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Technological Gap in Pomegranate Cultivation

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ABSTRACT

Pomegranate is an export oriented crop and the pomegranates from Karnataka enjoy good market in European Union and the Gulf countries. Over 40 per cent of the crop was exported to these countries. Karnataka occupies first position in export of Pomegranate exports by leading Maharashtra State. About 250 tons of pomegranate were exported from the small area of Kustagi and Yelburga tehsils and volume of trade was in the tune of Rs.8.50 crores Net Profit - Rs.3.75 lakhs to Rs.5.00 lakhs per hectare (8000 – 10700 $); in some cases, it has crossed Rs.6.25 lakhs per hectare (13400 $). However in case of Pomegranate growing areas in India, it is observed that because of some constrains, farmers are not realizing the potential yield and quality because the gap in the adaption of recommended technologies. This study attempts to investigate the technological gap prevailing in the cultivation of better quality pomegranates.. This paper summarizes the present cultivation practices followed by the farmers and prevailing gap in technologies like land preparation and planting, nutrient management, water management etc. and provides suggestions for needed research and promotion of policies to reduce the technological gap in the cultivation of better quality pomegranates.

Pomegranate is widely cultivated throughout India and the drier parts of Southeast Asia, Malaya, the East Indies, and tropical Africa. Crop and its entire tree is of great economic importance. Apart from its demand for fresh fruits and juice, the processed products like wine and candy are also gaining importance in world trade (Mahal, 2007). It is an ideal crop for the sustainability of small holdings, as it is well suited to the topography and agro-climate of arid and semi-arid regions. In addition, it provides nutritional security, has high potential to develop wastelands widely available in the region and an ideal crop for diversification. Moreover, it can make higher contribution to gross domestic product (GDP) with a small area. India's exports of fresh pomegranates amounted to US$ 12.8 million in 2005-06, up from US$ 3.0 million in 2002-03, thereby registering an impressive compound annual growth rate of 62.8 per cent. The major export destination for India's pomegranates is UAE, the Netherlands, UK, Belgium and Saudi Arabia. India's share in global exports of Pomegranates is about 6.4%, although the country is the largest producer of Pomegranates. This clearly shows the need for increasing the quantum of export of pomegranates. This study attempts to investigate the technological gap prevailing in the cultivation of pomegranate, in direction to boost the production of better quality pomegranates and its export.

METHODOLOGY

The state Karnataka was selected purposively for the study, because it was one of the states of India which contributes significantly in pomegranate production. Koppal district was purposively selected as it is a major pomegranate producing district in India. Koppal district comprises of four talukas, however, largest area under pomegranate is in two talukas namely Kustagi and Yelburga. Considering the area and production of pomegranate in the two talukas, they were purposively selected for the study. From each taluk four villages were selected by random sampling technique making a total of eight villages. From each village ten respondents (farmers who were growing pomegranate) were drawn using simple random sampling technique, i.e. forty respondents were selected from each taluk, thus total eighty respondents were selected. An ex-post facto

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research design was used for data collection. For the analysis of collected data a special index was developed The final technological gap index scores were computed as percentage of obtained score over obtainable score for each respondent.

RESULTS AND DISCUSSION

From the present study following results were found. Majority of the pomegranate growers were at middle level socio-economic status. Age of majority of respondents ranged from 36 to 50 years. Average education of the farmers is high school. Farming alone as an occupation was dominant vocation of the majority of respondents. Majority of the farmers were without any political position in socio-political organization. Majority of respondents have concrete houses and 45 per cent of the farmers were having semi-medium size of landholding.

Technological gap in the pomegranate cultivation

It is necessary to understand the technological gap prevailing in the pomegranate cultivation, in order to decrease that technological gap thereby increasing the yield of better quality pomegranates and also to give suggestions to the policy makers. Technological gap index was used to identify and rank the technological gap in different recommended technologies which are enlisted after consulting experts and available literature.

Socio-economic characteristics of the respondents

Analysis of these characteristics will give an idea about the characteristics of the respondents and their background. Data was analyzed using descriptive statistics (frequencies, percentage, standard deviation, mean etc). The results on the profile characteristics of the pomegranate growers are given below.

