Comparative analysis of the problems faced by the cotton growers in Gujarat

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ABSTRACT : A study was conducted in Anand and Surat district in Gujarat on comparative analysis of the problems faced by the cotton growers. The problems faced by the cotton growers were endemic to pest and diseases, soil problems, effect of insecticides, drought and late heavy rainfall, labour problems, black marketing and private traders. Structured interview schedule was used to obtain information from 50 farmers. The data were collected in the month of May- July, 2011. The data obtained were analyzed by frequency, percentage and paired comparison. The comparative study found that hierarchy of problems as perceived by the cotton growers were effect of insecticides, soil problems, labour problems, drought and late/heavy rainfall, endemic to pest and diseases, Black marketing and private traders.

Key words: Black marketing, comparative, cotton, paired comparison, soil

Cotton is primarily grown in dry tropical and subtropical climates at temperatures between 11 and 25°C. It is a warm climate crop threatened by health or freezing temperatures (below 5 and above 25°C), although its resistance varies from species to species. Excessive exposure to dryness or moisture at certain stages of the plant development (lasting 5 to 7 months) may be detrimental to cotton quality and yields, and might also kill the plant in Gujarat, Vadodara is one of the districts having the major area under cotton crop. The cotton crop is attacked by a number of insect, pests, diseases, nematodes and weeds. Yield losses due to these pests range from 15 to 25 per cent. The Government of Gujarat, in order to improve soil management and introduce farmers to new technology, started on a project which involved giving every farmer a soil health card. This acts like a ration card, providing permanent identification for the status of cultivated land, as well as farmers' names, account numbers, survey numbers, soil fertility status and general fertilizer dose. Samples of land from each village are taken and analyzed.

The Districts Surat and Anand of Gujarat was selected purposively, total 4 sadars namely ; Surat, Udhna, Anand and Petlad were selected purposively for the present study and 50 cotton farmers were selected as respondents. For this study the statistical tools used frequency and percentage, mean and method of paired comparisons were used to analyze the data.

Statistical methods used: The statistical methods used in this study include mean, percentage and method of paired comparison.

Mean: The mean is the arithmetic average and is the result obtained when the sum of the values of the individuals in the data are divided by the number of individuals in the data.

X

n

Mathematically it is represented as –

Mean =

Where, X = observation regarding a variable

n = number of respondents

Percentage: Percentages were used for making simple comparisons. For calculating percentage, the frequency of a particular cell was divided by the total number of respondents in the particular category and multiplied by 100.

The method of paired comparisons : Thurston developed the law of comparative judgment, which provides rationale for the

ordering of stimuli along a psychological continuum. It is a *Psychological Scaling Method,* and makes possible the quantitative investigation of all kinds of values and subjective experiences.

In this method, the stimuli (items, statements or variables) are presented in pairs in all possible combinations and the respondents are asked to select one stimulus over the other from each pair, which is judged as more favorable. This method of psychological scaling also provides an estimate of the distances between each of the stimuli, in comparison to the stimulus with least preference, whose scale value is (arbitrarily) brought down to the level of 'zero'.

If there are n stimuli, the numbers of pairs which may be obtained are n (n-1)/2. The stimuli or items for judgment should be distinct from each other and easily understandable. To eliminate response bias, both the stimuli in each pair and the pairs themselves, are randomly arranged. The stimuli are then presented to the respondents, who are asked to select one stimulus over the other from each pair, which they consider as more favourable.

The F matrix : The first table shall consist of *frequencies* corresponding to the number of times that each stimulus is judged more favourable than the other. The cell entries correspond to the frequency with which the column stimulus is judged more favourable than the row stimulus.

The P matrix : The p matrix gives the *proportion* of times the column stimulus is judged more favourable than the row stimulus. This is obtained by dividing each of the cell entries in the *F* matrix by N (total number of respondents) or this may be obtained conveniently by multiplying the cell entries of F matrix by the reciprocal of N i.e. 1/N. A rearranged P-matrix is then made with the stimulus having the smallest column sum at the left and that with the highest at the right.

The Z matrix : The Z matrix gives the *normal deviates* corresponding to the proportions in the table of P matrix. These are obtained from the table of normal deviates. In the Analysis of paired comparisons the method of complete data was used.

Age : It was found that the contact farmers of Anand and Surat district were predominantly middle aged and 60 per cent farmers belong to this category. About 20 per cent farmers were young *i.e.* upto 35 years old, and about 20 per cent farmers were old aged *i.e.* about 50 years.

Educational qualification: Data in Table 1 showed that 52 per cent of the cotton growers in Anand and Surat district were class X Passed. Most of the cotton growers' farmers belonged to class XII degree *i.e.* 24.00 percent and about 24 per cent cotton growers were having graduate degree.

