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Rural Development through Mustard Production and Mustard Oil Industry: North-East Rajasthan- Problem and Prospects

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ABSTRACT: Rapeseed-mustard (*Brassica* species) is the major rabi oilseed crop of Rajasthan. Mustard seed is the second most important oil seed crop in Rajasthan after soyabean accounting for nearly 20- 22% of the total oilseeds produced in the country. Rajasthan is the fourth producer of mustard seed contributing to around 11 % of world's total production. Rajasthan is the most giant mustard growing state and alone contributes 43% of the total mustard seed production in Rajasthan (Mustard crop Survey Report 2014-15). In Rajasthan, the mustard crop is mostly cultivated in Alwar, Bharatpur, Jaipur, Dholpur, Sawaimadhopur, Sriganganagar, Jhunjhunu & Sikar districts. Bharatpur, eastern district of Rajasthan is the largest mustard growing division covering about 48 per cent of the total production of state. Therefore a study was carried out to assess the trend in area, production and yield of mustard crop in Bharatpur region of Rajasthan. Secondary data were compiled for the period 2001-02 to 2014-15 from various published sources and websites. The area, production and yield of mustard crop in Bharatpur region has been witnessing an increasing trend since 2001-2013 decade due to increasing usage of RM seed oil in food. Moreover, strong domestic demand for mustard seed oil was also one of the reasons for rise in production. During 2013-15 mustard crop shows decreasing trends in terms of area, production and productivity due to unfavorable weather conditions.

KEYWORDS: mustard, oil, production, rajasthan, industry, prospects, problem, rural, development, seed

I. INTRODUCTION

The area and production under rapeseed-mustard in Rajasthan are 36.6 lakh ha, 44.1 lakh tonnes and 1,205 kg/ha, respectively. The major constraints in higher production are salt affected soil and poor quality irrigation water, [1,2] moisture deficiency at seeding time, prevalence of higher temperature at sowing time and continuous adoption of fallow-mustard sequence in large area leading to *Orobanche* and *Sclerotinia* rot problem. The technological interventions suggested are:

- * Growing of varieties such as early sown (RGN-13, Urvashi), timely sown-irrigated (NRCDR 2, RGN 13, RGN 73, Bio 902, Maya, RL 1359, Vasundhara), timely sown rainfed (RGN 48, Aravali[3,4] and Geeta), salt affected areas (CS-52, CS-54), late sown (Navgold, Ashirwad, Swarna Jyoti) and *Taramira* (Karan Tara)
- * Replacing mustard by *Taramira* in areas where soil moisture is inadequate
- * Crop rotation to reduce the infestation of *Orobanche*
- * Enhanced production by apiary boxes in mustard fields
- * Intercropping of mustard with chickpea (1:4) and with lentil (1:6).

Mustard is one of the main oilseed crops in Rabi season. Our vegetable oil requirement by the end of 2020 AD was estimated around 35 million tones of oil seeds against the present production of 27 million tones. This situation, in fact, is very alarming. Obviously, there is an urgent need for increasing the production of oilseeds in the country. To cope up with this situation, our research scientists, extension workers and farmers have great responsibility to maximize the production of oilseeds[5,6] which is only possible, if farmers have a knowledge and awareness about the new technology which is recommended by the Agriculture Research Scientists specially for the rapeseed-mustard crop,' then they may adopt the recommended practices. Because in the direction of adoption process of any practice, knowledge and awareness about such technology and practice must be necessary. [7,8]Therefore first. we go for the



study of knowledge level of different categories of farmers about improved mustard production technology. For this purpose State Agriculture Department, State Agricultural Universities and National Research Centre on Rapeseed-Mustard organize various activities to create awareness and increase the knowledge of farmers about improved mustard production practices. A large numbers of yield maximization trials laid out at the research stations as well as at the farmers fields have shown the potentiality of the new technology to, be highly effective in concern of knowledge improvement about new technology and by the improvement in knowledge level of farmers about mustard cultivation the gap of recommended and adopted practices may reduce by adopting the recommended practices.[9,10]

