab. The area, production and yield of each of these states are given in Table-1. These together account for nearly 96 per cent of the total area of the country. The national yield average has been 466 kg/ha. Lowest (326 kg/ha) and highest (625 kg/ha) yielding states were Madhya Pradesh and Punjab respectively.

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Uttar Pradesh contributes 57 percent, whereas 38.8 percent area is shared by eight states (Table-1). These crops are grown in winter season largely as dryland crops on moisture conserved during rainy season. Under such conditions these are inter-cropped with wheat, gram, linseed, etc. as a minor component or in a ratio of 1 : 1. Under irrigated conditions, these are generally grown as pure crop.

Madhya Pradesh grows these crops on an area of nearly 225 thousand hectares producing 74.9 thousand tons of oilseeds. Mustard has the lion's share in area and production followed by toria, yellow sarson and rocket in that order. These are grown on varying soil types under different climatic conditions and cropping systems. Low productivity and large year to year fluctuations occur depending upon variations in climatic factors. The state has nine major growing Districts (area above 5 000 ha.). Out of these six are tribal Districts, where the crop is grown under low level of management.

The paper analyses reasons of low productivity and suggests technology for increasing production with a special reference to Madhya Pradesh, which has generally been a low yielding state.

The production constraints and ways to remove these are discussed here in the light of technology available.

1. Lack of use of suitable varieties :

Farmers, in general and tribal farmers in particular, use old traditional varieties with poor yield potential. Suitable varieties have not been identified for most of the growing areas. Varuna which was suitable for most areas has become highly susceptible to Alternaria leaf blight and white rust.

At JNKVV Pulse and Oilseed Project Centre, Gwalior, better selections of mustard have been developed/identified. These have recorded higher yield than varuna in large plots. The varieties are RLM-198, RLM-514, Jawahar Rai-1 and Pusa Bold. These are under wider testing for confirmation of their superiority over varuna.

2. Sowing time and varietal suitability :

Rapeseed and mustard are largely grown as a monocrop under rainfed conditions in the State. However, in Bhind and Morena Districts, where only mustard (Brassica juncea) is grown, substantial area of the crop is irrigated and pure crop is taken. In other growing areas, in addition to mustard, Brassica campestris is also grown and the crop is grown pure as well as mixed. Timely planting could easily be accomplished when these crops are sown in pure culture. In out trials, timely sowing considerably increased yield of mustard and reduced incidence of aphids and diseases (Table-2). Hence timely sowing should be emphasized for higher yields with lower inputs.

Under irrigated conditions, mustard is predeced by a kharif crop and sown later than the optimum time. Suitable varieties for late sown conditions should be identified.

3. Use of Plant Nutrients :

It is known that rape-seed mustard respond well to both organic and inorganic manures. In our field trials conducted at the Experimental Station, mustard has responded to nitrogen but not to phosphate application (Table-3 and 4). In two separate trials conducted over two years, nitrogen alone increased yields by 258 and 140 kg/ha. The poor or no response to phosphates might be because of high initial status of the soils of the Experimental Station for this nutrient.

In many areas including Chambal Command Area, mustard suffers due to low sulphur and micro-nutrients availability in the soil. We have, therefore, worked on this aspect and found that mustard also responds to an application of 40 to 50 kg sulphur/ha. (increase of nearly 240 kg/ha. - Table-4). Similarly, it has also responded, though to a little lesser extent, to an application of 10 kg Zn and 10 kg Mn/ha. separately (Table-3).

4. Insect pest attack and screening :

The aphid (Lipaphis erysimi) causes considerable damage not only to mustard but also to rape, taramira and several other crop species. As stated earlier, incidence of this pest increases with the delay in sowing of the crop and the best precaution would be to go for timely sowing. Experimental as well as pest surveillance results revealed that first fortnight of October sowing proved to be least affected by this pest. Further, it was observed that toria, a short duration rape, suffers less by the attack of aphid. This could, perhaps be due to the fact that its flowering and fruiting coincides with the setting in of lower temperatures in the season.

Ninety two germplasm lines of this crop were screened and it was interesting to note that most of these were free from aphid attack. Only 5 entries were infested but the aphid population recorded was quite low (50 to 155/plants).