Table 1. Socio economic status of cotton growers

Category	N = 50	
	Frequency	Percentage
Age		
Young (upto 35 yrs)	10	20
Middle aged (36 – 50yrs)	30	60
Old aged (above 50 yrs)	10	20
Educational qualification		
Class X	26	52
Class XII	12	24
Graduate	12	24
Caste		
General	37	74
SC	6	12
ST	0	0
OBC	7	14
Parental occupation		
Farming	31	62
Business	5	10
Service	14	28
Family type		
Single	35	70
Joint	15	30
Family size		
Upto 5	32	64
Above 5	18	36
Holding size		
Less than one ha	10	20
One to two ha	13	26
Two to four ha	8	16
Four to ten ha	14	28
More than ten ha	5	10

From Table 1, it was apparent that the percentages who were having single family are more than the joint family. The study expressed that 70 per cent respondent having single family and 30 per cent respondent having joint family.

Regarding the land holding in Anand and Surat district of Gujarat from Table 1 that 20 per cent of cotton cultivators were having less than one ha of land. 26 per cent of the cotton cultivators were having 1 to 2 ha land and 16 per cent of the cotton cultivators had land holding between 2 to 4 ha of land. Another category more than 10 ha also represents 10 per cent of cotton cultivators. 28 per cent of the cotton cultivators had land holding between 4 to 10 ha.

Six types of problems faced by the cotton growers are identified as endemic to pest and diseases, soil problems, effect of insecticides, drought and late heavy rainfalll, labour problems, black marketing and private traders.

The 6 types of problems were presented to the cotton growers in pairs, in 15 possible combinations [6(6-1)/2=15]. The F matrix or the frequency with which each column stimulus was judged more favourable than the row stimulus was obtained and is presented in following Table 2.

[* To be understood as 35 cotton growers preferred training on plant protection measures to new technology and so on *i.e.* the column stimulus judge more favorable than the row stimulus].The cell entries in the diagonal line were, therefore, vacant we assume to be N/2 *i.e.* 50/2 = 25.00 in each case. The cell entries of F matrix were divided by N [the total number of respondents; 50] to get the P matrix. This is presented in the following Table 3. The cell entries of P matrix judged more favourable than the row stimulus.

It has been stated earlier that the cell entries in the diagonal line which were blank in the F matrix were assumed to be $^N/_2$ *i.e.* 25 in each case divided by M, gave a proportion of 0.500 which has been shown in each cell of the diagonal line in the P matrix. The P-matrix was then rearranged with the stimulus having the smallest column sum at the left and that with the highest at the right. For this purpose the

Table 2. F matrix for 6 types of problems judges by 50 cotton growers

Problems	Endemic to pest and diseases	Soil problems	Effect of insec- ticides	Drought and late heavy rainfall	Labour problems	Black marketing and private traders
Endemic to pest and diseases	-	35*	25	28	28	22
Soil problems	15	-	30	27	24	20
Effect of insecticides	25	20	-	19	29	14
Drought and late heavy rainfall	22	23	31	-	23	26
Labour problems	22	26	21	27	-	25
Black marketing and private traders	28	30	36	24	25	-

Table 3. P matrix corresponding to the F matrix

Problems	Endemic to pest and diseases	Soil problems	Effect of insecticides	Drought and late heavy rainfall	Labour problems	Black marketing and private traders
Endemic to pest and diseases	0.500	0.700	0.500	0.560	0.560	0.440
Soil problems	0.300	0.500	0.600	0.540	0.480	0.400
Effect of insecticides	0.500	0.400	0.500	0.380	0.580	0.280
Drought and late heavy rainfall	0.440	0.460	0.620	0.500	0.460	0.520
Labour problems	0.440	0.520	0.420	0.540	0.500	0.500
Black marketing and private traders	0.560	0.600	0.720	0.480	0.500	0.500
SUM	2.740	3.180	3.360	3.000	3.080	2.640

column stimuli in the table ahead were rearranged from smallest to highest as F, A,D,E, B and C. This gave the rearranged p matrix, which is presented in following Table 4.

The Z matrix corresponding to the rearranged P matrix was obtained by converting the Pij entries to Zij entries Table 5.

The column sum for each stimulus was obtained by adding the respective cell entries, taking the sign into consideration. The mean values were obtained by dividing the sums with the total number of stimuli (6 in the study). The absolute scale value of the stimulus with the largest negative deviation (0.156) was added to all the column means to make the scale value for this stimulus zero and all of the others with positive sign. The hierarchy of problems of cotton growers at village level and the scale values are presented in the above Table 5 and diagrammatically in following figure.

The present findings were based on the responding of 50 cotton growers spread over Anand, Petland, Surat and Udhna sadar of Anand and Surat districts in Gujarat. From the Table 5, it was found that out of six types of problems were identified. Problems on effects on insecticides had the highest scale value and was considered as the most important problem as perceived by the cotton growers of Anand and Surat district in Gujarat.

