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Study on Relationship Between Profile Characteristics of *Bt* Cotton Tenant Farmers with Their Level of Adoption on Recommended Package Of Practices

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ABSTRACT

The study was conducted in Andhra Pradesh state during 2017-18. A total of 120 Bt cotton tenant farmers were selected randomly for the study.Data was collected with interview schedule. To study the nature of the relationship between the profile characteristics and adoption level of Bt cotton tenant farmers, correlation coefficients (r) was computed and the values were presented in Table 1. The relationship between the profile characteristics and adoption level of Bt cotton tenant farmers were tested by null hypothesis and empirical hypothesis. The independent variables namely education, land taken for lease, training received, extension contact, social participation, annual income, credit acquisition and utilization, possession of soil health card, innovativeness, economic motivation, mass media exposure, risk orientation, market orientation showed a positive and significant relationship with adoption level of Bt cotton tenant farmers at 1 per cent level of significance whereas, age showed negative and non-significant relationship and farming experience showed positive and non-significant relationship with adoption level of Bt cotton tenant farmers. Multiple Linear Regression (MLR) analysisrevealed that all the selected fifteen independent variables put together, explained about 87.60 per cent variation in the adoption level for Bt cotton tenant farmers. Remaining 12.40 per cent was due to the extraneous effect of the variables.

***Key words**: Adoption, Bt cotton, tenant farmers*

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INTRODUCTION

In Andhra Pradesh cotton was cultivated in an area of 4.49 lakh hectares with a production of 13.10 lakh bales and productivity of 791 Kg/ha in 2016-17 [1]. Tenant farmers are those who cultivate crops by taking land on lease. Tenant farming is an agricultural production system in which land owners contribute their land and often takes care of operating capital and management; while tenant farmers contribute their labour along with at times varying amounts of capital and management. *Bt* cotton is genetically engineered cotton, which contains a gene taken from a soil bacterium (*Bacillus thuringiensis*) to produce toxins in the plants. The use of *Bt* cotton is a positive environmental protection because it makes possible the reduction of the insecticides load on the environment and reduced usage of such chemicals by farmers.

To achieve the higher level of production and productivity, the deviation from the recommended technology may be a big hindrance. So there is a need to help tenant farmers to realise the importance of production recommendations to achieve the objective of overcoming the gap between the potential yield and actual yield. So it is important to know the relation between profile characteristics and adoption level of *Bt* cotton tenant farmers

MATERIAL AND METHODS

The investigation was carried out during the year 2017 in Guntur district of Andhra Pradesh by adopting ex-post facto research design. The state of Andhra Pradesh was selected to get well acquainted with the regional language which would help to build a good rapport and also facilitates in depth study through personal observation. Guntur district was selected as it has the highest area under cotton cultivation.

Out of 57 mandals in Guntur district, three mandals were selected randomly after listing out the total number of mandals where tenant farmers were more in the cotton growing area. Three mandals, namely Prathipadu, Veldurthi, Karempudi were selected. After listing out the number of villages in each selected mandals, four villages were selected from each selected mandalrandomly where tenant farmers were more with the cotton growing area.Ten *Bt* cotton tenant farmers were selected from each village by simple random sampling procedure Thus, making a total of 120 farmers.

The data from the *Bt* cotton tenant farmers were collected with the help of schedules and interviews. The data collected was analysed and suitable interpretations were drawn. Statistical techniques like correlation coefficient and multiple linear regression analysis were used.SPSS was used to analyse the data and presented in tables to make findings meaningful and easily understandable.

Null Hypothesis (H_0)

There will be no significant relationship between the selected profile characteristics and the adoption level of the *Bt* cotton tenant farmers on recommended production technology.

Empirical Hypothesis (H_1)

There will be a significant relationship between the selected profile characteristics and the adoption level of the *Bt* cotton tenant farmers on recommended production technology.

