MANAGEMENT EFFICIENCY OF BT COTTON GROWERS IN BELAGAVI DISTRICT

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ABSTRACT

The present study was conducted in two taluks of Belagavi District in Karnataka state during 2014-15 to know the Management Efficiency of Bt cotton growers. A total of 120 Bt cotton growers were selected by using simple random technique from six villages of two taluks. The results revealed that majority of the Bt cotton growers belonged to medium knowledge about Bt cotton cultivation practices (51.66%) , adoption of Bt cotton cultivation practices (41.66%) , information seeking behavior (37.50%), ability in planning (39.16%), ability to make rational decision (39.16%), ability to co-ordinate activities (41.67%), ability in rational marketing (49.67%) and competence in evaluation (35.00%). Further, 40.83 per cent of Bt cotton growers belonged to medium overall management efficiency category. The characteristics viz., education, land holding, extension contact, extension participation and scientific orientation had positive and significant relationship with management efficiency. The results revealed that all the12 independent variables contributed to the extent of 61.10 percent of the variation in the management efficiency of Bt cotton growers. Hence, department of Agriculture and other concerned organizations need to educate the Bt cotton growers on functions of management especially planning, decision making, maintaining records, evaluation techniques etc., The positive and significant relationship established between the independent variables and dependent variable would serve as a guideline for the extension personnel to select the target groups for extension educational activities by considering these factors to improve economic performance of Bt cotton growers.

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International Research Journal of Human Resources and Social Sciences (IRJHRSS)

219 | P a g e

Keywords: Bt cotton, management efficiency, recommended cultivation practices, extension activities

Cotton (*Gossypiumsps*) the "white gold" and "king of fibers" is cultivated in tropical and subtropical regions of more than 70 countries across the world and enjoys a predominant position amongst all cash crops in the world. The major producers of cotton are China, India, USA, Pakistan, Uzbekistan, Argentina, Australia, Greece, Brazil, Mexico and Turkey. These countries contribute about 85 per cent to the global cotton production. India is the second largest cotton producer and consumer in the world. In India, Bt cotton occupies an area of 11.73 million ha with a production of 39.00 million bales with productivity of 565 kg/ha in 2014-15 (Anon., 2014).

Cotton plays a key role in the national economy in terms of generation of direct and indirect employment in agriculture and industrial sectors. Cotton textiles and its related exports constitutes nearly 65 per cent, accounting for nearly 33 per cent of the country's total foreign exchange earnings is around 17 billion dollars with a potential for a significant increase in the coming years. This clearly stresses the need for further efforts to increase productivity of the most important commercial crop of the country. Many countries including USA, China and Australia have reported positive experiences with Bt cotton. In China it has spread very rapidly.

In Karnataka, Bt cotton occupies an area of 7.60 lakh ha with a production of 26.90 lakh bales with a productivity of 626 kg/ha. The increase in productivity from 247 kg/ha in 2005-06 to 626 kg/ha in 2014-15 was mainly due to cultivation of Bt cotton (Anon., 2014). The predominant Bt cotton growing districts are Haveri, Belagavi, Dharwad, Raichur, Gadag, Kalaburagi, Davangere, Bellary and Mysuru. In Belagavi district, Bt cotton cultivated an area of 22,675 ha and production 84,455 tones and productivity of 394 kg/ha (Anon., 2012-13).

Cotton crop is infested by various pests. Among the pests of cotton, cotton bollworms viz., American bollworm (*Helicoverpaarmigera*), Pink bollworm (*Pectinophoragossypiella*) and spotted bollworms (*Eariasvitella*) cause significant yield losses. About 10 per cent of insecticides on global basis and 45 per cent in India are used to control of insect pests in cotton (Singh and Kaushik, 2007). The desperate situation faced by cotton farmers due to pest damage and the consequent suicides by many of the cotton farmers led to search for solutions. Application of biotechnology for developing pest resistance in cotton is one among them that appears to hold promise. Bt cotton was introduced in India to reduce the pesticide consumption. The farmers are adopting Bt cotton technology to reduce the pest damage and

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories.
International Research Journal of Human Resources and Social Sciences (IRJHRSS)

