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REVIEW PAPER

Prone factors of technological gap in groundnut production technology

P.D. VERMA*, G.R. PATEL AND M.K. YADAV
Krishi Vigyan Kendra (N.A.U.) DEDIAPADA (GUJARAT) INDIA
(Email : dpramodkumarverma@yahoo.com)

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Groundnut is predominantly grown in Gujarat. Groundnut technologies are now available which can boost up groundnut production. However, either the same has not reached to the farmers' field or the farmers are reluctant to these technologies. This may be the reason for low productivity of groundnut. To increase the groundnut production and thereby raise the socio-economic conditions of the farmers, rapid transfer of technology is must. Hence, this study was planned to identified the technological gapes in groundnut cultivation with the following

– To find out the practice wise extent of technological gap.

– To examine the factors responsible for groundnut production.

– To develop constraints index and analyze the constraints in groundnut production.

– To suggest remedial measures to over- come the constraints.

The study was conducted in South Saurashtra agro-climatic zone of Gujarat. By using proportionate random sampling technique, a total number of 256 respondents were interviewed from 24 selected villages of 12 talukas. To find out the per cent technological gap, an index having weightage was developed after consulting the experts in the concern field. The weightage of the particular practices was determined by seeking the opinions of 80 experts (Scientists/Extension workers *I* Progressive farmers) working in the field. They were asked to assign the weight to each selected practice, making a total of 100 for all the 17 selected practices. The mean scores were worked out for all the practices separately. The obtained mean score was then assigned to the adopted technologies by the farmers. The mean scores were again converted in to percentage. This index had 17 recommended technologies of groundnut cultivation. The following formula was used to compute the technological gap:

$$\text{Per cent technological gap} = \frac{R-A}{R} \times 100$$

where, R= Recommended score (weightage) and A= Obtained score

The pod yield was selected as dependent variable and nine variables were selected as independent variables.

To develop constraints index of groundnut production, a list of practice wise as well as general constraints of production was administered among 80 experts related with particular field. The responses of the experts were taken for each constraint on Four Point Continuum *viz*., most important, important, less important and least important having the weightage of 4,3,2,1 and mean score was computed for the weightage of each constraint, Same procedure was followed to collect the responses of 256 growers through personal interview method.

*** Author for correspondence**
G.R. Patel and M.K. Yadav , Krishi Vigyan Kendra (N.A.U.), DEDIAPADA (GUJARAT) INDIA

To find out the important constraints the from each sub group of a particular constraint the highest possible middle value of most important and important *i.e.*,16+9 /2=12.5 was consider as significant one. The suggestion were recorded and percentage of the respondents was work out for each suggestion.

It is observed from the data supplied by the respondents (Table 1) that the mean technological gap score was 39.44 per cent. It also indicated that overall technological gap in groundnut cultivation was of medium order. The disparity between recommendations and actual practices of the farmers is the pointer of the technological gape. When the findings were looked in this context, the inference could be drawn that the groundnuts growers had adopted most of the selected recommendations only to a partial extent. Unless the complete recommended package is adopted fully, one can't expect the optimum yield of the crop.

The study also revealed that technological gape was higher in case of soil testing (85.36%), chemical fertilizers (79.24%), plant protection (64.84%), row spacing (54.95%) and weed management (50.32%). However, minimum technological gap observe in case of tillage (4.80%), improved variety (12.49%) and harvesting (13.54%). Whereas, in remaining technologies, the gap was in the range of about 20 to 40 per cent. This clearly indicated that low cost and easily adoptable technologies are more feasible for adoption as compared to high cost and skill required technologies (Table 2).

The data also revealed that the variables (Table 3); knowledge and technology gap were highly significantly associated with the pod yield of groundnut. Also, size of land holding, income and cropping intensity were significantly associated with the pod yield of groundnut. The negative relationship of technological gap with pod yield suggests that higher the yield lower the technological gap. However, remaining variables (age, education, risk preference and extension participation) could not show their significant relationship with pod yield. An attempt was also made to correlate some important variables with each other and it was observed that the independent variables namely; size of land holding, income, extension participation and technology gap had significant correlation with each other. It was interesting to note that these variables had the negative correlation with the technological gap. While the variables namely; age, education, risk preference and cropping intensity did not show significant relationship with the technological gap.

The step-wise regression analysis of the data indicated that variation in farmers' yield is explained by all the independent variables to the extent of 58.41 per cent (Table 3).