An attempt was made to find out there exists any relationship of profile characteristics namely age, education, land taken for lease, farming experience, training received, extension contact, social participation, annual income, credit acquisition and utilization, possession of soil health card, innovativeness, economic motivation, mass media exposure, risk orientation, market orientation with their extent of adoption levels on *Bt* cotton production technology.

To study the nature of the relationship between the profile characteristics and adoption level of *Bt* cotton tenant farmers, correlation coefficients (r) was computed and the values were presented in Table1. The relationship between the profile and adoption level of *Bt* cotton tenant farmers were tested by null hypothesis and empirical hypothesis.

RESULTS AND DISCUSSION

Table 1Correlation coefficient values of Profile characteristicswith their adoption level of *Bt* cotton tenant farmers (n=120)

S. No.	Profile Characteristics	'r' value
1.	Age	-0.168^{NS}
2.	Education	0.873**
3.	Land taken for lease	0.848**
4.	Farming experience	0.134^{NS}
5.	Training received	0.510**
6.	Extension contact	0.777**
7.	Social participation	0.406**
8.	Annual income	0.788**
9.	Credit acquisition and utilization	0.779**
10.	Possession of soil health card	0.592**
11.	Innovativeness	0.842**
12.	Economic motivation	0.770**
13.	Mass media exposure	0.769**
14.	Risk orientation	0.802**
15.	Market orientation	0.745**

NS = Non-significant ** Significant at 0.01 level of probability * Significant at 0.05 level of probability

The results in the Table 1 revealed that out of fifteen independent variables studied namely education, land taken for lease, training received, extension contact, social participation, annual income, credit acquisition and utilization, possession of soil health card, innovativeness, economic motivation, mass media exposure, risk orientation, market orientation showed a positive and significant relationship with adoption level of *Bt* cotton tenant farmers at 1 per cent level of significance. Hence, null hypothesis was rejected by accepting empirical hypothesis for the variables such as education, land taken for lease,

training received, extension contact, social participation, annual income, credit acquisition and utilization, possession of soil health card, innovativeness, economic motivation, mass media exposure, risk orientation, market orientation.

Whereas, age showed negative and non-significant relationship and farming experience showed positive and non-significant relationship with adoption level of *Bt* cotton tenant farmers. Hence null hypothesis was accepted by rejecting empirical hypothesis for the variables such as age and farming experience.

Table 2 Multiple linear regression analysis of profile characteristics of *Bt* cotton tenant farmers with their extent of adoption level (n=120)

S. No.	Profile Characteristics	Regression coefficient	Standard error	't' value
1.	Age	0.004	0.038	0.094^{NS}
2.	Education	2.554	0.578	4.418^{**}
3.	Land taken for lease	5.981	1.700	3.518^{**}
4.	Farming experience	-0.033	0.161	-0.203^{NS}
5.	Training received	0.218	0.287	0.758^{NS}
6.	Extension contact	-0.305	0.661	0.461^{NS}
7.	Social participation	-0.995	0.336	-2.966^{*}
8.	Annual income	-0.000	0.000	-1.882^{NS}
9.	Credit acquisition and utilization	-1.232	1.130	-1.090^{NS}
10.	Possession of soil health card	-0.370	2.572	-0.144^{NS}
11.	Innovativeness	0.356	0.139	2.557^{*}
12.	Economic motivation	-0.926	0.431	-2.146^{*}
13.	Mass media exposure	1.075	0.773	1.391^{NS}
14.	Risk orientation	0.835	0.615	1.358^{NS}
15.	Market orientation	-0.313	0.787	-0.398^{NS}

a=21.881 R^2=0.876 * Significant at 0.05 level of probability

NS = Non significant ** Significant at 0.01 level of probability

Age Vs Adoption

The perusal of table 1 revealed that there was negative and non significant relationship between age and adoption level of *Bt* cotton tenant farmers with a computed coefficient of correlation value ($r = -0.168^{NS}$). Hence null hypothesis was accepted by rejecting empirical hypothesis.

