ROLE OF LIFT IRRIGATION IN TRANSFER OF TECHNOLOGY: A CASE STUDY OF CHATOUD VILLAGE

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Agriculture is considered as the backbone of the Indian economy, practiced by more than 70 percent population. The productivity is not up to the desired level, we are lacking behind with the developed countries. The country has shown phenomenal growth in agricultural development during the last few decades and now it has reached the record level of food grain production, which is almost sufficient for the existing demands. The trends of productivity shows that the production will reach about 225 million tones in 2025 A.D. which will not be sufficent to cater the population at that time, it will needed about 300 million tones of food stuffs. The cultivated area is decreasing rapidly, therefore, only alternate for increasing the production is to increase the productivity. In this connection the Government initially launched a number of agricultural and rural development programmes from CDP (1952) to IVLP (1995) and it has been estimated that the farmers adopted only 30 percent of the recommended technologies. The situation is worst in the eastern part of M.P. known as Chhattisgarh. It was observed that one of the major hindrances in the transfer of modern technology to the farmer's fields is the lack of proper irrigation facilities. Various past studies revealed that there was a huge gap between the productivity level of irrigated and rainfed areas, by providing irrigation facilities he may increase the cropping intensity which will provide the sufficient food stuffs not to cater the domestic population but also surplus to gain foreign exchange.

METHODOLOGY

The present study was confined to Chatoud village of Dharsiwa block of Raipur district, M.P. The data were collected from 10 groups of villagers through participatory method using structured interview schedule. Each gruop consisted of more than 5 villagers.

RESULTS AND DISCUSSION

The total geographical area of Chatoud village is 1317 acres, out of which 985 acres is under cultivation. This village has 317 families dominated by the Kurmi, satnami and Scheduled Tribes. The majority of families in this village solely dependent on agriculture The cultivated land has the predominance of heavy soils, most of this land is bunded and used for growing rice. Although, Chatoud village comes in the command area of canal irrigation, it do not get canal water for irrigation because it is situated on the extreme tail end and disputes with the neighbouring villages.

A natural stream (nala) is flowing around the village in three sides and it contains sufficient flowing water for more than seven months commencing from the rainy season. By the joint efforts of the villagers, state departmnt of agriculture and Indira Gandhi Agricultural University, Raipur a lift irrigation project was installed on Kolhan nala in 1994, to fill the biggest and highest elevated tank in the village known as Mathan tank, later on, all other tanks were also connected with this tank by the channels (Fig. 1) and all these tanks are now using for irrigation purpose, not only for kharif crops but rabi crops also.

The major changes and their consequences which was occurred in the village after inception of lift irrigation project are discussed below.

1. Area under crop husbandry–The data

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compiled in the Table 1. shows that about 10 acres area were converted for the cultivation of kharif crops and about 85 and 80 acres increase in area was recorded in the cultivation of rabi and summer crops, respectively. regarding area under different crops, paddy was found as main crop, cultivated by the villagers in kharif season. regarding other crops, the similar table reveals that the area of other remunerative kharif crops like soybean, arhar and vegetables were occupied the increasing area for their cultivation. During rabi season there was a drastic changes occurs in the area of lathyrus and gram corps in the village. It was found that the area of lathyrus crop has been creased from 448 acres to 168 acres and the area under gram crop was increased from only 29 acres to record level of 336 acres may be due to the lift irrigation project. The findings also indicate that the area under wheat crop was increased about six times than the pre-lift irrigation period. similarly, the area of mustard and lentil crops was found to be increased 4 and 2 times, respectively.

Table 1. Area under different crops in Chatoud village (acres)

S. No.	Crops	Before lift irrigation	In 1998	%increase/ decrease
	Kharif			
1.	Rice	930	940	1·07
2.	Soybean	2	7	250·00
3.	Arhar	1	4	300·00
4.	Vegetables	12	16	50·00
	Total kharif	**960**	**970**	**1·04**
	Rabi			
1.	Lathyrus	448	168	–266·00
2.	Gram	29	334	1051·70
3.	Wheat	9	52	477·78
4.	Mustard	3	13	333·33
5.	Lentil	17	33	94·12
	Total rabi	**535**	**620**	**15·89**
	Total summer	**10**	**90**	**800·00**