Table 1 : Distribution of the respondents according to over all technological gap (n=256)

Sr. No.	Technological gap	Respondents (Number, Percentage)
1.	Low (up to 25 score)	37 (14.45%)
2.	Medium (26 to 54)	188 (73.44%)
3.	High (55 and above)	31 (12.11%)

Mean = 39.44 SD. 14.44

Table 2 : Practice wise extent of technological gap of improved rainfed groundnut cultivation practices

Sr. No.	Name of the practices	Total score (100)	Mean score obtained	Per cent gap
1.	Soil testing	3.21	0.47	85.36
2.	Tillage	3.33	3.17	4.80
3.	Improved variety	13.37	11.70	12.49
4.	Seed treatment	5.29	3.16	40.26
5.	Seed rate	4.86	3.00	38.28
6.	Sowing time	7.76	4.92	36.60
7.	Row spacing	4.44	2.00	54.95
8.	Sowing method	3.71	2.44	34.23
9.	Organic manure	7.93	5.47	31.02
10.	Chemical fertilizer	7.37	1.53	79.24
11.	Gap filling	3.20	2.57	19.69
12.	Intercultural	4.97	2.92	41.25
13.	Weed management	6.30	3.13	50.32
14.	Supplementary irrigation	9.04	6.67	26.22
15.	Plant protection	9.07	3.19	64.84
16.	Harvesting	3.62	3.13	13.54
17.	Grading and storage	2.53	1.67	33.39

The independent variables namely; knowledge and technological gap alone contributed maximum (54.36 %) to the pod yield of groundnut crop. Hence, remaining variables were eliminated in the regression analysis. This clearly indicated that higher level of knowledge and adoption of technologies ultimately affected the yield positively

To examine the direct and indirect effect of all the independent variables on the dependent variable (yield) the path analysis was employed. It revealed that the variables namely ; knowledge, technological gap and education had the maximum direct effect on the pod yield in descending order (Table 3) .The remaining variables registered trivial direct effect on the pod yield. The variables namely; technological gap, income and knowledge showed their maximum total indirect effect on the pod yield. This clearly indicates that these variables, both having direct and indirect effects may be contributing maximum to increase the pod yield of groundnut.

The constraint index of relevant constraints ranging between 1 to 15 (From Soil Testing to Post harvest including general constraints) making a total of 114 constraints were identified on a structured questionnaire/ schedule. The details on selected significant constraints are given in (Table 4).

Looking to the data in Table 4 among the constraints in plant protection practice more incidence of insect/ pest having mean score of 15.08 was at top level followed by lack of effective bio- pesticides (15.00) and lack of knowledge regarding recommended doses of insecticides/ pesticides (12.84). This might be due to facts that there is no multiple disease and pest resistance variety in groundnut. With regards to irrigation, it can be seen that constraints in irrigation practices group were; the high cost of improved irrigation system and insufficient water for irrigation with mean score of 15.00 and 14.24, respectively and irregular electric supply with mean score of 13.84. This might be due to the facts that this costly system can not be used for whole year due to limited available irrigation water in the farmer's filed as well as limited electric supply. The data also indicated that the constraints *viz.*, improved technologies are not demonstrated on the farmers filed on a large scale having mean score of 15.00 followed by lack of competent extension personnel (14.68) and lack of coordination between agricultural department and other agencies (13.02) were perceived as important by the groundnut growers in the group of information transfer.

On the basis of mean score, results revealed that among the varietal constraints, lack of availability of newly released varieties (13.88), lack of multiple resistant varieties (13.80) and difficulties in getting of improved seed (13.59). It can be inferred from these constraints that farmers used their own seed from year to year and very much aware of about need better varieties . It may, thus be concluded that groundnut growers need better varieties than the varieties grown by them in the present situation. It may also be concluded that the constraints in marketing system was non- remunerative price of groundnut crop with a mean score of 13.88 faced by the growers. From the above results it may be inferred that these constraints are due to lack of storage facilities at village level. Other important constraints expressed by the groundnut growers were in following order; irregularity of sowing due to uncertainty of rainfall having mean score of 13.72, non storage due the pest and disease (13.23) lack of knowledge about micronutrients (13.04) complicated finance procedure (12.92) and high wages of labour in weed management practice which secured mean score (12.84).

The suggestion offered by groundnut growers to overcome the constraints in groundnut production is given in Table 5. Thus, it could be inferred that the suggestion made by the majority of the respondents are based on the facilities

Table 3 : Zero - order correlation, step - wise regression and path- coefficient between independent variables and pod yield of groundnut

Sr. No.	Variables	r-value	Regression co- efficient	t- value	Direct effect	Total indirect effect
1.	Age	-0.062NS	Eliminated	-----	0.0687	0.006
2.	Education	-0.050NS	Eliminated	-----	-0.1763	0.126
3.	Size of land holding	0.1905*	Eliminated	-----	0.0757	0.115
4.	Income	0.1846*	Eliminated	-----	-0.0972	0.282
5.	Knowledge	0.6975**	62.37**	10.77	0.5556	0.141
6.	Risk preference	0.077NS	Eliminated	-----	0.048	0.028
7.	Extension participation	0.097NS	Eliminated	-----	0.041	0.055
8.	Cropping intensity	0.1415*	Eliminated	-----	0.1015	0.04
9.	Technological gap	-0.579*	-9.71**	-5.63	-0.2846	-0.295

NS - Non Significant, *- significant at .05 level, ** significant at .01 level
R^2= 0.5436, Obtained equation: Yield = 183.72 + 62.37 KN - 9.71 TG
where, KN = Knowledge, TG= Technological gap