This means as age increases, the adoption level decreases. This might be due to the reason that lack of physical strength, ability to grasp the latest technology at old age. As age increases, there will be a negative influence on intelligence and confidence which leads to the lower adoption level of the *Bt* cotton recommended package of practices. The above finding was in conformity with the findings of Sivanarayana *et al.* [12].

Education Vs Adoption

It's clear from the table 1 that the coefficient of correlation value ($r=0.873^{**}$) between education and adoption level of *Bt* cotton tenant farmers was positive and significantly related. Hence null hypothesis was rejected by accepting empirical hypothesis. This means the higher the education levels, higher would be the extent of adoption.

This trend might be due to the fact that better education facilitates them to have more contact with extension agencies, better access to farm information, increases awareness to the new ways of farming practices in *Bt* cotton which leads to the increased adoption of recommended production technology. This finding was in agreement with the findings of Pruthvi [9].

Land taken for lease Vs Adoption

The results presented in the table 1 revealed that there was a positive and significant relationship between Land taken for leaseand adoption level of *Bt* cotton tenant farmers with computed r value of 0.848^{**}. Hence null hypothesis was rejected by accepting empirical hypothesis.

This clearly implies that extent of adoption increases with increase in land taken for lease. This trend might be due to the fact that a farmer with large land holdings tends to acquire more information on cultivation practices to get higher profits. Higher the extent of land leased, then more new farming practices can also be adopted regarding *Bt* cotton. The above finding was in conformity with the findings of Rao [10] and Manjunath *et al.* [6].

Farming experience Vs Adoption

The perusal of table 1 revealed that there was a positive and non significant relationship between farming experience and adoption level of *Bt* cotton tenant farmers with a computed coefficient of correlation value ($r = 0.134^{NS}$). Hence null hypothesis was accepted by rejecting empirical hypothesis.

This trend might be due to the fact that less experienced *Bt* cotton tenant farmers also adopt the difficult practices on par with much experienced *Bt* cotton tenant farmers by following the fellow farmers. Though the farming experience high, the adoption is less because of illiteracy, the complexity of technologies recommended and non-availability of technology to the farmers. The above finding was in conformity with the findings of Murugan [7].

Training received Vs. Adoption

It's clear from the table 1 that the coefficient of correlation value ($r=0.510^{**}$)between training received and adoption level of *Bt* cotton tenant farmers was positive and significantly related. Hence null hypothesis was rejected by accepting empirical hypothesis.

This means higher the trainings received higher would be the extent of adoption. The possible reason might be due to the fact that trainings conducted by extension personnel and other agencies provide knowledge, skill and understanding of all the available agricultural information which in turn leads to the adoption of innovative technologies. The above finding was in conformity with the findings of Kiranmayi [4].

Extension contact Vs Adoption

The perusal of table 1 revealed that there was a positive and significant relationship between extension contact and adoption level of *Bt* cotton tenant farmers with a computed coefficient of correlation value ($r =0.777^{**}$). Hence null hypothesis was rejected by accepting empirical hypothesis.

This clearly implies that extent of adoption increases with increase in extension contact. This can be inferred that *Bt* cotton tenant farmers with high extension contact approach extension personnel like MPEOs, AEOs when they need information regarding agricultural practices on production technologies in agriculture in their area. They get more information from the extension agents and Subject Matter Specialists (SMSs) at the time of demonstrations, training programmes, study tours and exhibitions regarding the improved technologies. This extension contact enables the farmer to different kinds of information which help to adopt new agricultural technology in his farm. This finding was in line with the findings of Yadav *et al.* [13].

Social participationVs Adoption

The results presented in the table 1 revealed that there was a positive and significant relationship between social participation and adoption level of *Bt* cotton tenant farmers with a computed r value of 0.406^{**}. Hence null hypothesis was rejected by accepting empirical hypothesis.