5. New Cropping Systems :

There exists a good scope of introduction of toria in rotation with pearlmillet-toria-wheat or fallow-toria-wheat in Chambal Command Area of Madhya Pradesh. It was grown successfully over a large area as a monocrop and also preceding to wheat as a double crop under rainfed and irrigated situations respectively (1980-81) in Bhind and Morena Districts in semi-rabi.

Four early varieties of toria viz. T-9, D-1, TH-60 and TH-3/63 were sown with a weekly interval from September, 12, onward till October, 3 (Table-5). The highest yielding variety was T-9 and best time of sowing was September, 19. The optimum mean temperature for sowing was 29°C and maximum and minimum

temperatures were 35°C and 23°C respectively. The variety D-1 matured in 78 days and gave yield of 1667 kg/ha. With such varieties toria could find place in different cropping systems and areas of the state.

In the adaptive trials conducted at 10 locations in Bhind, District, toria-wheat was compared with fallow wheat rotation. On an average 7.4 q/ha. of toria followed by 39.9 q/ha. of wheat-yields were obtained against fallow-wheat yield of 45.0 q/ha.

Thus it is concluded that a good amount of scope do exist for improving productivity of these crops in Madhya Pradesh as well as in other States of the country.

Table-1 : Area and productivity of major (area above 100 thousand ha.) rape-mustard growing States of India (1977-80).

S.No.	State	Area 000 ha.	Share %	Productions 000 tons	Yield kg/ha
1.	Uttar Pradesh	2.017.5	57.0	935.0	462.6
2.	Rajasthan	344.4	9.7	177.0	386.0
3.	Madhya Pradesh	225.2	6.3	74.9	325.6
4.	Assam	195.9	5.5	84.7	431.0
5.	Haryana	140.5	3.9	76.2	554.3
6	Gujrat	137.4	3.8	45.9	441.0
7.	Orissa	131.9	3.7	52.3	396.6
8.	West Bengal	109.4	3.0	47.7	443.3
9.	Punjab	103.6	2.9	62.3	624.6
	TOTAL	3.405.8	95.8	1.565.0	
	All INDIA	3.534.0	100.0	1.647.6	465.6

Table 2 : Effect of date of sowing on yield, aphid and disease incidence in mustard (1980-81).

Dates	Yield kg/ha	Aphid/5 plant	White* rust PDI	Alternaria PDI
1st October	900	26.9	0.0	67.0
16th October	709	285.8	0.0	72.9
31st October	544	249.2	65.3	84.4
15th November	339	645.8	69.9	72.2

**PDI = Percent Disease Incidence (1980-81 only).*

Note= In the second year only 3 dates of sowing : 1st October, 23rd October and 10th November.

Table-3 : Effect of nitrogen, phosphorus, zinc and manganese on mustard (Gwalior-rabi 1980-82).

S. No.	Treatment	Yield (kg/ha).
1.	Control	1287
2.	60 kg/ha	1545
3.	60 kg N + 30 kg $P_2 0_5$ /ha	1390
4.	60 kg N + 5 kg Zn/ha	1342
5.	60 kg N + 10 kg Zn/ha	1460
6.	60 kg N + 5 kg Mn/ha	1540
7.	60 kg N + 10 kg Mn/ha	1678
8.	60 kg N + 10 kg Zn – 10 kg Mn/ha	1607

Table-4 : Effect of nitrogen, phosphorus and sulphur on mustard (Gwalior-rabi 1980-82).

S. No.	Treatment	Yield (kg/ha)
1.	Control	1227
2.	60 kg N/ha	1367
3.	60 kg N + 30 kg $P_2 0_5$ /ha	1431
4.	60 kg N + 10 kg q/ha	1386
5.	60 kg N + 20 kg S/ha	1335
6.	60 kg N + 30 kg S/ha	1409
7.	60 kg N + 40 kg S/ha	1544
8.	60 kg N + 50 kg S/ha	1604

Table-5 : Performance of promising toria varieties under different dates of sowing (JNKVV, Morena Station 1980-82).

S. No.	Dates	Varieties (Yield kg/ha)				Mean
		T-9	D-1	TH-60	TH/3/63	
1.	September 12	1741	815	1241	1667	1246
2.	September 19	2722	1667	1963	1185	1889
3.	September 26	1611	963	1371	1926	1463
4.	October 3	1296	870	1056	1611	1204
	Mean	1852	1074	1463	1593	
		Variety		Date	Interaction	
	S. Em. ±	278		278	426	
	C.D. at 5 %	N.S.		N.S.	N.S.	