

# **Adoption of New Agricultural Technology: A Case Study of Buksa Tribal Farmers in Bijnor District, Western Uttar Pradesh, India**

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## **Abstract**

The tribal agriculture is mostly on primitive lines, as evidenced by shifting cultivation, use of indigenous technologies, small size of land holdings and lack of diversification of occupations. The adoption of new agricultural technology in the form of HYV seeds, chemical fertilizers, agro-chemicals, method of cultivation, etc. can improve the production and productivity of agricultural sector leading to improvement in economic condition of the tribal people. Ignorance of the tribal farmers, lack of irrigation facility, poor credit supports, etc. are some of the factors that restrict its spread. The present study was taken up to delineate the existing problems among the tribal farmers which create hindrance in adoption of new agricultural technology in district Bijnor of Western Uttar Pradesh. For this purpose 72 tribal farmers were selected and interviewed with the help of a questionnaire for collection of data.

## **Highlights**

- A total of 72 Buksa tribal farmers were selected from the district Bijnor of Western Uttar Pradesh.
- Low literacy rate of the Buksa tribal farmers was the major hurdle in the adoption of new agricultural technology.

**Keywords:** Tribes, Buksa, agricultural technology, farmers.

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Tribes in India constitute 8.19 % of the Indian population. It has 700 tribal groups and each group vastly different from the other in ethnic and cultural stand points. Most of the tribal people are engaged in agriculture and allied activities. The economy of the tribals can be treated as 'agrarian' since the tribals depend on primary occupations like cultivation, livestock, hunting, fishing etc. Among the tribals, there is lack of knowledge about the modern methods of cultivation (Nandakumar, 2004). It is well known that the Indian tribes picked up the art of agriculture

quite early in history, although tribal agriculture remained mostly subsistence in character. The tribes evolved a simple technology to deal with the natural situations. Tools for diggings, cuttings and chopping were the immediate needs and stone hand-axes; chopper tools and cleavers helped them wage their struggle for survival (Ahmad, 2002).

C.H. Hanumantha Rao (1980) defines technological change as the use of new or modern inputs such as fertilizers, high yielding varieties of seeds, tractors, pump sets, threshers and harvest combines. Introduction of new agricultural



technology seems to offer an opportunity to increase output and income substantially. Technology refers to how to cultivate a crop successfully. This success can be obtained by knowing how to apply fertilizer, control pests, and take care of plant for its healthy and good growing (Truong and Yamada, 2002).

The development and dissemination of new technology is an important factor determining the future of agriculture. Farmers are using a number of modern agriculture technologies (crop production/processing/storage/livestock production) for producing more output all over the country (Meena and Punjabi, 2012). The application of new knowledge in the method of cultivation and other agricultural activities by the tribal farmers to increase production, productivity and quality is called the adoption of new agricultural technology. The agricultural technology aims at increasing agricultural productivity in the country by replacing the old method of farming by a modern and more efficient technique of cultivation (Barla, 2013).

One of the major problems of tribal areas in general and this area in particular is low level of agricultural production and productivity. The tribal group of district Bijnor is dependent on agriculture for their livelihood. Low agricultural productivity and production have resulted into their economic deprivation. New agricultural technology can improve the production and productivity of agricultural sector in tribal area and can cause the improvement in economic condition of the tribals living in this area. Keeping in view the importance of new agricultural technology, the present study was taken up to delineate the existing problems among the tribal farmers which create hindrance in adoption of new agricultural technology.