The above findings indicates that rice is the major crop of this village and used as a staple food by the villagers, therefore, the area under this crop is not possible to change drastically to the other remunerative crops but the increase in area of high returnable crops like gram, soybean, arhar, vegetables etc. is a good sign for positve diversification and prosperity ofvillagers. During rabi season, relay cropping of lathyrus crop was the predominant practice adopted by the majority of villagers before lift irrigation project, yielding about 2-3 qu/ha which were generally used for thefamily consumption. After the start of lift irrigation project, the area under grasspea crop has gone record minimum level of 168 acres may be due to wide adoption of gram corp in the area. Gram crop needed only 1 or 2 irrigation for better output. Currently, this high returnable crop (gram) was found highly popular among the villagers which has a market price of about Rs. 1100/qt which is more than double to the lathyrus crop, also gram crop yielded double than the grasspea. therefore, these findings indicate that, for the economic upliftment of villagers, gram played a pivotal role.

2. Irrigated area under different coups–Before the start or lift irrigation project, the main source of irrigation was tanks, which were depended on rainfall. If sufficient rainfall occurs than only these tanks were able to provide irrigation water to the crops. Dug-wells were the main irrigation source for the vegetable cultivation in the village. These wells were shallow type and again depend upon the rainfall. By the lift irrigation project (Table 2) the irrigated area under rice crop was increased from 310 acres to 678 acres and vegetables from 2 to 11 acres in kharif season. during rabi season the irrigated area under gram crop was increased from 21 to 306 acres. Wheat crop needed assured irrigation and itsarea was increased from 9 to 52 acres. Also 12 and 19 acres more area was carried under irrigation for mustard and lentil crops, respectively. Vegetables are now cultivated on 17 acres of irrigated land. This increase may be due to increase in the ground water table due to this irrigation project, now sufficient water is available in these wells to provide irrigation, tube wells are more successful now. At a glance the above table reveals that the total irrigated area in the village was increased from 320 to 700 acres in kharif season and 55 to 427 acres in rabi season. This may be an important incentive for the crop success in Chatoud village.

Table 2. Irrigated Area Under Different Crops in Chatoud Village (acres)

S. No.	Crops	Before lift irrigation	In 1998	%increase/ decrease
	Kharif			
1.	Rice	310	678	118·71
2.	Soybean	–	7	–
3.	Arhar	–	1	–
4.	Vegetables	2	11	450·00
	Total kharif	**320**	**705**	**120·31**
	Rabi			
1.	Lathyrus	–	–	–
2.	Gram	21	306	1357·14
3.	Wheat	9	52	477·78
4.	Mustard	–	12	–
5.	Lentil	1	19	1800·00
6.	Vegetables	3	17	466·66
	Total rabi	**55**	**427**	**676·36**
	Total summer	**10**	**86**	**860·00**

3. Area Under High Yielding Varieties–High yielding verieties are considers as an important asset for the increasing productivity and one of the improved technology, which will needed to be transferred up to the majority of the farm enrepreneures for the adoption. Table 3 reveals that, in 1997 the Chatoud village has adopting a fairly high amount of high yielding varieties of major crops. Before 1994 the findings shows that, in Chatoud village the high yielding varieties of major crops was adopted only on 311 acres in paddy, 3 acres in gram, 1 acre in Pigeonpea, 11 acres in lentil and 2 acres in soybean. further the findings indicates that currently paddy is grown mostly with high yielding varieties, gram was reported as the major rabi crops and more than 95 % area of gram in the village was under high yielding varieties, simolarly, area under HYV of soybean and lentil crops was fairly increased.

