

REGENT ADVANCES IN RAPESEED BREEDING IN UTTAR PRADESH

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Rapeseed includes a number of Oleiferous Brassica being grown throughout the world for different commercial uses. The most important of those is oil. India heads the list with regard to both area and production.

Among the Indian States, Uttar Pradesh ranks first with regard to both area and production of Brassica. During 1973-74 the total area and production of rapeseed and mustard in India was 3428.1 thousand hectares and 1692.2 thousand tons, respectively. Uttar Pradesh accounted for 56 percent of the total area and 60 percent of the total production in the country (Anonymous, 1974).

The commonly cultivated rapeseed crops are Toria (B. campestris L. var. toria), Brown sarson (B. campestris L. var. brown sarson) and Yellow sarson (B. campestris L. var. yellow sarson). Among these, toria is a highly cross-pollinated crop and it is also self-incompatible in nature. It is predominantly grown throughout the State, especially in the tarai belts. Being a short-duration crop it is advantageously used as a catch crop after the Kharif and before the Rabi season. Toria is classified in two distinct forms, namely brown toria and yellow toria. This classification is based on the colour of the seed which is brown in the former and yellow in the latter. Yellow toria is called 'Lahia'. As it matures early (95-100 days) it escapes the damage caused by aphids and frost, if sown in the early part of September. The major problems associated with this crop are: low yield, small seed size, shattering of seed at maturity, late maturity, seed setting and susceptibility to diseases and pests. In order to tackle some of the major problems, projects such as production of short-duration composites & breeding for high yield and better oil content were undertaken at this university. As a result of different breeding procedures, a number of cultivars were evolved to suit the agroclimatic conditions of different regions. The main criterion in evolving such cultivars was the number of days to maturity so that sufficient time was to be left for the preparation of land for the succeeding crop. Accordingly, the following cultivars were recommended for general cultivation.

1. 'I.9' - Selection from a sample collected from Tarai area in Nainital district. Dwarf plants ranging up to one metre in height with 6 - 8 main branches which are dichotomous in habit and having extrorse anthers in open flowers. It matures in about 95 days. The seed size is medium and contains 46.0 percent oil. The yield varies from 12 - 15 q/ha. Recommended for pure cropping in the whole of Uttar Pradesh especially for Tarai region.

2. 'T.36' - Selection from a sample from Etawah, U.P. Plants about 1.25 metre in height with fair branching and maturing in about 95-100 days. The size of the seed is medium (323 seeds per gram) and the colour is yellow with an oil content of 49.0 percent. The yield varies from 12-15 q/ha. Redommeded for the whole of U.P. to be grown as a catch crop between maize or green manuring and sugar-cane.

Brown sarson has been classified as Tora brown sarson and Lotni or Mewatj brown sarson. Tora brown sarson is a self-pollinated crop whereas Lotni brown sarson is a cross-pollinated and self-incompatible type. Tora brown sarson is generally grown in the eastern region of the State. The plants are dwarf, moderately branched, the branches are compact, the leaves green, small in size and lanceolate in shape. The compact branching of the plant makes it an ideal crop for being grown with several other crops such as wheat and barley. The main areas of Lotni brown sarson are the West Bundelkhand and the South West of Agra region. Once grown for its drought-resistant and high-yielding qualities of Lotni brown sarson, the area now under this crop has been considerably reduced owing to its high susceptibility to aphids and alternaria blight. The plants of Lotni brown sarson are moderately tall, profusely branched, with branches of open type, leaves medium to large and light-green in colour. The breeding methodology adopted so far, includes production of short-duration composites and synthetics, mass-pedigree selection, recurrent selection etc. The cultivars recommended at present for general cultivation in the state are as listed below:

1. Tora 'B.S.70' - It is a selection from a sample received from Azamgarh. Plants are 1.25 metres in height with 4-6 branches starting from the lower portion of the stem. The branches are pressed close to the main stem. The maturation period is 130-140 days. The seeds are medium in size with 48.84 percent of oil. The yield varies between 12-15 q/ha. Recommended for the eastern tracts of U.P.

2. Lotni 'B.S.2' - It is a selection from a sample received from Mathura. Plants are 1.25 to 1.50 metres in height with 8-10 branches starting from the base. The maturation period is 120-130 days. The seeds are medium bold in size with an oil content of 48.05 percent. The yield varies between 12-15 q/ha. Recommended for the dry tracts of south-western U.P.