### Review of Literature

It is well-known that a number of individual factors influence adoption behaviour. New agricultural technologies tend to be adopted earlier and more frequently by farm households that possess better access to land and capital resources and that are more involved in market exchange (Feder *et al.*, 1985). Shah and Aggarwal (1970) have concluded that with the introduction of new agricultural technology, the income levels of progressive farmers have considerable increased. There is a significant difference in the income levels of progressive and less progressive farmers in the different size group of holdings. Waman *et al.*, (1998) found that the level of education, size of family, interest in modern farming and sources of information were the main factors, which significantly

influenced behavior of the small farmers regarding new farm technology. Truong (2008) says that there are many obstacles to running a successful technology strategy. The main reasons for non-adoption of technology are weak perceptions of technology and low education of farmers, low teaching capacities, limited knowledge among extension workers, disorganization, geographical conditions, and inadequate resources and funds. Furthermore, farmers should must have a certain level of education and be very familiar with rice farming in order to be motivated to learn new technology. The choice of farming technologies will continue to increase in the future. One problem, however, is the price of new technology, which is often high. Adopting new technologies can thus require making significant investments and farmers are only willing to invest money when it is profitable for them to do so. This can require expanding the scale of the farm operation through buying more farmland or livestock. Thus new technologies are a major driving force behind structural change resulting in fewer and larger farms, more machinery used on farms, and less manpower needed to run the farm (Gaemelke, 2001). Moreover, factors like age, education and gender also influence farmers' willingness to invest.

### Study Area

The district Bijnor of Western Uttar Pradesh is located between 29°2' and 29°57' North latitude and 77°59' and 78°56' East longitude. District Bijnor is the gateway of the hilly region of Uttarakhand. The western boundary is formed throughout by the deep stream of the river Ganga. The district may be described topographically as plain tract with slight undulations caused by the valley of few rivers. According to agro-climatic regions of Uttar Pradesh this area falls in Tarai Region. District Bijnor is comprised of eleven blocks and 5 sub divisions. The total tribal population is 2427 in the district which is spread over the three blocks namely Najibabad, Kotwali and Afzalgarh. There are only nine tribal inhabited villages in these blocks. These villages consist of 478 tribal households. The main crops of the area are wheat, rice and sugarcane.

### The Tribal Farmers

Buksa acquired the status of scheduled tribe in June 1967 and as a primitive tribe in 1981 by the Government of India, presently known as Particularly Vulnerable Tribal Groups (PTGs). According to tribal zones of India, Buksa falls in northern zone. The Buksas are found along the slopes of the lower Himalayas in a forested region known as the



Tarai. In Uttar Pradesh they are found in Bijnor, Pilibhit and Farrukhabad districts, while in Uttarakhand, they are residing in Udham Singh Nagar, Dehradun, Nainital, Pauri and Hardwar districts. The Buksa is an agriculturist community. Almost all the Buksa population is engaged in agriculture and allied activities. Pressure of increasing tribal population, their pressing needs and fragmentation of land due to growing generations have caused the problem of land alienation among some Buksa families. The economy of the Buksas is thus based on agriculture and animal husbandry. The secondary occupations include service, wage labourers, basketry etc. They also rear cows, buffaloes, goats, horses and poultry birds. They also keep kitchen gardens, collect *tendu patta*, make ropes and do carpentry (Awais and Singh, 2007). The primitive way of living, illiteracy, introverted nature of Buksas in general, unawareness and lack of employment opportunities have perpetuated their age old pauperism (Bisht, 2006). However, some self employment generation schemes have provided some of the youths an opportunity of employment other than agriculture.

### Research Methodology

The study was conducted during the year 2012 in nine tribal inhabited villages of district Bijnor as it is the home of Buksa tribal farmers. In all 72 tribal farmers were selected randomly as respondents to study the problems in adoption of agriculture technology on the basis of different size of land holdings. The selected respondents, usually the head of the household, of the farm family were interviewed personally with the help of a well structured questionnaire in order to get relevant information. Then, the collected data were tabulated and statistically analyzed using simple statistical tools like average and percentage to interpret the results.