220 | P a g e

the cost of production. Therefore, cultivation is spreading steadily in terms of area and production. Hence, studying the management efficiency of Bt cotton is important to realize the maximum potential yield and income. With this back ground, the present study has been planned to undertake with the following specific objectives

1. To study the management efficiency of Bt cotton growers
2. To know the relationship between the personal and socio economic characteristics of Bt cotton growers with their management efficiency

MATERIALS AND METHODS

The present study was conducted in purposively selected two talukas of Belagavi District based on maximum area under Bt cotton cultivation. Three villages from each taluk were selected based on the criterion of maximum area under Bt cotton. From each village, a list of Bt cotton growers was prepared with the help of Agricultural Assistants and 20 respondents from each village were selected by using simple random technique. Thus making a total sample of 120. Data were collected by using structured pre-tested interview schedule by personal interview method.

RESULTS AND DISCUSSION

Management efficiency

The management efficiency of Bt cotton grower was operationalized as the degree to which a Bt cotton grower undertake mental as well as operational managerial activities with regard to Bt cotton production to get maximum benefit with available resources.

Eight components selected for the measurement of management efficiency were operationally defined and measured through appropriate scales and schedule. The details of their measurements are given below:

1 Knowledge about Bt cotton cultivation practices

It is operationally defined as the degree to which the factual information was possessed by the Bt cotton grower regarding improved production practices.

A teacher made test as suggested by Anastasi (1961) was employed to measure the knowledge level of the respondents about the Bt cotton cultivation practices. A list of knowledge items was prepared by discussing with experts from agronomy and agricultural extension and also by referring to the package of practices book published by the University

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories.
International Research Journal of Human Resources and Social Sciences (IRJHRSS)

221 | P a g e

of Agricultural Sciences, Dharwad. Each practice was framed in a question form to obtain the response from the respondents. For each question alternative answers were given. The answers to the question were quantified by giving one score to correct answer and zero score to incorrect answer. The test constituted 26 knowledge questions. The maximum possible score was 26 and the minimum was zero. The respondents were grouped into three categories using mean (17.98) and standard deviation (2.47) as measure of check.

2 Adoption of Bt cotton cultivation practices

It was defined as the extent to which the improved production practices of Bt cotton were utilized on a continuous basis.

The questions covering full range of cultivation practices of the Bt cotton crop were framed. The actual practices followed by the respondents during 2014-15 were noted down. The score of 2 and 0 was assigned to the correct and wrong answers respectively. For some of the practices especially dosage of fertilizer applied, dosage of pesticides supplied etc. adopted was fairly close to the recommendation, it was viewed as partially adopted. In such cases, score of 1 was assigned. The test in all had 26 questions and the maximum possible score was 52 and the minimum possible score was zero.

Depending upon the total scores obtained by each one of the respondents, they were grouped into three categories with mean (38.99) and standard deviation (3.39) as a measure of check.

3 Information seeking behaviour

It was operationalized as the extent to what information sources and channels were utilized by the Bt cotton growers for acquisition of scientific and technical information with respect to Bt cotton production.

To measure the ability in seeking information five informal, five formal and six mass media information sources/channels relevant to Bt cotton production were selected. The frequency of use of these sources/channels was rated on a four point continuum ranging from "regularly (3), "sometimes" (2), "occasionally" (1) and "never" (0). The scores of each source/channel were summed up to arrive at the total score of a respondent.

The respondents were grouped into three categories using mean (116.14) and standard deviation (10.91) as measure of check.

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories.
International Research Journal of Human Resources and Social Sciences (IRJHRSS)

222 | P a g e

4 Ability in planning

It is the degree to which an individual is capable of stating the activities of Bt cotton cultivation that he/she intends to do by certain ways in an enterprise.

In the present study, the statements were framed to measure the planning ability of Bt cotton grower. The scale consisted of seven statements and responses were obtained as 'followed' and 'not followed' for scale. The score of 1 and 0 was assigned for these statements respectively. Thus, the score for each respondent ranged from 0 to 7. Based on the total score, the respondents were classified into three categories by using mean (4.66) and standard deviation (1.73) as a measure of check.

5 Ability to make rational decision

It was operationalized as the degree to which an individual is capable of weighing the available alternatives in terms of their desirability and likelihoods and choosing the most appropriate one for achieving maximum profit from the Bt cotton farming.

