

## APPLICATION OF RESEARCH—MUSTARD REVOLUTION ON FARMERS' FIELD IN EASTERN UTTAR PRADESH—A SUPERB SUCCESS

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India has been striding ahead to meet the edible oil requirement of the growing population with spectacular success in production with speed and higher yield during recent years. This has been possible by adopting available new techniques of research developed by scientists at research stations and subsequently transferred with great success on farmers' field. Mustard being the second largest cultivated crop in oilseed group recorded significant achievements. The nine oilseeds crop production crossed 18 million tonnes during 1991-92 in which mustard shared 5.84 million tonnes contributing about one third of the total oilseeds period since 1949-50 to 1991-92. Not only this, over the period since 1949-50 to 1991-92 there has been seven times increase in mustard production *i.e.* from 0.81 to 5.84 million tonnes (Table 1). Moreover, in late eighties to early nineties there was steep rise in mustard production (2.60 million tonnes in 1986-87 to 5.84 million tonnes in 1991-92).

It is important to note from state-wise data in 1991-92 that more than 77 percent area under mustard cultivation is occupied by four states only namely Rajasthan, UP, Haryana and Madhya Pradesh and their production contribution is also in the same way. One encouraging phenomenon is that it is now being adopted in the non-traditional mustard growing southern states of the country also which will further enhance the overall mustard production. All these parameters are leading the country for achieving near self-sufficiency in edible oils. Till the mid-eighties, India used to import large quantities of edible oils (about a million tonnes a year) from the United States, Brazil and Malaysia in particular which caused heavy financial burden of crores of rupees on exchequer of the country.

To keep the pace with edible oil requirement, the scientists involved in agricultural research are not complacent and are actively working in developing high yielding strains of mustard alongwith appropriate production technology suited to different agro-climate conditions. It has helped to boost-up its production manifold which has been very well demonstrated on farmers' fields in Eastern districts of Uttar Pradesh by realising convincing results and visual impact not only on small area of demonstrations but through large scale contiguous area demonstrations on the land of villages. For the farmers, there were numerous problems, constraints and factors responsible to obtain good mustard yield. These bottlenecks have been identified and appropriate measures were applied to minimise and eliminate them.

### METHODOLOGY :

The primary data have been generated by conducting large scale demonstrations on the farmer's fields in Fatehpur, Allahabad, and Mirzapur—the Eastern districts of U.P. The institute has developed the appropriate technology of mustard production suited to the different parts of the country. These districts were covered under the transfer of technology programme of IARI, New Delhi during the period 1988-89 to 1991-92. The production technology of mustard was demonstrated to the farmers from the sowing to harvesting. The national and state level data were obtained from "Agricultural Scientists at a glance". The data have been compared at differ-

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ent levels. Maximum, minimum and average have been worked out. Bench mark survey information were also used for gap analysis.

### Transfer of Mustard Production Technology on Farmers' Field :

**(A) Existing Situation :** It is pre-requisite to have stock of the first hand knowledge of existing situation in relation to mustard cultivation prior to demonstrate the mustard production technology on the farmer's field. To meet this requirement primary information was collected which contained methods of mustard cultivation, problems and constraints encountered by the farmer's responsible to adopt appropriate mustard technology for its higher yield.

**(B) Technology Transfer :** Since the Indian Agricultural Research Institute has made a remarkable progress in developing mustard technology suitable for these districts, large scale demonstrations were conducted not only on high yielding varieties, but also matching production technology to realize their potential. As such, some agro-technology and other methods were used to combat the problems and constraints in the way of mustard production during the programme period 1988-1992.

### RESULTS AND DISCUSSION :

To analyse the results, some important factors in respect of the yield were kept in view :-

1. Yield per unit area.
2. Per day yield.
3. Level of yield, maximum, minimum and average.
4. Average yield comparison with the local, state and national level average.