### Results and Discussion

The adoption process involves an interrelated series of personal, cultural, social and institutional factors, including the five stages of: awareness, further information and knowledge, evaluation, trial, and adoption. Characteristics of a technology, such as simplicity, visibility of results, usefulness towards meeting an existing need and low capital investment promote its eventual adoption and should be considered when transferring any technology (Viatte, 2001). Some of the important factors which are responsible for adoption of new agricultural technology are discussed here:

#### Age Composition

The age composition of a population is a good indicator of the type of population under study. The age of the members of tribal family plays important role in the adoption of agricultural technology i.e. young generation are more motivated towards new technology as compared to old.

In the present study, it is followed that age specific distribution of tribal farmers indicates a young age structure and developing or growing population by comprising 25.82% of the population who are assembled in the age range of 15-35 years. As regard to the age distribution in the range of 0-6, 7-14 and 36-60 years, the percentage shows 14.56 %, 18.13 % and 28.29 % respectively. The table 1 depicts that majority of the people belong to age range of 36-60 years. In the age range of 60 years, the percentage is 13.18% to the total members who indicate a high mortality or low survival to old age. High fertility, lack of old age care, improper nutrition and low level of socio-economic conditions of tribal farmers may be attributed for this state of age composition. The reason behind the low adoption of technology is that there are majority of members belongs to age group of 36-60 years.

**Table 1:** Distribution of Family Member by Age among the Tribal Farmers

Si. No.	Age Range (in years)	Tribal farmers			
		Male	Female	Total	Percentage
1.	0-6	29	24	53	14.56
2.	7-14	35	31	66	18.13
3.	15-35	49	45	94	25.82
4.	36-60	55	48	103	28.29
5.	60 above	28	20	48	13.18
Total		196	168	364	100.00

Source: Field survey.



They are less interested to take any new initiative in farming system.

### **Educational Status of Family Members**

In all socio-economic aspects, education is thought as the most influential factor in differentiating people's social and demographic behavior. Education is also regarded as an integral component for development and well-being. The Table 2 shows educational status of the tribal farmer's households which also includes a total of school and non-school going children of family members.

**Table 2:** Educational Status of Family Members among the Tribal Farmers

S. No.	Level of Education	Tribal farmers	
		Members	Percentage
1.	Illiterates	195	53.57
2.	Primary	87	23.90
3.	Junior High School	49	13.46
4.	High School	16	4.39
5.	Intermediate	9	2.47
6.	Graduation	5	1.37
8.	Others	3	0.82
Total		364	100.00

Source: Field survey.

The number of literate members contributes 46.43% to the total members of the tribal households, while 53.57 % were illiterate. It is mainly because tribal people in the study area were financially poor and were unable to afford the educational expenditure of their children. It was therefore, observed that due to illiteracy the rate of adopting new agricultural technology was very low in the study area.

### **Land Holding**

In agricultural system size of holding determines the agricultural income of farmers. There is an intrinsic relationship between the size of land holding and socio-economic transformation. The size of a farm is a matter of great importance to success in agriculture and for accelerating agriculture production by applying modern farm technology (Baghel *et al.*, 2012). The size of landholding of the tribal farmers is depicted in the Table 3.

Tribal farmers of the study area were mostly small farmers having a total of 31.36 hectares of land. The data indicated in Table 3 reveals that the tribal farmers falling in landless category are 21.21 %, while in medium category 18.29 %.

Similarly 16.49 % tribal farmers were falling in marginal category. As the overall size of holding is low (less than 1 hectare), as a result the tribal farmers are not willing to take any risk to adopt new agricultural technology. Therefore, it is said that small land holdings were obstacle in the adoption of new agricultural technology.

**Table 3:** Size of Land Holdings among the Tribal Farmers

S. No.	Category	Tribal farmers		
		No.	Area(ha)	Percentage
1.	Landless	21	15.12	21.21
2.	Marginal	19	11.76	16.49
3.	Small	27	31.36	43.99
4.	Medium	5	13.04	18.29
Total		72	71.28(0.99)	Total

Source: Field survey.

