Enhancing rapeseed -mustard production in South Asia: problems and strategies

P.R.Kumar[1], Arvind Kumar[2]

[1]203, DDA SFS Flats, Sector 3, Pocket-2, Dwarka, New Delhi 110075, India
[2]National Research Centre on Rapeseed-Mustard (ICAR), Bharatpur 321303 (Raj.) India
Email: rapelab@public.wh.hb.cn

Abstract

With ever-growing population of South Asia and constantly increasing consumption of fats and oils, the situation would be alarming in next two decades. In the present paper, an effort has been made to examine the production and productivity problems associated with rapeseed-mustard and suggest suitable strategies for enhancing and stabilizing the production and productivity of South Asian countries like, Bangladesh, Bhutan, India, Nepal, Pakistan and Sri-Lanka. This would reduce the huge import of edible oils incurred by South Asian countries, the home to about 400 million people with almost 30% of them living below the National poverty and make these countries self-reliant.

Factors limiting rapeseed-mustard production in this region are vagaries of weather; degraded soils; low investment capacity of farmers; non availability of quality seed; lack of: region specific, high yielding nutritionally superior and resistant/tolerant varieties to biotic and abiotic stresses; inappropriate soil and water management practices, slow pace of technology dissemination, etc.

The research strategic plan should be weaved around the exploitation of impressively large number of germplasm for developing highly productive high harvest index varieties, capable of resisting the diseases/pests/frost/drought, etc. Raising the yield ceiling through synthesis of artificial alloploids in *juncea, napus* and *carinata*; cytoplasmic hybridisation; reshuffling of chloroplast and mitochondrial genomes; exploitation of hybrid vigour, development of suitable ideotypes for different agro-ecologies and evolving nutritionally superior genotypes. All out efforts should be made for quick multiplication of quality seeds of newly developed varieties, their distribution and popularisation. Effective management of natural resources, integrated approach to plant, water, nutrient, pest and disease management should be ensured.

In addition to the traditional areas, non-traditional areas should also be given full attention for extending rapeseed-mustard cultivation in newer areas under different cropping systems. A large potential exists especially in paddy growing regions where suitable technology for growing mustard after paddy need to be evolved. Preliminary trials conducted in rice belt with mustard as *paira* crop in India, have given encouraging results. Intensification of researches to develop early maturing varieties and low input production and protection technologies, is urgently required.

Key words: Brassica, oilseed, production, South Asia, constraints, strategies

Introduction

Agriculture is the main source for the majority of the main people and to achieve socio-economic advance and self-sufficiency in edible oils. Improving the production and productivity of rapeseed- mustard is the present day need. Regional co-operation would not only lead to rapid-economic development but also help in exchange of improved technologies. With ever-growing population of South Asia and constantly increasing consumption of fats and oils, the situation would be alarming in next two decades. In the present paper, an effort has been made to examine the production and productivity problems associated with rapeseed-mustard and suggest suitable strategies for enhancing and stabilizing the production and productivity of South Asian countries like, Bangladesh, Bhutan, India, Nepal, Pakistan and Sri-Lanka. This would reduce the huge import of edible oils incurred by South Asian countries, the home to about 400 million people with almost 30% of them living below the National poverty and make these countries self-reliant. Rapeseed-mustard is the dominant oil crop in SAARC countries, except in Maldives and Sri-Lanka, and contributes 24.6 % in area and 14.7% of the total rapeseed-mustard production. The productivity in these countries varies from 0.372 kg/ha in Bhutan to more than 1000 kg/ha in India and Pakistan compared to the world average of 1700 kg./ha. The constraints and strategies to enhance the productivity have been discussed.

Table 1. Area, Production and Yield of Rapeseed-Mustard in SAARC Countries during 2004-5.

Country	Area (Million hectares)	Production (Million metric tons)	Yield (Kg/ha)
India	7.31	7.59	1038
Pakistan	0.38	0.40	1039
Bangladesh	0.30	0.22	750
Nepal	0.19	0.14	756
World	26.9	46.4	1722

Area, Production and Yield of Rapeseed-Mustard in SAARC Countries

Among the SAARC countries, India happens to be leading the production scenario. While the details are given below (Table 1). Bhutan has a very nominal area of 1760 ha under rapeseed-mustard with a productivity of 372 kg/ha.

Production constraints

The political, socio economic and production constraints limiting rapeseed-mustard production in this region are:

Policy Constraints: Liberal imports of edible oil, marketing of oilseed crops, breeder rights.

Social Constraints: Adherence to old traditions and growing wheat, cotton, rice and sugarcane; use of marginal lands for rapeseed-mustard and canola crops

Biological Constraints: High sensitivity of rapeseed / canola and mustard to insect attack except in India

Economic Constraints: Less use of costly inputs; no support price for rapeseed-mustard in this region, except India; insufficient funds for research in countries like Bhutan, Nepal and Bangladesh.