Rationality in decision making was measured with the help of the scale developed by Supe (1969) with necessary modifications. Responses to the six items were measured on three rational levels *viz.,* rational, intermediate and less rational with assigned weigh tages of 2, 1 and 0, respectively. Thus, the possible range for each respondent was 0-12. The respondents were grouped into three categories using mean (5.85) and standard deviation (2.32) as measure of check.

6 Ability to co-ordinate activities

It was defined as the degree to which a Bt cotton growers co-ordinates activities in a time dimension.

In the present study, the statements were framed to measure the ability to co-ordinate activities of Bt cotton grower. The scale consisted of five statements and responses were obtained as 'followed' and 'not followed' for scale. The score of 1 and 0 was assigned for these statements respectively. Thus, the score for each respondent ranged from 0 to 5. Based on the total score, the respondents were classified into three categories by using mean (3.66) and standard deviation (0.88) as a measure of check.

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories.
International Research Journal of Human Resources and Social Sciences (IRJHRSS)

223 | P a g e

7 Ability in rational marketing

It was operationalized as the capacity of the Bt cotton growers to get maximum returns for his produce.

In the present study, the statements were framed to measure the ability in rational marketing of Bt cotton grower. The scale consisted of six statements and responses were obtained as 'Considered' and 'Not considered' for scale. The score of 1 and 0 was assigned for these statements. Thus, the score for each respondent ranged from 0 to 6. Based on the total score, the respondents were classified into three categories by using mean (4.6) and standard deviation (0.82) as a measure of check.

8 Competence in evaluation

It is operationalized as the ability of the grower to identify the imperfections and correct them aptly as well as judge the value of alternatives or activities at various stages of the production, processing or marketing. Scale developed by Nagaraja (1989) was used with slight modifications relating to Bt cotton cultivation activities. The eight questions are framed and responses were obtained as 'Yes' and 'No' for competence in evaluation questions. The score of 1 and 0 was assigned for these questions. Thus, score of each respondent ranged from o to 8. Based on the total score, the respondents were classified into three categories by using mean (5.85) and standard deviation (1.44) as a measure of check.

Results and Discussion

1. Management efficiency of Bt cotton growers

Management efficiency was quantified considering performance of an individual for eight components *viz.*, knowledge about Bt cotton cultivation practice, adoption of Bt cotton cultivation practice, information seeking behaviour, ability in planning, ability to make rational decision, ability to co-ordinate activities, ability in rational marketing and competence in evaluation.

Components of management efficiency of Bt cotton growers

Management efficiency of the growers has been discussed in detail with respect to the components considered and are presented under following headings.

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories.

International Research Journal of Human Resources and Social Sciences (IRJHRSS)

224 | P a g e

1. Knowledge about Bt cotton cultivation practices

It could be inferred from the data in Table 1 that more than half (51.66 %) of the Bt cotton growers belonged to medium knowledge level category. while 26.67 per cent and 21.67 per cent were observed in high and low knowledge categories respectively. The probable reason might be due tothe Bt cotton growers taken utmost care to collect all necessary information regarding cultivation practices. Correct knowledge about practices is a pre-requisite for any activity to be carried out efficiently and effectively. The other possible reasons are higher education, greater self interest in taking up this activity, regular participation in extension activities, more income, good social interaction among members etc. Might have promoted them to acquire knowledge about improved methods of Bt cotton cultivation. These findings are supported with the results of Rajashekhar Reddy (2006) and Birajdar (2012)

2. Adoption of Bt cotton cultivation practices

It could be seen from Table 1 that 41.66 per cent of the Bt cotton growers belonged to medium adoption category, whereas 39.17 and 19.17 percent of the Bt cotton growers were in low and high adoption of Bt cotton cultivation practices category was observed. Knowledge limits the action of an individual as it is the basis for any individual to think of pros and cons in making a decision to adopt or reject a practice. Hence, probable reason might be due to, possession of medium to high knowledge by farmers with respect to recommended practices of Bt cotton cultivation. The findings are inconformity with the results Rajashekhar Reddy (2006) and Birajdar (2012)

3. Information seeking behavior

The results in Table 1 indicated that 37.50 per cent of Bt cotton growers belonged to medium information seeking behaviour category, whereas 31.67 per cent and 30.83 per cent growers belonged to high and low information seeking behaviour categories respectively. Information necessarily is the backbone for any knowledge to be obtained. Exposure to various mass media sources, contact with extension personnel and agencies, might have helped the growers to gather more information regarding improved Bt cotton production practices. Hence, a higher per cent of growers might be observed in medium and high category of information seeking behaviour. These results are in conformity with the results of Birajdar (2012) and Basavaraj Gundappagol (2014)

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories.