This clearly implies that extent of adoption increases with the increase in social participation. Farmers with high social participation will have higher chances to exchange one's views and experiences with other people. So, they can adopt new practices. They discuss problems and seek solutions from others which results in the adoption of *Bt* cotton recommended production technologies. This finding was in line with the findings of Neethi and Sailaja [8].

Annual income Vs Adoption

The perusal of table 1 revealed that there was a positive and significant relationship between annual income and adoption level of *Bt* cotton tenant farmers with a computed coefficient of correlation value ($r =0.788^{**}$). Hence null hypothesis was rejected by accepting empirical hypothesis.

This clearly implies that extent of adoption increases with an increase in annual income. This trend might be due to the fact that as the farmer gets more income, he can purchase more amounts of inputs, thereby increasing the adoption level of recommended *Bt* cotton production technology. Those farmers had more enthusiasm for adopting new cultivation practices in *Bt* cotton.The above finding was in conformity with the findings of Bondarwad *et al*. [2].

Credit acquisition and utilization Vs Adoption

The perusal of table 1 revealed that there was a positive and significant relationship between credit acquisition and utilization and adoption level of *Bt* cotton tenant farmers with a computed coefficient of correlation value ($r =0.779^{**}$). Hence null hypothesis was rejected by accepting empirical hypothesis.

This implies that as the credit acquisition and utilization increases, adoption also increases significantly. A farmer with more capital may approaches extension personnel more because he always tries to avoid risk in farming and thus gains information for adopting *Bt* cotton recommended production technology so that he can utilise the credit efficiently. The finding was in tune with the findings of Kiranmayi [4].

Possession of soil health card Vs Adoption

The results presented in the table 1 revealed that there was a positive and significant relationship between possession of soil health card and adoption level of *Bt* cotton tenant farmers with the computed r value of 0.592**.Hence null hypothesis was rejected by accepting empirical hypothesis.

This clearly implies that extent of adoption increases with increase in possession of soil health card. Soil health card provides a lot of information regarding nutrient content in their soil without which one cannot estimate the nutrient content of soil. It provides information regarding the quantities of fertilizers to be applied to their soil, according to the available nutrient content. So, a farmer who possessed soil health card can apply fertilizers according to the recommendations given in soil health card, thereby protecting the soil health and decreasing the cost of cultivation. Since, application of large of amounts of fertilizers spoils the soil health.

Innovativeness Vs Adoption

The perusal of table 1 revealed that there was a positive and significant relationship between innovativeness and adoption level of *Bt* cotton tenant farmers with a computed coefficient of correlation value (r=0.842**). Hence null hypothesis was rejected by accepting empirical hypothesis.

This implies that as the innovativeness adoption, knowledge also increases significantly. Innovativeness is the individual's earliness in the use of new practices. A person who is more innovative acquires more information from various reliable sources and adopts the practices in his farm. Similar findings were reported by Gopinath [3] and Sarada [11].

Economic motivation Vs Adoption

The perusal of table 1 revealed that there was a positive and significant relationship between economic motivation and adoption level of *Bt* cotton tenant farmers with a computed coefficient of correlation value (r=0.770**). Hence null hypothesis was rejected by accepting empirical hypothesis.

This implies that as the economic motivation increases, adoption also increases significantly. Every person in the farming community aims to attain maximum profits. As the economic motivation increases, farmers always try to get maximum yields to improve their economic level by adopting new agricultural technology about *Bt* cotton cultivation practices. The result was in accordance with the findings of Kumar and Dhorey [5].

Mass media exposure Vs Adoption

It's clear from the table 1 that the coefficient of correlation value (r=0.769**) between mass media exposure and adoption level of *Bt* cotton tenant farmers was positive and significantly related. Hence null hypothesis was rejected by accepting empirical hypothesis.