Values in parenthesis indicate the average availability of land holding per farm

### **Difficulties in Agriculture Improvement**

To know the reasons of low impact of new farm technology in the area under study, tribal farmers were asked about their major difficulties which worked as impediments in farm improvement. Table 4 reveals that the foremost problem faced by the farmers with respect to irrigation followed by that of fertilizers, credit supply, HYV seeds, transport facility, knowledge of agricultural practices and human labour.

**Table 4:** Tribal Farmers' Major Difficulties for Agriculture Improvement

S. No.	Item	Tribal farmers	
		Rank	Percentage
1.	Irrigation	1	40
2.	Credit	3	15
3.	Fertilizers	2	20
4.	HYV seeds	4	10
5.	Agricultural Knowledge	6	8
6.	Transport	5	6
7.	Labour	7	1

Source: Field survey.

From the Table 4 it is concluded that irrigation is prerequisite for farming and tribal farmers of study area are facing major problem of irrigation. They are not very much receptive to adopt the new agricultural technology since they think other inputs are useless devoid of irrigation.



### Priorities for Future Investment

Priorities for investment of tribal farmers both short and long terms have been ascertained as given in the table 5. Since irrigation is a pre-condition for adoption of modern technology, irrigation investment is desired on the tribal farms and it acquires highest priority.

**Table 5:** Tribal Farmers' Priority for Future Investment

S. No. Item	Tribal farmers	
	Rank	Percentage*
1. Irrigation	1	60
2. Fertilizers	2	12
3. HYV seeds	3	9
4. Farm cattle	4	11
5. Land improvement	5	1
6. Farm buildings	6	4
7. Machinery	7	2

Source: Field survey. \*Multiple responses

The choice of investment in irrigation occupies first place. The second priority goes to fertilizers followed by HYV seeds, farm cattle, land improvement, farm buildings and investment in farm machineries. One of the major reasons for tribal farmers who are reluctant for investment in machineries may be their lack of finance and knowledge to purchase and operate machines. The above table gives an indication about the future course of actions of the farmers which they will take to improve their farm business. Thus, to meet the farmers' near future demand for the above mentioned items; necessary arrangements for adequate and timely supply of these items as well as credit will help in fulfilling the desired goals of the tribal farmers.

### Source of Agricultural Information

The process by which messages are transferred from a source to one or more receivers is vital aspect of social change. It is indeed the key that opens the door for change. New ideas are introduced into a social system in order to attain higher per capita incomes levels of living through more modern production methods and improved social organization. The tendency for tribal farmers to follow the prescribed ways of their ancestors may be attributed to their lack of knowledge about available alternatives.

Table 6 shows the proportion of tribal farmers receiving agricultural knowledge from different sources. Here we find that the role of fellow cultivators as source of agricultural knowledge is more significant for tribal farmers. Relatives are second most important source of

information as extension staff counterpart followed by mass media methods and demonstrations.

**Table 6:** Different Sources of Agricultural Knowledge among the Tribal Farmers

S. No.	Sources	Tribal farmers
1.	Extension staff	20
2.	Fellow cultivator	75
3.	Demonstration	10
4.	Mass media	15
5.	Relatives	50

Source: Field survey. \* Multiple responses (in percent)

### Conclusion

Technological change has been the major driving force for increasing agricultural productivity and promoting agriculture development. Dissemination of information related to technology is important. In general, tribal farmers have conservative attitudes and need more time and information to be persuaded to adopt new technologies. In the study area low literacy rate of the tribal farmers was the major hurdle in the adoption of new agricultural technology. Majority of the tribal farmers were small landholders, which was one of the major obstacles towards the adoption of agricultural technology. As tribal farmers are getting agriculture information extension staff is very meager, which indicated its effective role in the study area. It is therefore important that the government provides reliable and site-specific data. Agricultural research and extension services could concentrate, on improving the productivity of tribal farms. Rural financial systems are required to facilitate tribal farmers' borrowing for investment, input purchase and insurance purposes. The Government should take steps to raise literacy rate in the study area. Small agricultural training centres should be opened in the areas to train the tribal farmers with new agriculture technology.

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