**Table 1. Achievements of mustard production technology demonstrations on farmers' fields under TOT programme in Eastern part of UP during 1988-89 to 1991-92**

District	Year	Variety	No. of farmers	Area covered (ha.)	Yield q/ha.		
					Max.	Min.	Average
1	2	3	4	5	6	7	8
Fatehpur	1988-89	Pusa Bold	830	290.50	25.50	20.25	22.29
		Varuna	159	30.80	20.50	16.00	18.14
		Kranti	69	19.20	22.25	17.75	18.85
		Pusa Barani	3	1.00	13.50	13.50	13.20
		All varieties	1061	341.50	25.50	13.50	18.20
	1989-90	Pusa Bold	29642	13765.60	27.00	13.40	19.05
		Pusa Barani	344	160.00	26.00	13.00	18.20
		Varuna	204	135.20	20.00	11.00	17.65
		Kranti	38	20.80	23.80	11.75	16.50
		All varieties	30228	14081.60	27.00	11.00	17.85
1990-91	Pusa Bold	9774	4000.00	24.40	13.20	17.30	
3 years overall		41063	18423.10	27.00	11.00	17.75	
Mirzapur	1990-91	Pusa Bold	8048	3366.00	16.30	8.60	14.28
	1991-92	Pusa Bold	4301	1824.80	20.80	7.00	14.75
	2 years overall		12349	5190.80	20.80	7.00	14.52
Allahabad	1990-91	Pusa Bold	3537	1666.00	16.10	7.80	14.05
	1991-92	Pusa Bold	5038	2243.20	19.90	7.50	14.72
	2 years overall		8575	3909.20	19.90	7.50	14.39
Overall of 3 districts		Pusa Bold	61170	27156.10	27.00	7.00	16.75
		Pusa Barani	347	161.00	26.00	13.00	15.85
		Varuna	363	166.00	20.50	11.00	17.90
		Kranti	107	40.00	23.80	11.75	17.68
			61987	27523.10	27.00	7.00	16.90
Overall of all varieties							

It is inferred from the table 1 that in different years of four years' programme period from 1988-92 in Fatehpur, Mirzapur and Allahabad districts, four varieties namely Pusa Bold, Varuna, Kranti and Pusa Barani were demonstrated on the farmers' field existing 25,000 hectares of area and covering more than 60,000 farmers successfully.

The highest yield of demonstrations recorded per unit area in these districts has been 27.00 q/ha being the average 16.90 q/ha (Table 1) during programme period. It is important to observe that the four years' average yield was about double of the national level average yield (8.86) Table 2. The average yield also had been more than three times higher than the local average (5.17 q/ha), Table 2. Per day yield of mustard was recorded as 13 kg as compared to 3.98 kg and 6.82 kg of local and national averages stage average of four years (1988-92), the average yield of demonstrations plots obtained by way of adopting new technology has been much higher. Hence, it has been established that there can be manifold increase in yield by using the appropriate mustard technology on the farmers' fields.

**Table 2. Yield gap in mustard in eastern districts of UP (Yield-q/ha)**

District	Year	Av. yield of crop demo.	Base line yield	Gap in yield (3-4)	UP state av. yield	National av. yield	No of. times increase in yield over base line
1	2	3	4	5	6	7	8
Fatehpur	1988-89	18.20	6.67	11.53	8.17	9.06	2.73
	1989-90	17.85	(1987-88)	11.18	8.27	8.31	2.68
	1990-91	17.30		10.63	9.60	9.00	2.59
	Three years av.	17.75		11.08	8.68	8.79	2.66
Mirzapur	1990-91	14.28	4.65	9.63	9.60	9.00	3.07
	1991-92	14.75	(1989-90)	10.10	8.75	9.07	3.17
	Two years av.	14.52		9.87	9.18	9.04	3.12
Allahabad	1990-91	14.05	4.20	9.85	9.60	9.00	3.35
	1991-92	14.72	(1989-90)	10.52	8.75	9.07	3.51
	Two years av.	14.39		10.19	9.18	9.04	3.43
<b>Average of three districts</b>		16.90	5.17	11.73	8.98	8.86	3.27
<b>Per day yield</b>		13.1 kg	3.98 kg	9.12 kg	6.91 kg	6.82 kg	3.29 kg

#### **Impact of Mustard Technology Transfer Programme in Eastern Districts of UP :**

1. Farmers are convinced for adopting newly developed high yielding varieties like Pusa Bold, Pusa Barani, Kranti and Varuna.
2. They have shifted for growing pure crops of mustard instead of mixed cropping pattern like mixed with wheat, gram, pea and barley etc.
3. Yield obtained through new technology demonstrated on farmers' field has been 2-3 times higher than the local, state and national average.
4. Per day yield (13 kg) of high yielding varieties has been 2-3 times higher than the local ones.
5. Production technology demonstrated to the farmers through large scale demonstrations have created visual impact for the speedy diffusion of technology to other farmers and the neighbouring districts and states.