This means higher the massmedia exposure, higher would be the extent of adoption. Now a day's newspapers, television, farm publications and other mass media play an important role in the diffusion of agricultural innovations. Farmers who keep in touch with mass media are likely to have better knowledge and adoption of the current advances in agriculture. This is because of the reason that the farmers who keep in touch with the mass media such as television, newspapers, mobiles, and the internet will have greater exposure to farm information which helps to improve the knowledge level of the *Bt* cotton tenant farmers thereby increasing the adoption levels. Similar findings were reported by Manjunath *et al*. [6].

Risk orientation Vs Adoption

The results presented in the table 1 revealed that there was a positive and significant relationship between risk orientation and adoption level of *Bt* cotton tenant farmers with a computed r value of 0.802**. Hence null hypothesis was rejected by accepting empirical hypothesis.

This clearly implies that extent of adoption increases with an increase in risk orientation. This is because of the reason that the farmer who is willing to take calculated risks during constraint situation will gain better results. Those risk taking individuals will go out all the way to get the information from different sources in order to adopt new technologies. The result was in accordance with the findings of Bondarwad *et al*. [2].

Market orientation Vs Adoption

It's clear from the table 1 that the coefficient of correlation value (r=0.745**)between market orientation and adoption level of *Bt* cotton tenant farmers was positive and significantly related. This clearly implies that extent of adoption increases with an increase in market orientation. Hence null hypothesis was rejected by accepting empirical hypothesis.

This might be due to the fact that the farmers who had a more market orientation keep themselves updated with the market information regarding current price fluctuations, new practices. This makes them get the higher income by selling the yield when prices were at the peak, which leads to the adoption of recommended technology. The above finding was in conformity with the findings of Kiranmayi [4].

Multiple Linear Regression Analysis of Profile Characteristics of *Bt* Cotton Tenant Farmers with their Extent of Adoption on Recommended Production Technology

An attempt was made to find out the amount of contribution made by the profile characteristics in explaining the variation in the dependent variable i.e., adoption towards *Bt* cotton farming. The results were presented in the table 2

From the above table 2 the MLR equation can be fitted as follows

$Y=21.881 + 0.004x_1 + 2.554^{**}x_2 + 5.981^{**}x_3 - 0.033x_4 + 0.218x_5 - 0.305x_6 - 0.995^{*}x_7 - 0.000x_8 - 1.232x_9 - 0.370x_{10} + 0.356^{*}x_{11} - 0.926x_{12}^{*} + 1.075x_{13} + 0.835x_{14} - 0.313x_{15}$

Table 2 revealed that the coefficient of determination "R^2" value of 0.876 indicated that all the selected fifteen independent variables put together, explained about 87.60 per cent variation in the adoption level for *Bt* cotton tenant farmers. Remaining 12.40 per cent was due to the extraneous effect of the variables. Hence, it could be stated that the variables selected to a large extent explained the variation in level of adoption of *Bt* cotton tenant farmers.

The regression coefficient given in the table 2 further revealed that the profile characteristics, namely education, land taken for lease were found to be positively significant at 0.01 level of significance. Innovativeness found to be positively significant at 0.05 level of significance, whereas social participation and economic motivation were negatively significant at 0.05 level of significance. Remaining variables viz., age, farming experience, training received, extension contact, annual income, credit acquisition and utilization, possession of soil health card, mass media exposure, risk orientation, market orientation were non-significant in this analysis.

A unit of change in education influences positively 2.554 times, land taken for lease influences positively 5.981 times, innovativeness influences positively 0.356 times, social participation influences negatively 0.995 times and economic motivation influences negatively 0.926 times in adoption.

This might be due to the fact that education played a greater role in acquiring and understanding the information that widened the thinking horizon and made the farmer more knowledgeable and adoption of recommended practices. A farmer with large land holdings tends to acquire more information on cultivation practices to get higher profits. Higher the amount of land leased, then more new farming practices can also be adopted regarding *Bt* cotton. Farmers with high social participation will have high chances to exchange one's views and experiences with other people but they don't discuss production technologies. They discuss non-scientific and political aspects which influence negatively on adoption. A person who is more innovative acquires more information from various reliable sources and adopts the new practices on his farm. A farmer with more economic motivation always tries to get maximum yields to improve their economic level by adopting new agricultural technology about *Bt* cotton cultivation practices.