Mustard is one of the important oilseeds crop and occupies a major position among oilseed in Rajasthan state. Rajasthan government imports large quantity of palm oils to fulfill domestic requirement of oils. In this regard, to sustain this production and consumption system, the Department of Agriculture, Cooperation and Farmers Welfare had sanctioned the project “Cluster Frontline Demonstrations on Rabi Pulses 2015-16, 2016-17 and 2017-18” to ICAR-ATARI, Jodhpur through National Mission on Oilseed and Oil Palm. This project was also implemented by Krishi Vigyan Kendra, Sawai Madhopur with main objective to boost the production and productivity of oilseeds through CFLDs with latest and specific technologies. CFLDs on mustard crop were conducted by KVK, Sawai Madhopur, Rajasthan was purposively assessed. The performance of frontline demonstrations and the change in adoption level was measured in the study.[11,12] Cluster Frontline demonstrations on mustard were conducted by using variety NRCDR-2 and Giriraj in an area of 100 ha at 225 farmer’s field in different clusters of Sawai Madhopur district. The need based critical inputs provided to farmers were improved seed @ 4 kg/ha, soil treatment with quenolphas 1.5% @ 25kg/ha seed treatment with mencozeb @ 2.0 g/ kg seed and imidachloprid 48%FS @ 7ml gm/kg seed, application of sulphur @ 40kg/ha. Recommended doses of fertilizers, plant protection measures and other practices (PoP) were applied by farmers. Results were concluded that average increased in yield of demonstrations plots was 25.11% over control plots. The same trend found in case of average gross and net monetary returns of CFLDs, was Rs. 71519/- and Rs. 52527/- and for control Rs. 56724/- and Rs. 36403/- per hectare, respectively. The average benefit cost ratio was recorded higher in demonstration plots (2.79) as compared to control plots (2.06). This improvement in yield might be due to the use of improved seed, soil treatment, seed treatment, use of fertilizers, timely weed and water management and integrated pest management practices. The findings of the study also revealed that they had increase in adoption level ranging from 13.33 percent of storage and marketing to 40.89 percent of seed treatment [13,14] after conducting the CFLDs. It can be concluded that the CFLDs is playing one of the important role in motivating the farmers for adoption of production technology resulting in increasing their yield and profit. It can be also concluded that the oilseed production could be enhanced by encouraging the farmers through adoption of recommended technologies which were followed in cluster frontline demonstrations.

Considering the good price of mustard, a huge increase in its sowing is expected this time. There has been a tremendous jump in its area this year in Rajasthan, the country’s largest mustard producing state. Here in the Rabi season, about 33 percent of the total area sowing is estimated to be of mustard. Normally 95 lakh hectare area is sown during Rabi season in the state. Whereas this year due to good rains in the month of September, it is estimated to reach 10 million hectares.[15,16]

Mustard and gram have been sown in more area. According to the officials of the Agriculture Department, the mustard area in the state used to be an average of 27 lakh hectares, which is expected to increase to 33 lakh hectares this year. Rajasthan alone produces 40.82 percent of the total mustard production of the country. Agricultural scientists are happy with the increase of 6 lakh hectares in its area here.

II. DISCUSSION

Apart from Rajasthan, the states where mustard farming is done include Haryana, Madhya Pradesh, UP and West Bengal. In Haryana, about 13.33 percent of the country’s mustard is produced. The share of Madhya Pradesh is 11.76 percent. Whereas Uttar Pradesh contributes 11.40 and West Bengal contributes 8.64 percent to the total production. It has been told that there has been an increase in the sown area in all these. The general area under mustard sowing in the country is 61.55 lakh hectares. It was sown in 65.97 lakh hectares in Rabi season 2020-21. Whereas in 2021-22 it is expected to increase to 81.66 lakh hectares. That is, this time its sown area is estimated to increase by 15.69 lakh hectares. Dr. DK Yadav, Assistant Director General (Seeds) in the Rajasthan Council of Agricultural Research (ICAR), says that there is an increase in the sowing of mustard crop due to two reasons. The first factor is the price and the



second is the good weather. Mid-December has arrived. But till now news of good harvest is coming from everywhere. There is no infestation of insects anywhere.[17]

Due to good rains in the last week of September and the first week of October, the area of crops has increased. Mustard has been sold in many places at almost double the minimum support price (MSP). Therefore, in some states, due to heavy rains, once sowing is affected, farmers have sowed for the second time.