Effect of insecticides is one of the most important problems of cotton growers. Plant protection is the most important measures in cotton cultivation. Plant protection measures involves the use of all possible appropriate methods to keep pest population at a level that is below Economic Threshold Level, which will not cause any economic loss. Adulterated insecticide chemicals and pesticide abuse are the major problems leading to reduced yields and resultant social problems in otherwise high

Table 4. Rearranged P matrix smallest to highest column sum

Problems	Black marketing and private traders	Endemic to pest and diseases	Drought and late heavy rainfall	Labour problems	Soil problems	Effect of insecticides
Black marketing and private traders	0.500	0.560	0.480	0.500	0.600	0.720
Endemic to pest and diseases	0.440	0.500	0.560	0.560	0.700	0.500
Drought and late heavy rainfall	0.520	0.440	0.500	0.460	0.460	0.620
Labour problems	0.500	0.440	0.540	0.500	0.520	0.420
Soil problems	0.400	0.300	0.600	0.480	0.500	0.600
Effect of insecticides	0.280	0.400	0.380	0.580	0.400	0.500
SUM	2.640	2.740	3.000	3.080	3.180	3.360

yielding areas of Gujarat. The trend evident in case of pesticides use was more the risk, more was the number of sprays. More than 30 per cent of the sprays was monochrotophos, used for its growth promoting effect than as a pest control measure. The second important problem as perceived by the cotton growers was "soil problems". Unproductive soil is the tendency to use less than recommended dose of fertilizers because of the risk inherent in intensive cultivation under uncertain weather. "Labour problems" was ranked as the third important problem as perceived by the cotton growers.

There was a steep hike in labour charges. They are taking charges of about 120-180/ day. There is a large shortage of skilled labourers which indirectly shows effect on labour charges which they are taking. Problems on "drought and late heavy rainfall" was ranked as the fourth important problem as perceived by the cotton growers. Climate plays havoc with heavy rains and extended wet spell during October and November, resulting in the outbreak of pests (*Helicoverpa* and *Spodoptera*) causing extensive damage to cotton production. Gujarat has faced

Table 5. Z matrix Hierarchy of problems of cotton growers

Problems	Black marketing and private traders	Endemic to pest and diseases (A)	Drought and late heavy rainfall	Labour problems	Soil problems	Effect of insecticides
Black marketing and private traders	0.000	0.151	-0.050	0.000	0.253	0.583
Endemic to pest and diseases	-0.151	0.000	0.151	0.151	0.524	0.524
Drought and late heavy rainfall	0.050	-0.151	0.000	-0.100	-0.100	0.305
Labour problems	0.000	-0.151	0.100	0.000	0.050	-0.202
Soil problems	-0.253	-0.524	0.253	-0.050	0.000	0.253
Effect of insecticides	-0.583	-0.253	-0.305	0.202	-0.253	0.000
SUM Z	-0.937	-0.928	0.149	0.203	0.474	1.463
Mean Z	**-0.156**	**-0.154**	**0.025**	**0.033**	**0.079**	**0.243**
Add largest negative deviation	+0.156	+0.156	+0.156	+0.156	+0.156	+0.156
Rank (Scale value) R	0.000	0.002	0.181	0.189	0.235	0.399

problems with groundwater depletion, especially after demand for water went up in the 1960s. As access to electricity in rural areas increased, subermersible electric pumps became more popular in the 1980s and 1990s. However, the Gujarat Eectricity Board switched to flat tariff rates linked to the horsepower of pumps, which increased tubewell irrigation again and decreased the use of electric pumps. Groundwater maintenance and preventing unnecessary loss of the available water supplies is now an issue faced by the state. The Sardar Sarovar Project, a debated dam project in the Narmada valley consisting of a network of canals, has significantly increased irrigation in the region. "Endemic to pest and diseases" is one of the fifth most important problem for the cotton growers. The unpredicted nature of weather, various harmful insecticides had attach the crop. "Black marketing and private traders" had been ranked as the sixth and last important problems

as perceived by the cotton growers. Marketing is one of the major aspects for consideration with the rise in agricultural production (Prasad, 2003). But the local traders are purchasing the cotton at less MSP than normal rate by taking into consideration the economic condition of farmers. The farmers usually sell at the rate at which the traders demands so that they can get little relief from the loan. The local traders took the license from Agricultural Product Marketing Committee (APMC) to purchase the cotton from various villages. There is no direct control of APMC over these dealers.

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Table 6. Relative importance of the problems according to their scale values

Problems	Scale values	Rank
Effect of insecticides	0.399	I
Soil problems	0.235	II
Labour problems	0.189	III
Drought and late heavy rainfall	0.181	IV
Endemic to pest and diseases	0.022	V
Black marketing and private traders.	0.000	VI