CONCLUSION

The analysis on relation between profile characteristics and adoption of Bt cotton tenant farmers indicated that majority of the selected independent variables showed a positive and significant relationship with adoption level of *Bt* cotton tenant farmers at 1 per cent level of significance whereas, age showed negative and non-significant relationship and farming experience showed positive and non-significant relationship with adoption level of *Bt* cotton tenant farmers. Multiple Linear Regression (MLR) analysis revealed that all the selected fifteen independent variables put together, explained about 87.60 per cent variation in the adoption level for *Bt* cotton tenant farmers. Remaining 12.40 per cent was due to the extraneous effect of the variables.

REFERENCES

1. Anonymous, (2016).All India Co-ordinated Research Project on Cotton Annual Report: 2016. http://www.aiccip.cicr.org.in/CD_16_17/3_PC_Report.pdf.
2. Bondarwad, S.P., Wangikar, S.D and Deshmukh, N.D. (2010). Correlation of adoption of *Bt* cotton production technology. *Agriculture update.* 5 (3&4): 300-302.
3. Gopinath, M. (2005). Knowledge and Adoption of bengalgram farmers in Kurnool district of Andhra Pradesh.*M. Sc (Ag.) Thesis*. Acharya N.G. Ranga Agricultural University, Hyderabad, India..
4. Kiranmayi, K. (2013). Adoption behaviour of chilli farmers in Guntur district of Andhra Pradesh.*M. Sc. (Ag.) Thesis*.Acharya N.G. Ranga Agricultural University, Guntur, India.
5. Kumar, P.P and Dhorey, R.K. (2017). Extent of adoption of farmers about *Bt* cotton practices in Warangal district of Telangana state, India. *International Journal of Current Microbiology and Applied Sciences.*6 (11): 824-829.
6. Manjunath, V.B., Hanchinal, S.N., Maraddi, G.N., Binkadakatti, J.S and Shambulingappa, B.G. (2012). Analysis of extent of adoption of *Bt* cotton recommended production practices followed by the farmers. *Asian Science.* 7 (1): 5-8.

7. Murugan, R.J. (2017). Training needs of Banana growers in Palakkad district of Kerala. *M. Sc. (Ag.) Thesis*.Acharya N.G. Ranga Agricultural University, Guntur, Andhra Pradesh.
8. Neethi, B and Sailaja, A. (2013).Extent of adoption of cotton production technologies by farmers in Andhra Pradesh. *International Journal of Scientific Research*. 2 (11): 21-24.
9. Pruthvi, T.P.M. (2011). A study on farmer's perception about *Bt* Cotton and awareness & willingness of potential consumers to buy genetically modified foods. *M. Sc. (Ag.) Thesis*.University of Agricultural Sciences, Banglore.
10. Rao, B.M. (2011). An analysis study on *Bt* cotton in Andhra Pradesh. *Ph. D. (Ag.) Thesis.*Acharya N.G. Ranga Agricultural University, Hyderabad, India.
11. Sarada, K. (2016). A study on Innovative Farmers Network (IFN) for transfer of cotton production technologies in Telangana state.*M. Sc. (Ag.) Thesis*. Professor Jayashankar Telangana State Agricultural University, Hyderabad. India.
12. Sivanarayana, G., Ramadevi, M and Venkataramaiah, P. (2008). Awareness and adoption of cotton (*Gossypiumhirsutum* L.) integrated pest management practices by the farmers of Warangal district in Andhra Pradesh. *Journal of Research*. 36: 33-40.
13. Yadav, S., Godara, A.K and Yadav, V.P.S. (2017). Adoption of *Bt* cotton production technology by the growers in Haryana. *Indian Research Journal of Extension Education.* 17 (4): 8-11.

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