Socio-economic variables:

i) Age

The data collected for age have been presented in Table 1. It was observed that majority (53.3 per cent) of the respondents belonged to the middle age group of 36 to 50 years, followed by young age groups (25.0 per cent) and remaining 21.7 per cent of old age group. It is evident from Table 1 that age of respondents ranged from 36 to 50 years.

ii) Education

The data collected regarding educational level of the respondents are reported in Table 1. It was observed that majority of the respondents were of high school passed (35 per cent). About 33 per cent of respondents were middle school passed followed by college graduates (21 per cent) and functionally literate (10 per cent). Interestingly, not a single respondent was found to be illiterate. This clearly indicates that majority of the respondents were having good education level. This is a positive trend. Print media can be extensively used to impart training and to disseminate information to such farmers/ pomegranate growers because of high level of education.

iii) Occupation

Farming only as an occupation was dominant among the sample respondents (57.5 per cent), Farming and business were the occupation of 26.25 per cent of pomegranate growers. Farming and service were the occupation of 12.5 per cent of pomegranate cultivators. Thus, results clearly indicate that majority of respondents were doing farming as their primary occupation. Distribution of respondents according to their occupation is given in Table 1.

Results clearly infer that growing of pomegranate is done with an intention of exporting to the maximum extent. Hence, programmes on training in pomegranate farming should be aimed at reducing the technological gap by focussing maximum attention on the technologies which are important to reduce technological gap.

iv) Socio - political participation

The data regarding socio political participation of the respondents is presented in Table 1.

1. It is evident from the Table 1 that 46.25 per cent of respondents were having official position in one or more organizations and 23.75 percentages of them were involved in community work. 30 per cent of pomegranate growers were having no official position in socio-political organization.

Table 1: Frequency distribution of respondents on socio-economic variables.

Attributes	Category	Frequency	Percentage
1. Age	1. 35 years and below	20	25.0
	2. 36 to 50years	43	53.7
	3. 51 years and above	13	21.7

2. Education	1. Functionally literate	06	10.0
	2. College graduates	13	21.7
	3. Middle school	20	33.3
	4. High school	21	35.0
3. Occupation	1. Farming alone	44	57.5
	2. Farming+ service	7	12.5
	3. Farming+ business	8	26.25
	4. Farming+ family profession	1	3.75
4. Socio political participation	1. No official position in socio-political organization	24	30.0
	2. Official position in one or more organization	37	46.25
	3. Involvement in community work	19	23.75
5. Type of house	1. Brick walled and thatched	10	12.5
	2. Concrete home	60	75.0
	3. Concrete and double storied	10	12.5
	1. Marginal (0.1-1 ha)	0	0.0
	2. Small (1.1-2 ha)	47	58.3
	3. Semi medium (2.1-4.0 ha)	24	30.0
	4. Medium (4.1-10 ha)	08	10.0
	5. Large(more than 10 ha)	2	1.7
6. Possessions	1. Two farm animals or materials (bullocks/ radio)	15	18.3
	2. Three farm animals or materials (improved farm implement/ news paper/electricity)	15	18.3
	3. 5-10 farm animals or materials (gobar gas/pump set/motor cycle)	40	50.0
	4. More than ten farm animals or materials (tractors /automobile)	10	13.4

Only 30.0 per cent of pomegranate growers were not involved in any socio political participation. It can be concluded that socio political participation of the respondents was very high. It means they can positively influence policies related to pomegranate cultivation and implementation of technologies.

vi) Type of house

The distribution of types of house of respondents is given in Table 1. It was found that almost 75 per cent of respondents were having Concrete home followed by 12.5 per cent with brick walled and thatched. Another 12.5 per cent of respondents were having concrete and double storied type of house. No shed thatched and mud walled thatched type of house was found. This clearly indicates average standard of respondents. This in totality indicates that most of them are with good resources.

viii) Land holding

Distribution of respondents according to land holding is given in Table 1. Results show that most (58.3 per cent) of the respondents had small (1-2.5 ha) size of land holding. It is followed by Medium (4.1-10ha) size of land holding with 8.3 per cent of respondents. 1.25 per cent of respondents had large land holding (more than 10 ha). Majority of pomegranate growers had small to medium size of farm. This finding should be kept in mind by planners and extension workers while designing policies and training them. Landholders of category small to medium of farm can give more attention to the technologies if trained well by institutional mechanism.

ix) Possessions

Distribution of respondents according to possessions is given in Table 1, which shows that 50 per cent of the respondents had possessions of either five to ten farm animals or materials such as gobar gas/pump set/motor cycle. More number of farmers was found to possess motor cycles than farm animals. Data showed that two categories had 18.3 per cent of respondents showing

either two to three farm animals or materials like bullocks/ radio/improved farm implement/news paper/ electricity etc. Only 13.4 per cent of respondents had either more than ten farm animals or materials (tractors /automobile).

The finding shows that possessions of respondents were of medium to high level thereby showing their medium standard of living.

The results of the technological gap index are presented in the tables

The technologies followed by the farmers were categorised into the following different components.