Biotic constraints: Includes diseases, viz., Alternaria leaf blight, Sclerotinia rot (India, Nepal), white rust and downy mildew and insect pests mustard mainly aphid, sawfly

Abiotic constraints: Includes inadequate moisture supply (No winter rain), soil acidity in Nepal (4-5-6.5 pH), insufficient supply of quality seed, soil salinity in many parts in India.

Other constraints:

1. Non-availability of inputs at proper time and cost
2. Lack of judicious and optimum doses of fertilizers
3. Inadequate production practices,
4. Inappropriate soil and water management practices
5. Non-availability of harvesting and threshing machinery
6. Limited availability of germplasm material and narrow genetic base particularly in Bhutan, Sri Lanka and Nepal.
7. Non-availability of low cost environmental-friendly bio-pesticides (Diamond back moth
8. in Srilanka, etc) and fungicides to mange pest and diseases.
9. Absence of collaboration with leading international organizations involved in oilseeds research in most of the countries
10. Lack of region specific, high yielding nutritionally superior and resistant/tolerant varieties to biotic and abiotic stresses
11. Lack of improved practices to manage pest and diseases using IPM and biological control.

Strategies to overcome these production constraints

There is a vast yield gap between potential (at experimental station) and in farmers' fields in SAARC countries. It has been observed that there is an untapped yield reservoir in India (14-128.5%), available between frontline demonstrations and country mean. The other grey areas to be explored include the newer areas and seasons for cultivation. The research strategic plan should be weaved around the following area of research to bridge the gap and increase the production in various SAARC countries:

Exploitation of germplasm for development of suitable genotypes especially for developing highly productive high harvest index and early maturing varieties. Improved varieties are the key components for enhancement of productivity, which contribute to an extent of 20-25% enhancement in productivity. Development of varieties to withstands vagaries of weather and suitable for degraded soils should be stressed. Exploitation of hybrid vigour to increase horizontal growth of the crop is the need of the hour. Development of suitable ideotypes for different agro-ecologies and evolving nutritionally superior genotypes could be beneficial. Resyntesis of *B. juncea* for broadening of genetic base, development of hybrids using cytoplasmic male sterility (CMS) could lead to higher productivity. In India, among the twelve tested hybrids in the multi-locational initial varietal trial, two *mori* CMS-based hybrids NRCHB-501 (2767 kg/ha) and NRCHB-506 (3034 kg/ha) out-yielded the best check Maya by 3.2 and 13.2% respectively. At present, the CMS system has been perfectized in India and further efforts for incorporation of quality and other aspects are under process.

Raising the yield ceiling through synthesis of artificial alloploids in *juncea, napus* and *carinata*; cytoplasmic hybridisation; reshuffling of chloroplast and mitochondrial genomes; development of suitable ideotypes for different agro-ecologies and evolving nutritionally superior genotypes. All out efforts should be made for quick multiplication of quality seeds of newly developed varieties, their distribution and popularisation. In Bhutan and Nepal, production of improved seeds is lacking as per farmers need.

Low-cost production technology for resource-poor (N-S sowing) farmers viz., adoption of remunerative cropping system, sequential cropping, sowing direction, optimum sowing time and spacing, application of irrigation at critical stage, detopping, timely weeding, seed treatment with aqueous garlic bulb extract (2% w/v), etc.

Extension to this crop in non-traditional areas especially in India needs full attention for extending rapeseed-mustard cultivation in newer areas under different cropping systems like Maharashtra, Karnataka and Andhra Pradesh states in India. The recently released varieties like GM-2 and Sej-2 have shown promise in these areas.

All out efforts should be made for quick multiplication of quality seeds of newly developed varieties, their distribution and popularisation.

Effective management of natural resources and integrated approach to plant, water, nutrient, pest and disease management should be ensured. Integrated mode of managing insect pests and diseases in rapeseed-mustard emphasizes the need for simpler and economically safer measures for the control of the biotic stresses with an additional benefit of reducing pesticide load on the environment.

Management packages separately for rainfed and irrigation and areas should be adequately defined.

A large potential exists especially in paddy growing regions where suitable technology for growing mustard after paddy needs to be evolved. Preliminary trials conducted in rice belt with mustard as *paira* crop in India, have given encouraging results. In eastern states like Assam, West Bengal in rice fallows (11.7 m ha), there is a lot of potential in increasing area under rapeseed-mustard in India.

Intensification of researches to develop and recommend low input production and protection technologies

There is need for judicious use of fertilizer. Targeted yield concept has made soil-test based fertilizer recommendation more quantitative, precise and meaningful. The advantage in the targeted yield based fertilizer recommendation based on soil test can be made with highly profitable both for high and low level of mustard production. Over 80% N used is through fertilizer urea. Therefore, selection of the best time and method is important. Application of organic manuring can boost production in a sustainable manner while reducing dependence on chemical fertilizer.

SAARC Net-Work

Realising the urgent need for increasing the production of rapeseed-mustard in South Asia, a net-work between the SAARC member countries has been initiated through the efforts of India. It is hoped that the net-work would help in production enhancement through mutual exchange of material, technologies, genetic and human resources, thereby enabling these countries to move towards self-reliant in edible oils.