International Research Journal of Human Resources and Social Sciences (IRJHRSS)

225 | P a g e

4. Ability in planning

The data in Table 1 highlighted that 39.16 per cent of the Bt cotton growers belonged to medium ability planning category. Whereas, 34.17 and 26.67 per cent of the growers belonged to high and low ability in planning categories respectively. Planning necessarily is a decision making process. The difference in planning ability among the Bt cotton farmers could be attributed to the nature of risk involved in maintaining the Bt cotton production. Other contributed factors might be the less experience of growers and small area under Bt cotton cultivation. As the area under cultivation of Bt cotton is less, it necessarily does not have extra burden on growers to plan the activities. Other important factor observed is that generally farmers do not tend to plan their activities. Planning and documentation are time consuming activities. Farmers under Indian conditions are found to neglect or attach lesser importance to planning activity in case of any enterprise. This may be due to the lack of interest or difficulty in understanding and implementing planning techniques. The results of the study are corroborated with the findings of Rajashekhar Reddy (2006), Birajdar (2012) and BasavarajGundappagol (2014)

5. Ability to make rational decision

The results in the Table 1 depicted that 39.16 per cent of the Bt cotton growers belonged to medium rational decision making category. Whereas, 31.17 and 29.17 per cent belonged to high and low rational decision making categories, respectively. In general, nearly an equal proportion of farmers were observed among different categories of decision making. Decision making is an integral part of planning. The explanation given in case of planning ability holds good for the present findings too. Decision making concept is highly influenced by close interaction among co-growers, family members and friends. Most of the decisions are influenced by close members of group dynamics which in turn affect the decision making process of an individual. Decision making is also enhanced by experience, social contact, mass media exposure, participation in extension activities and contact with experts. These helps an individual in understanding the relative importance attached to available alternatives and choosing the best option from available alternatives. These results are in conformity with the results of Rajashekhar Reddy (2006), Birajdar (2012) and BasavarajGundappagol (2014)

6. Ability to co-ordinate activities

Table 1 revealed that 41.67 per cent of the Bt cotton growers belonged to medium level of ability to co-ordinate activities followed by low (40.83 %) and high (17.50 %)

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories.
International Research Journal of Human Resources and Social Sciences (IRJHRSS)

226 | P a g e

categories respectively. Coordination of activities is related to the intensity of activities of an enterprise. In general, enterprise with more intricate activities requires higher coordination efforts. Bt cotton management also requires timely coordination of different activities in order to get maximum returns. Tasks are interrelated and need to be performed with one another. Hence, the findings might have been observed in the present study. The results are in accordance with the findings of Rajashekhar Reddy (2006), Birajdar (2012) and Basavaraj Gundappagol (2014)

7. Ability in rational marketing

A glance at data in Table 1 indicated that (49.67 %) of the Bt cotton growers belonged to medium level of ability in rational marketing category. Whereas, 40.00 per cent and 10.83 per cent belonged to low and high categories respectively. This might be due to their respective education level, extension contact and mass media exposure and marketing procedure. Ability in rational marketing is influenced by the decision taken by the respondents in production planning. Most of the respondents were selling their produce in regulated markets which in turn had positive impact on their marketing orientation. As they were found to have medium ability in rational marketing, assured market with near stabilized prices for the produce might have resulted in medium marketing orientation. The results are in conformity with the findings of Rajashekhar Reddy (2006), Birajdar (2012) and BasavarajGundappagol (2014)