Table 4 : Constraints faced by the groundnut growers in groundnut production

Sr. No.	Constraints	Weightage	Mean
1. **Plant protection**			
	More incidence of insect/ pests	2.39	15.08
	Lack of effective bio- pesticide	3.77	15.00
	Lack of knowledge regarding recommended doses of insecticide / pesticides	3.21	12.84
2. **Irrigation**			
	High cost of improved irrigation system	3.75	15.00
	Insufficient water for irrigation	3.56	14.24
	Irregular electricity supply	3.46	13.84
3. **Information transfer**			
	Improved techniques are not demonstrated on the farmers filed on a large scale	3.75	15.00
	Lack of competent extension personnel	3.67	14.68
	Lack of co- ordination between agriculture department and other agencies	3.43	13.02
4. **Variety**			
	Lack of availability of new generation varieties	3.50	14.00
	Lack of disease and pest resistance varieties	3.47	13.88
	Lack of multipurpose resistances varieties	3.45	13.80
	Difficulty in getting of improve seed	3.41	13.59
5. **Marketing**			
	Non remunerative price	3.47	13.88
6. **Sowing**			
	Irregularity of sowing due to uncertainty of rainfall	3.43	13.72
7. **Storage**			
	Problem of storage due to post and diseases	3.06	13.23
8. **Fertilizers management**			
	Lack of knowledge about micro nutrients	3.26	13.04
9. **Financing**			
	Complicated finance procedure	2.64	12.92
10. **Weed- management**			
	High wages of labour	3.29	12.84

to the growers already being provided by the various governmental agencies, which need be strengthened and tailored according to the requirement of groundnut growers. The other suggestion offered by the less number farmers need be looked into very carefully by the appropriate agencies to improve the productivity of rain fed groundnut.

Conclusion:

The findings of the study led to the conclusion that the overall technological gap was 39.44 per cent. The variables namely; size of land holding, income, knowledge, cropping intensity and technological gap were significantly correlated with the pod yield of groundnut. The contribution of knowledge and technological gap on pod yield was 54.36 per cent. The variables namely; knowledge and technological gap had their direct effect on pod yield, whereas, technological gap ,income and knowledge showed their total indirect effect on pod yield.

The study has brought out 114 constraints as identified by the expert and faced by the groundnut growers in talking higher groundnut production. The important constraints perceived by the groundnut growers were in the group of, plant protection, irrigation, information transfer, variety ,non-remunerative price, , sowing, storage, fertilizers management , financing and in the weed management. Hence, there is an urgent need to make all possible efforts to overcome the constraints of groundnut production. For this, the following measures could be suggested:

– Efforts should be made to upgrade the knowledge level of the groundnut growers and also to generate low cost, location specific and appropriate technologies. If required, the available technologies may be modified, so as to make these more readily acceptable to the growers. To realize above, demonstrations and training programmes should be organized very frequently. Also the non-adopted technologies should be refined with the help of PRA techniques.

Table 5 : Suggestions to overcome the constraints in groundnuts production

Sr. No.	Suggestions	Per cent
1.	Groundnut should be purchased by the government remunerative price	90.23
2.	Input should be made available at subsidized rate	87.89
3.	Multiple resistance variety should be developed	85.94
4.	Soil testing facilities should be made available at filed level by organizing field camps	78.13
5.	Subsidies should be given to increase farm- mechanization	70.31
6.	Production and availability of the seed of improved varieties should be increased	68.36
7.	There must be regular electric supply at the time of critical irrigation stages of crop	58.98
8.	Availability of organic manure should be increased	58.59
9.	Bunch variety with fresh seed dormancy should be developed	46.88
10.	Payment of crop insurance should be quick	42.69
11.	There must be uniformity in the rate of insecticides/ pesticides / fungicides/ weedicides	29.69
12.	More number of demonstrations on improved crop production technology should be laid out at farmers filed and its publicity should be ensure	28.51
13.	More number of farmers should be contacted by the village level workers to make them aware of about the new groundnut production technology	27.73
14.	Financial procedure should be simple	25.78
15.	Continuous supply of canal water should be ensured at appropriate time	25.39
16.	Appropriate techniques should be developed for harvesting	23.44
17.	Training should be provided for different important practices in groundnut cultivation like plant protection, seed treatment etc.	23.05
18.	Crop insurance should be for all farmers , not only for those who are enjoining credit facilities	20.31
19.	Soil erosion from the cultivated land should be controlled	19.53
20.	Effective and non- residual post emergence herbicides should be developed	17.97
21.	Literature should be provided with fertilizer bag about the recommended doses of fertilizers and its methods of application	17.58
22.	Effective soil moisture conservation technologies should be developed	17.18
23.	Easy techniques should be developed to know the available soil moisture for scheduling irrigation at appropriate time	13.67
24.	Literature related with agricultural information should be available at token rate, through different agencies like, Gram-Panchayat, co- operative society, etc.	7.8

– There should be active involvement of the farmers with policy makers and extension workers to solve the farmer's problems.

– Policy - makers should have to provided highly appreciable support in the form of financial assistance as well as timely availability of required quantity of quality inputs.

– The existed extension system should also need to be streamlined for effective and efficient transfer of technology, if required by providing incentive offer to the extension agencies/organizations.

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