Mostly in Rajasthan Mustard farming carried out from the ancient time. With this, Mustard crops are popular in Madhya Pradesh and Gujarat too. Some southern area farmers have also grown Mustard crops in Rajasthan, including Karnataka, Tamil Nadu and Andhra Pradesh. The Rabi crop in Assam, Bihar, Orissa and West Bengal mentions it as a yellow season. With all these, it is a catch crop in Punjab, Haryana, Up and Himachal Pradesh. In short, we can say that Mustard farming is the soul of the Rajasthan economy, and it purely contributes to the farmer's livelihood. [18]

Climatic Conditions for Mustard Farming

Mustard cultivation is begun in a subtropical climate. Cultivation of mustard seed grows well in dry and cool weather. Therefore the mustard growing season is mainly known as a Rabi crop. The mustard seed tree requires temperatures between 10°C to 25°C. The mustard crop is produced in the areas receiving 625 -1000 mm annual rainfall. Mustard farm does not tolerate freeze, so it requires a clear sky with frost-free conditions.

Mustard farming can be raised in wide varieties of soils that range from light to heavy loamy soils. However, medium to deep soils with good drainage are best suitable for cultivating the mustard crop. Soil ideal pH range for mustard variety is 6.0 to 7.5. Make sure to manage a soil test to prepare the soil properties like soil type, strength and healthy levels. Sandy and loamy sand soils are suitable for Sarso farming. The spacing of mustard plant cultivation should be about 45 cm x 20 cm.

Sowing Methods of Mustard Crop Cultivation

Mustard farming is usually planted in the Sept-Oct months. If a mustard crop is pure, it is produced by the drilling method, or if the mustard crops are mixed, seeds should be sown by broadcasting or drilling process. Mix the hybrid mustard seed with fine sand for uniform spacing. There is sufficient fog already in the soil when mustard seeds plant. For better mustard seed germination, seeds planted a maximum of 6 cm depth in the soil. Following, we showed complete details about mustard seeds growing.

- For toria crop, farming from the first fortnight of September to October.
- African sarson and Taramira can be sown in the whole October month.
- For Raya crop complete sowing from Mid October to November End.[19]

A Seed Rate of Mustard

Thinning operations must be done three weeks after sowing and maintain only healthy seedlings.

To obtain optimum plant about mustard seeds that stand for higher yield, the recommended seed rate of mustard should be followed as per the list mentioned below.

- A rapeseed rate of 1.5 kg seeds per acre.
- In pure mustard crop seed, the rate could be about 4 – 6 kg per hectare.
- In mixed crops, the seed rate could be about 2 – 3 kg per hectare.

1 to 2 ploughings and two harrowings given as part of field preparation for mustard farming. In addition, the field prepared for second crop mustard seeds cultivation by giving 2 crosswise harrowing after the Kharif crop. Check out below for proper details about cultivation of mustard crop in Rajasthan.

- Fine seedbeds needed for the excellent germination of crops.
- Planking done after every ploughing.
- Prepared firm, moist and uniform seedbed as it will help in uniform mustard seed germination.[21,22]

Mustard Farming Irrigation

Pre-sowing irrigation done before the sowing of seeds. For good growth, crops required in general about three irrigation applications at an interval of three weeks after sowing. A good amount of organic manures applied to the soil, and it will help conserve moisture in the ground.

Weed Control Information About Mustard



Thinning done after a 2 weeks time interval(in the case of a pure mustard crop). In the case of the mixed crop, the mustard crop received from the inter cultivation given to the main crop. The most common weeds which develop in the fields of Rapeseed and Mustard are deep-rooted broad-leaved weeds.

- Bathua – *Chenopodium album*
- Chatter mattari – *Lathymys* spp
- Kateli – *Cirsium arvense*
- Gajri – *Fumariapal vijlora*

Weeds separated mainly through hand-hoeing with Khurpi. This method is advantageous since it eliminates the weeds thoroughly during the early stages of growth. Moreover, it pulverizes the soil and creates mulch over the soil, and reduces moisture loss.