A. Land preparation and planting

Among different Land preparation and planting technologies followed by the farmers, 'Variety used' was ranked first in technological gap with an index of 33.75; Because of problem of non availability of the recommended variety and also due to lack of adequate knowledge etc, 33.75 percent of farmers are not able to use the variety recommended for the area. 'Chemicals used' was given second rank with technological gap index of 36.25. It is also interesting here to note that all other recommended practices under land preparation and planting practices are followed without any technological gap.

Land preparation and planting Technologies

Land preparation and planting	Technological gap
Time of ploughing	0
Number of tillages	0
Soil treatment	0
Size of the pits	0
Filling of pits	0
Time of planting	0
Spacing followed	0
Bahar treatment followed	0
Variety used	33.75
Plant protection followed in initial stages	0
Chemicals used	36.25
Dose of chemicals used	0
Overall	**5.83**

B. Nutrient management Technologies

'Dose of phosphate fertilizer applied' was ranked first in the technological gap index with the score of 15.62, followed by Quantity of green leaf/compost applied with score of 14.37. Nitrogen fertilizer is applied and Method of application of potassic fertilizer were ranked third and fourth respectively. Among the other technologies in which gap are observed are constraints 'nitrogen fertilizer is applied' as well as 'Time of application' were the prominent ones.

Nutrient management Technologies

Particulars	Technological gap
Quantity of green leaf/compost applied	14.37
Which nitrogen fertilizer is applied	11.25
What is the dose of nitrogen fertilizer applied	15.00
Time of application of nitrogen fertilizer	1.87
Method of application of nitrogen fertilizer	0
Which phosphate fertilizer is applied	2.5
What is the dose of phosphate fertilizer applied	15.62
Time of application of phosphate fertilizer	0
Method of application of phosphate fertilizer	0
Which potassic fertilizer is applied	3.12
What is the dose of potassic fertilizer applied	0
Time of application of potassic fertilizer	0.62
Method of application of potassic fertilizer	6.25
Overall	**5.43**

C. Water management Technologies

In the technologies related to the water management, 'number of irrigations are applied' and Interval of application were found to be having high technological gap with a technology gap index of 40.62. Whereas no gap was found in method of application and time of application

Water management Technologies

Particulars	Technological gap
How many irrigations are applied	40.62
Time of application	0
Interval of application	40.62
Method of application	0
Overall	**20.31**

D. Weed management Technologies

'Control of weeds by chemical method' was having highest technological gap in the weed management with the score of 35.As many of the farmers were not controlling weeds by chemical method. 'Number of weeding done in mechanical method 'was ranked at second place with a score of 35.

Weed management Technologies

Particulars	Technological gap
How did you control weeds	0
a) By mechanical method	0
b) By chemical method	35
c) Did not control	0
If mechanical method used i) number of weedings done	35
Overall	**14**

D. Pest and diseases management Technologies

'Number of sprays used' both in case of pest and diseases was found to be having major technological gap and in case of pest management the technological gap was found to be highest and ranked first with a score of 34.37, and the number of sprays used in controlling diseases was ranked second with technological gap of 31.25. It has been found that farmers are using overdose or under dose in spite of recommendations prescribed by the package of practices. Interestingly no gap was found in the chemicals used by the pomegranate growers.

Pest and diseases management Technologies

Particulars	Technological gap
Major diseases from which your crop is suffering?	0
Chemicals you use	0
Number of sprays used	31.25
Major insects from which your crop is suffering?	0
Chemicals you use	0
Number of sprays used	34.37
Overall	**10.93**

Technological gap according to land holding of the pomegranate growers

It was found that the technological gap varied with the land holding of the farmers. In case of land preparation and planting large farmers were found to be having highest gap in the land preparation and planting with a score of 8.33, followed by small and medium farmers. Whereas in case of nutrient management medium farmers were found to be having highest gap with a technological gap index of 7.58, followed by small and semi medium farmers with a technological gap index of 6.41 and 5.77.In case of water management the least technological gap was found in medium farmers, where as highest technological gap was found in both large and small farmers with a technological gap index of 25. In the weed management practices highest gap was seen in large farmer, whereas least gap was seen in medium and semi medium farmers. In case of disease and pest management highest gap was found in case of small and semi medium farmers and least gap was found in case of medium farmers.

Table 2. Ranking of technological gap according to the land holding of the pomegranate growers

SI.No.	Particulars	Small	Semi-medium	Medium	Large	Overall
1	Land preparation and planting	6.48	6.48	4.90	8.33	5.83
2	Nutrient management	6.41	5.77	7.58	3.85	6.59
3	Water management	25.00	20.49	18.75	25.00	20.31
4	Weed management	22.22	12.01	12.01	25.00	17.43
5	Disease and pest management	13.89	13.43	7.60	8.33	10.94

Correlates of technological gap in pomegranate

An attempt has been made to analyze the relation between the dependent variable: the technological gap index scores and independent variables: farmers' socio-economic characteristics. Pearson's correlation coefficients are presented in Table 5.4.