Yellow sarson is also a self-pollinated crop. The oil of yellow sarson is preferred for massaging and cooking purposes. The yellow colour of the seed and the physical quality of the oil fetch premium price in the market but on account of its low productivity which is primarily due to its susceptibility to aphids, it is being cultivated only to meet the needs of the small household. Yellow sarson is medium tall, moderately branched, branches compact, leaves medium, light-green in colour. The compact nature of the plant has been utilized for mixed cropping especially with wheat. The screening of germ-plasm at this university has resulted in picking up certain aphid-tolerant lines which are being utilized for incorporating aphid resistance in the agronomic bases. Singh et al. (1975) reported a new siliqua variant in yellow sarson which has very long siliqua as compared to common types. In order to study genetic parameters, a diallel-analysis programme of ten diverse genotypes was undertaken (Singh, 1977). He reported that non-allelic interaction played its part in the expression of most of the characteristics including yield. The recommended cultivars of yellow sarson in the different agro-climatic regions of the state are as follows:

1. 'T.42' - It is a selection from a sample from Basti, U.P. Early maturing (120-125 days), dwarf, fair branching, siliqua two-valved, medium and flat, seeds bold (5.2 g/1000 seeds) and oil content 44.0 percent, yield varies between 12-15 q/ha. Recommended for the eastern district of the state but fares well where it escapes aphids attack.

2. 'K.88' - It is a selection from a local material from Etawah and was released in 1973. It matures in 130-132 days. The plant height is medium, the branching is moderate. The yield varies: 14-16 q/ha. The seed size is bold (5.1 g/1000 seeds) with 48.79 percent oil content. Recommended for the Aligarh, Agra and Meerut regions of the state.

Quality studies in rapeseed were undertaken at this university (Pathak et al., 1973). Table 1 shows the quality parameters of seed, oil and cake.

Table 1 (enclosed).

As regards free fatty acids, the oil B. campestris var. T.42 had the lowest and that of B. Juncea (Sweden Rai) the highest values. The oils with lower free fatty acid content may have better keeping qualities.

REFERENCES

- Anonymous, 1974. Agriculture situation in India. November, 1974.
- Pathak, R.K., M.K. Sharma, R.N. Singh and R.D. Tripathi, 1973.
Quality Studies in some Cruciferous Oilseeds. Indian J.
Agr. Res. Vol. 7 (2): 99-103.
- Singh, R.N. & A.N. Srivastava, 1975. Note on new siliqua variant in
yellow sarson (B. campestris var. sarson). Sci and cult.
vol. 41 (10): P.495.
- Singh, S.P., 1977. A diallel cross-study in some developmental traits
of Brassica campestris (L) var. Yellow sarson. Unpublished
Ph.d. Thesis, C.S.A. University of Agriculture & Technology,
Kanpur.

TABLE 1
QUALITY COMPOSITION OF SEEDS, OILS & CAKES OF RAPESEED

	Biochemical Composition of seeds				Oil constants				Macro-nutrient composition of cakes						
	Moisture %	Oil %	Protein %	Allyl-1-iso thiocyanate %	Ash %	Refractive index HD2	Iodine value (Wij)	Saponification value	Free Fatty Acids (Oleic) %	N %	P %	K %	Ca %	Mg %	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
<u>B. campestris</u> var. lotni brown sarson 'BS-2'	6.7	45.20	20.70	0.40	4.37	1.4717	100.9	174.1	173.1	0.99	6.03	0.69	1.60	0.44	0.25
<u>B. campestris</u> var. tora brown sarson 'sufla'	6.4	47.45	19.72	0.20	3.72	1.4719	102.4	171.1	170.5	0.29	6.02	0.59	1.76	0.45	0.29
<u>B. campestris</u> var. yellow sarson 'T 42'	6.0	46.38	17.34	0.46	3.74	1.4717	100.7	170.7	170.2	0.28	5.18	0.71	1.45	0.35	0.27
<u>B. campestris</u> var. toria '19'	6.0	47.58	22.24	0.30	4.31	1.4720	105.9	170.8	168.7	1.05	6.79	0.62	1.59	0.62	0.29
<u>B. campestris</u> var. toria '136'	5.5	48.78	18.90	0.45	3.22	1.4717	101.4	171.5	170.5	0.48	5.91	0.76	1.49	0.50	0.31
<u>B. juncea</u> (Sweden Rai)	7.6	29.63	27.05	0.45	7.11	1.4729	117.0	178.2	175.8	1.21	6.15	0.70	1.58	0.45	0.30
<u>B. juncea</u> var. 'varuna'	6.8	44.08	22.29	0.30	3.38	1.4727	110.7	179.5	178.4	0.58	6.38	0.62	1.57	0.45	0.30

SESSION B / SESSION B / SITZUNG B

BREEDING FOR QUALITY / SÉLECTION: QUALITÉ / ZÜCHTUNG: QUALITÄT

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