Weed control in Toria crop, pre-plant incorporation of Trifluralin at 400ml/200Ltrs of water per acre. For Raya crop, give a pre-emergence spray at 400gm/200Ltr within 2 days of sowing.[19,20]

III. RESULTS

Mustard harvesting carried out as soon as the pods turn yellow & the seed grows hard. The mustard crop grows in about 110 to 160 days. Harvesting done in the early morning hours to avoid any shattering of stock.

- Cut crops close to the ground with the help of a sickle.
- Stacked the harvested crops for 7-10 days.
- Complete threshing operation after proper drying.

Type of R&M	Period of Maturity at Harvesting
Rajasthan Mustard	110-160 days
Yellow Sarson	90-120 days

Post Harvesting Variety of Mustard

Mustard harvesting plants tied into bundles, keep them in the sun for 5 to 6 days to dry when the seed gets adequately dry, and then store seeds in gunny bags or bins. Threshing can carried out by hitting the mustard plants with a stick. Then, winnowing done to separate the grain from the husk.

Rainfed of Mustard Farming

- Disc harrowing after every practical shower in monsoon helps in conserving moisture. On cessation of rain, planking should invariably followed after each harsh to avoid cloud formation and moisture loss.
- Pulverize the soil before sowing using a cultivator.
- Planking in irrigated and non irrigated land is essential to avoid cloud formation and prevent moisture loss.[23]

IV. CONCLUSIONS

Following are the some best mustard varieties in Rajasthan:-

PBT 37

- Early development of this variety of mustard.
- Develops in 91 days.
- It is suitable for Toria-wheat agriculture.
- Seeds are dark brown and robust in size.
- It provides an average yield of 5.4 QTL/acre, and seeds contain 41.7% oil.

TL 15

- It is an early maturity variety.
- Required 88 days to mature.
- It gives an average yield of 4.5 QTL/acre.

TL 17

- Ready to harvest in 90 days.
- Suitable for multiple cropping.



- It gives an average yield of 5.2 QTL/acre.
- RLM 619
- It recommended for farming in irrigated and rainfed areas.
- It is ready to collect in 143 days.
- Its seed is bold and contains 43% oil.
- It is resistant to white rust, mildew and downy mildew.
- Gives an average yield of 8 QTL/acre.
- PBR 91
- It gets ready to harvest in 145 days.
- Resistant to blight, rust and insect pests.
- It gives an average yield of 8.1 quintal/acre.
- PBR 97
- Proper for cultivation under rainfed conditions.
- Ready to harvest in 136 days.
- Grains are medium bold and contain 39.8% oil content.
- Gives an average yield of 5.2 QTL/acre.
- PBR 210
- Suitable for timely sown and irrigated conditions.
- Ready to harvest in 150 days.
- It gives an average yield of 6 QTL/acre.
- RLC 3
- Tall variety, ready to harvest in 145 days.
- Its average yield is about 7.3 QTL/acre.
- Its oil content is 41.5%.
- GSL 1
- Ready to harvest in 160 days.
- The crop is short and does not lodge easily.
- It gives an average yield of 6.7 QTL/acre.
- Seeds contain 44.5% oil content.
- PGSH51
- Ready to harvest in 162 days.
- Tall and high yielding hybrids give an average yield of 7.9 QTL/acre.
- Seeds content 44.5% oil content.
- Hyola PAC 401
- It is a medium height crop and ready to mature in 150 days.
- Seeds are brownish-black and contain about 42% oil.
- It gives an average yield of 6.74 QTL/acre.
- GSC 6
- Recommended for timely sown crop under irrigated condition.
- Seeds are bold and contain 39.1% oil content.
- It gives an average yield of 6.07 QTL/acre.
- RH 0749
- Suitable for growing in North Rajasthan, Delhi, Jammu, Punjab and Haryana.
- It is a high yielding variety having more seeds per silique.
- Ready to harvest in 146-148 days.
- Seeds are bold and have an oil percentage of 40%.
- It gives an average yield of 10.5-11 QTL/acre.
- T 59 (Varuna)
- It is suitable under all climatic conditions.
- Ready to harvest in 145-150 days.
- Gives an oil content of about 39%.
- It gives an average yield of 6-8 QTL/acre.[24]



These are the best methods of cultivation of mustard, which helps do mustard farming in Rajasthan. Hence, if make a mustard farming business plan, these methods help earn a high income. [25]

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