8. Competence in evaluation

The results presented in Table 1 revealed that 35.00 per cent of Bt cotton growers belonged to medium competence in evaluation group. Whereas, 33.33 and 31.67 per cent of the growers were seen in low and high competence in evaluation categories respectively. The importance of evaluation and control is obvious for keeping in touch with the desired goals. Evaluation is necessary to know whether the enterprise is earning profits or incurring loss. It was observed that majority of the Bt cotton growers kept records of produced quantity and prices realized. They were aware of profits and loss in the enterprise. Societies too provided the data to the growers which helped them to assess their costs of production. Similar findings are observed by Rajashekhar Reddy (2006)

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories.
International Research Journal of Human Resources and Social Sciences (IRJHRSS)

227 | P a g e

II. Overall management efficiency of the Bt cotton growers

The findings pertaining to overall management efficiency of Bt cotton growers are presented in Table 2. The results revealed that 40.83 per cent of the Bt cotton growers belonged to medium management efficiency category followed by 33.33 per cent and 25.83 per cent high and low management efficiency categories respectively. The possible reasons for medium management efficiency of Bt cotton growers might be due to their medium knowledge and adoption of Bt cotton cultivation practices, information seeking behaviour, ability in planning, ability to make rational decision, ability to co-ordinate activities, ability in rational marketing and competence in evaluation. The results are in conformity with the findings of Nagaraja (1989), Rajashekhar Reddy (2006) and Basavaraj Gundappagol (2014).

III. Relationship between personal and socio-economic characteristics of Bt cotton growers with their management efficiency

It is apparent from Table 3 that the variables such as education, land holding, extension contact, extension participation and scientific orientation were found to be positive and significant relationship with management efficiency. Other variables *viz.,* age, experience in Bt cotton cultivation, area under Bt cotton, annual income, mass media exposure, economic motivation and innovative proneness had a non-significant relationship with management efficiency of the respondents.

The probable reasons might be due to that as one gets higher education, gains more knowledge which leads to high management efficiency. In the same way as the land holding of an individual farmer increases, his management efficiency also increases due to more involvement in managing his large land holdings. Extension contact contributes for the management efficiency, the reason is that as that higher level of contacts with extension agency are favourably predisposed to acquire more information, skills and other factors relating to enterprises. The farmers exposure to the extension activities leads to increase in his management skill due to participation in various extension educational activities. Finally, the scientific orientation makes farmers employ scientific methods on making the decisions as well as, acquire and adopt efficient factors of management of enterprise consequently raising their management efficiency level. The findings are in agreement with the findings of Rajashekhar Reddy (2006),Nehete*et al.*(2011), Birajdar (2012) and Basavaraj Gundappagol (2014).

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories.
International Research Journal of Human Resources and Social Sciences (IRJHRSS)

228 | P a g e

IV Multiple regression analysis of independent variables with management efficiency of Bt cotton growers

The results of the regression analysis under taken to determine the extent of contribution of selected variables on the management efficiency of Bt cotton growers presented in Table 4. The results indicated that all the variables taken together contributed to 61.10 per cent of the variation in management efficiency. The results further revealed that among the 12 independent variables education, land holding, annual income, extension participation and innovative proneness were significant in predicting the variation in the level of management efficiency of Bt cotton growers.

CONCLUSION

The findings of the study revealed that majority of the Bt cotton growers belonged to medium knowledge about Bt cotton cultivation practices (51.66%) , adoption of Bt cotton cultivation practices (41.66%) , information seeking behaviour (37.50%), ability in planning (39.16%), ability to make rational decision (39.16%), ability to co-ordinate activities (41.67%), ability in rational marketing (49.67%) and competence in evaluation (35.00%). Further, 40.83 per cent of Bt cotton growers belonged to medium overall management efficiency category. The characteristics viz., education, land holding, extension contact, extension participation and scientific orientation had positive and significant relationship with management efficiency of Bt cotton growers. Hence, Department of Agriculture and other concerned organizations need to educate the Bt cotton growers on functions of management especially planning, decision making, maintaining records, evaluation techniques etc., The positive and significant relationship established between the independent variables and dependent variable would serve as a guideline for the extension personnel to select the target groups for extension educational activities by considering these factors to improve economic performance of Bt cotton growers.