6. Technical know-how of farmers has improved by imparting production technology through training and education of participating farmers.
7. It has been established that the mustard can be grown successfully in the flood prone areas also by adopting appropriate technology timely.
8. Higher yield has consequently accrued higher income.
9. Higher oil content has been found by the farmers in the newly adopted high yielding varieties as compared to old varieties and as a result fetching better market price by extracting higher oil content

**Strategy to meet edible oil requirement :**

1. There is urgent need to evolve better genotype of oilseed (mustard) crop having short duration high oil content and much more higher yielding.
2. Yellow mustard of good oil content and high seed yield is being developed by IARI scientists; there is immediate need to emphasis its spread on the farmers field for conducting large scale demonstrations on contiguous areas.
3. Disease resistant varieties are required to be developed.
4. Varieties to tolerate more moisture stress will be more suitable as the vast area in the country is rainfed, hence there is need to develop such varieties.
5. Transfer of technology programme with respect to oilseed (mustard) need to be strengthened particularly in the major mustard growing states like Rajasthan, UP, Madhya Pradesh and Haryana.
6. In addition, steps are to be taken to spread technology in non-traditional areas adequately suited to mustard production technology.
7. Since, large scale demonstrations on contiguous area on the farmers' field have been found quite effective and giving convincing results, this established method can be propagated more and more in new areas also for higher production of mustard.
8. Replacement of old seeds by new seeds should be encouraged and advocated to the farmers' to enhance yield.
9. Farmers need training for seed production technology on their fields from the very beginning of sowing to harvesting and later on post harvest technology like proper seed storage etc.
10. Seed grown on farmers' field by adopting scientific method can be used for themselves and also can be provided to other farmers.
11. India must evolve a population control policy to be adopted to meet the challenges of edible oil requirement in the very near future which is close at hand.
12. Requirement of edible oils can be met if the population growth is reduced effectively.
13. There is need to gear-up block and district level infra-structure involved in crop production process in the states.
14. For effective technology transfer and better production of mustard, there are some more important parameters also which need to be considered at different stages :-
  - (i) To motivate farmers for adopting technology.

- (ii) In the beginning, personal regular visits alongwith concerned scientists are required.
- (iii) To increase technical know-how effectively, there is need to impart training at different stages by using effective training methods, organising field days, mobile field exhibitions etc.
- (iv) Conducting large scale demonstration on the farmers' field.
- (v) Timely availability of requisite inputs like improved seeds, fertilizers, plant protection chemicals, sprayers etc. is of paramount importance to boost-up the mustard production.
- (vi) Mobilizing farmers in group for contiguous block demonstrations will help for quick adoption and dissemination of technology measures like plant protection. To control aphids, needs community approach.
- (vii) Field staff working in rural backward, neglected and remote areas are to be encouraged by making special provision to give them encouragement and making the field incentives so attractive that the field workers do not feel demoralized, disheartened and neglected and other staff also feel tempted to work with the farmers in the fields. The incentives may be given in terms of field allowances, conveyance allowances and vehicle arrangements, family allowances, better promotion avenues etc. for field workers.

### CONCLUSION :

The strategy so suggested has been widely tested at various locations of technology transfer programme of IARI and the results obtained have been found as per expectations. This strategy can be adopted in the other parts of the country for desired results. In this paper, the results of Fatehpur, Allahabad and Mirzapur only have been projected. Hence, there is no doubt at all to increase mustard production manifold (2 to 3 times) in the country with the present available technology. The per capita availability can also be increased by following the suggested strategy and adopting additional measures like keeping population growth synchronising with the oilseed production growth and providing physical facilities and due incentives to the personnel involved in such challenging tasks.

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