Table 3. : Correlation coefficients of value addition index scores

Independent variables	Correlation coefficient	Standard t value
Age	0.46	4.53*
Education	-0.39	3.76*
Occupation	0.32	2.95*
Social participation	0.14	1.21
Total income	-0.18	1.60
House type	-0.35	3.27*
Land holding	-0.41	3.94*
Possessions	-0.08	0.69

* Significant at 0.05 level of probability

Out of the nine independent variables put under correlation analysis, only five variables were found to be associated with the technological gap index scores. The correlation coefficients were significant at 0.05 level of probability. It is interesting to note that education was found to be negatively associated with technological gap, which indicated that more educated farmers are having lower technological gap and are resorting to more adaption of technologies in the sample villages.

Regression analysis of value addition index scores

A further analysis was done to ascertain the factors responsible for technological gap in pomegranate. For this, a regression equation was fit with technological gap index scores as dependent variable and all the nine independent variables.

The results of regression analysis are given in Table 5.5. The results reveal partial 'b' unstandardized coefficients, beta values and t values.

Table 4. : regression analysis of technological gap index scores

	b	Standard Error	t value	P-value
Constant	8.35	6.67	1.25	0.21
Age	0.06	0.05	1.08	0.28
Education	1.02	0.63	1.61	0.11
Occupation	0.41	0.33	1.26	0.21
House type	-1.40	0.68	-2.07*	0.04
Possessions	-0.40	1.17	-0.34	0.73

R value = 0.344, R square = 0.118571, F value$_{5, 74}$ = 0.089855 ^{NS}

* Significant at 0.05 level of probability

As can be seen from the results, all the nine independent variables could explain a very small amount of variation in technological gap index scores of respondents. The R square value is 0.1185, which indicates that only 11.85 percent variation in technological gap could be explained by the regression equation. The F value at 5, 74 degrees of freedom was 0.089, which was statistically non-significant. This indicates that the variables included in the study were not sufficient to explain variation technological gap practices among pomegranate farmers. However, house type was found to be only single variable affecting the Technological gap in pomegranate.

CONCLUSION

The trend in production and export of pomegranate in India shows that even though India is a top producer of pomegranate its share in the world exports is only 6.4 percent. It shows that there is a urgent need of increasing the better quality pomegranates to cater to the needs of the export market. Since pomegranate is a export oriented crop its cultivation also includes various technologies many times farmers fails to follow these recommended practices lead to the technological gap which in turn results in decreased quality of the fruit.

The study revealed that 'Water management' was having major technological gap with a technological gap index of 20.31, followed by 'weed management 'with a score of 17.43. 'Disease and pest management' during rainy season and hot summers result in low production and low quality produce not suitable for marketing or export, which was found to be having third rank in technological gap with a score of 10.94

Nutrient management was found to be having technological gap index score of 6.59 and was in the fourth place in the overall ranking of technological gap in the technologies as the farmers were not applying the prescribed quantity and dosage. Growing of better quality pomegranates requires good land preparation and planting it was having a technological gap index score of 5.89 and in the fifth place.

The study also revealed that the technological gap varied with the land holding of the farmers. In case of land preparation and planting large farmers were found to be having highest gap in the land preparation and planting with a score of 8.33, followed by small and medium farmers. Whereas in case of nutrient management medium farmers were found to be having highest gap, with a technological gap index of 7.58, followed by small and semi medium farmers with a technological gap index of 6.41 and 5.77. In the weed management practices highest gap was seen in large farmers. Whereas least gap was seen in medium and semi medium farmers. In case of disease and pest management highest gap was found in case of small and semi medium farmers and least gap was found in case of medium farmers.

Pomegranate cultivation needs high initial investment and the crop is also having high gestation period and it also involves risk of attack by the devastating disease

like bacterial blight. The technologies recommended for pomegranate cultivation are also capital intensive hence 'lack of financial support' coupled with 'Technological gap' prevailing in the practices followed by the farmers are contributing to the reduced quality and export of the pomegranate.

The above mentioned situation calls for organizational and Government support in terms of technical knowledge, trained manpower along with support in terms of credit and infrastructural facilities including assured marketing linkages to reduce the technological gap in the cultivation of pomegranate. KVKs in research area must be vested with the responsibility of imparting training to potential interested pomegranate growers and should take measures to reduce the technological gap.

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