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A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories.
International Research Journal of Human Resources and Social Sciences (IRJHRSS)

229 | P a g e

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A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories.
International Research Journal of Human Resources and Social Sciences (IRJHRSS)

230 | P a g e

Table 1. Components of management efficiency of Bt cotton growers(N=120)

Sl. No	Components of management efficiency	Category	Frequency	Percent	Mean	S D
1	Knowledge about Bt cotton cultivation practice	Low (<16.74)	26	21.67	17.98	2.47
		Medium (16.74 -19.22)	62	51.66		
		High (>19.22)	32	26.67		
2	Adoption of Bt cotton cultivation practice	Low (<37.29)	47	39.17	38.99	3.39
		Medium (37.29-40.69)	50	41.66		
		High (>40.69)	23	19.17		
3	Information seeking behaviour	Low (<110.68)	37	30.83	116.14	10.91
		Medium (110.68-121.59)	45	37.50		
		High (>121.59)	38	31.67		
4	Ability in planning	Low (<3.78)	32	26.67	4.66	1.73
		Medium (3.78-5.55)	47	39.16		
		High (>5.55)	41	34.17		
5	Ability to make rational decision	Low (<4.68)	35	29.17	5.85	2.32
		Medium (4.68-7.01)	47	39.16		
		High (>7.01)	38	31.17		
6	Ability to co-ordinate activities	Low (<.3.22)	49	40.83	3.66	0.88
		Medium (3.22-4.10)	50	41.67		
		High (>4.10)	21	17.50		
7	Ability in rational marketing	Low (<4.18)	48	40.00	4.6	0.82
		Medium (4.18-5.01)	59	49.67		
		High (>5.01)	13	10.83		
8	Competence in evaluation	Low (<5.13)	40	33.33	5.85	1.44
		Medium (5.13-6.58)	42	35.00		
		High (>6.58)	38	31.67		

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories.
International Research Journal of Human Resources and Social Sciences (IRJHRSS)

231 | P a g e

Table 2. Overall management efficiency of Bt cotton growers (N= 120)

Management efficiency	Criteria	Number	Percentage
Low	Lessthan197.06	31	25.83
Medium	Between 197.06 to 204.44	49	40.83
High	More than 204.44	40	33.33
Total		**120**	**100**

Mean:197.75;   SD:13.38

Table 3 . Relationship between personal and socio- economic characteristics of Bt cotton growers with their management efficiency (N=120)

Sl. No.	Characteristics	Correlation co efficient (r)
1	Age	0.033^{NS}
2	Education	0.217^*
3	Experience in Bt cotton cultivation	0.028^{NS}
4	Land holding	0.179^*
5	Area under Bt cotton	0.075^{NS}
6	Annual income	0.06^{NS}
7	Mass media exposure	0.062^{NS}
8	Extension contact	0.221^*
9	Extension participation	0.239^{**}
10	Economic motivation	0.106^{NS}
11	Scientific orientation	0.195^*
12	Innovative proneness	0.145^{NS}

* Significant at 0.05 per cent level of probability

** Significant at 0.01 per cent level of probability

NS= Non-Significant

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories.
International Research Journal of Human Resources and Social Sciences (IRJHRSS)

232 | P a g e

Table 4 . Multiple regression analysis of independent variables with management efficiency of   Bt cotton growers (N=120)

Sl. No.	Characteristics	Regression coefficient (B)	Standard Error	t value
1	Age	0.111	0.144	0.771
2	Education	3.061	1.297	2.361*
3	Experience in Bt cotton cultivation	0.347	1.241	0.280
4	Land holding	0.388	0.150	2.589*
5	Area under Bt cotton	0.019	0.674	0.028
6	Annual income	2.481	0.981	2.529*
7	Mass media exposure	0.252	0.469	0.536
8	Extension contact	0.415	0.699	0.594
9	Extension participation	2.026	0.718	2.822**
10	Economic motivation	1.801	1.007	1.788
11	Scientific orientation	1.147	0.613	1.870
12	Innovative proneness	1.915	0.918	2.086*

R^2 =0.616   F (12,107) = 7.167

NS = Non-Significant

* Significant at 0.05 per cent level of probability

** Significant at 0.01 per cent level of probability

A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories.
International Research Journal of Human Resources and Social Sciences (IRJHRSS)
233 | P a g e