Table 3. Area Under High Yielding Varieties of Major Crops in Chatoud Village (acres)

S. No.	Crop	Before lift irrigation	In 1998	% increase/ decrease
1.	Rice	311	726	133·44
2.	Soybean	2	6	200·00
3.	Arhar	1	2	100·00
4.	Gram	3	312	10300·00
5.	Wheat	11	39	254·55
6.	Lentil	11	16	45·45

4. Sowing Methods of Rice–Sowing method is recognised as significantly correlated factor with the productivity of crops especially in case of rice crop. Though, rice is the main crop of the farmers of Chatoud village, therefore, this variable is also included in this study. Not only in Chatoud village, broadcast system of rice cultivation is prevalent in whole Chhattisgarh. This method has several drawbacks like need of more seeds, need of sufficient water at the time of bushening which is crucial under rainfed condition. Insufficient plant population, high weed infestation, late bushening etc. resulting reduced production It was found in the village that before the start of lift irrigation, the area under broadcast was 864 acres which were reduced to 443 acres. In place of broadcast system, a modern technique recommended by the scientists of IGAU, Raipur for rice cultivation known as line sowing. recently this method are practiced on 326 acres, similarly, another recommended practice especially in irrigated areas, transplanting mathod increased from 30 acres to 170 acres (Table 4). This switching in sowing method of rice crop is an important and positive sign towards the adoption of new techonlogies and increase in productivity.

Table 4. Area Under Various Sowing Methods of Rice Crops

S. No.	Sowing method	Before lift irrigation	In 1998	% increase/ decrease
1.	Broadcast biasi	864	443	–95·03
2.	Lin sowing	36	326	805·55
3.	Transplanting	30	171	470·00

5. Fertlizer use–The data compiled in table 5 contains the average use of manures fertilizers in rice crop in Chatoud villate. The findings reveals that before the use of irrigation water from lift irrigation by the villagers most of them used 38, 19 and 2 Kg of N, P and K fertilizers, respectively. A lso that they used 2.5 cart of local made manures with no green manuring in rice crop in the village. After the start of this project, as we earlier discussed that the farmers of Chatoud village were increasingly using the high yielding varieties, recommended sowing methods and irrigation to the crops, they all may be jointly responsible for the

increased use of 94, 47 and 26 Kg/ha N, P and K, fertilizers respectively which is fairly high. Slight increase in the use of manure was also reported by the villagers, presently about 22 acres area in the village in comes under the green manuring in rice crop. Use of these innovations and integrated approaches of nutrient management for crops shows a sign of diversion of villagers towards the innovative behaviour.

Table 5. Use of Fertilizers and Manures in rice crops in Chatoud Village

S. No.	Fertilizer/ manure	Before lift irrigation	In 1998	% increase/ decrease
1.	Nfertilizers (urea)	38	94	147·37
2.	Pfertilizers	19	47	147·37
3.	K fertilizers	02	26	1200·00
4.	Local manure (cart lood/ha)	2·5	3·6	44·00
5.	Green manuring (area in ha)	0·0	22	2200·00

6. Productivity of Major Crops–The above findings are supposed to be highly influencing the productivity of crops in Chatoud village. Table 6 clearly indicates that, productivity of almost all the crops were increased after the irrigation project.

Table 6. Average yield of major crops in Chatoud Village (qt/ha)

S. No.	Crop	Before lift irrigation	In 1998	% increase/ decrease
1.	Rice			
	Bisasi	24·0	32·0	33·33
	Line sowing	29·0	44·0	51·72
	Transplating	36·0	58·0	61·11
2.	Soybean	14·0	21·0	50·00
3.	Arhar	7·0	9·2	31·43
4.	Gram 4·5	9·6	113·33	
5.	Vegetables (kg/acre)	767·0	987·0	28·68
6.	Lathyrus	2·6	4·4	69·23
7.	Wheat	4·6	11·3	145·65
8.	Lentil	3·8	5·7	50·00
9.	Mustard	3·1	6·6	112·90

The average yield of rice all the three methods of sowing was found increased from 24, 29 and 36 qt/ha to 32, 44 and 58 qt/ha in the biasi, line sowing and transplanting methods, respectively. the per hectare yield of soybean crop was found 21 qt from 14 qt, gram was found 9.6 qt from 4.5 qt, Arhar was found 9.2 qt from 7 qt, vegetables were 9.8 qt from 7.6, lathyrus was found 4.4 qt from 2.6 qt, Wheat was found 11.3 qt from 4.7 qt, Mustard was found 6.6 qt. from 3.1 qt and the average productivity of lentil crop was found 5.7 qt from 3.8 qt/ha in Chatoud village. This increase in productivity of all the major crops grown by the villagers in Chatoud is fairly high which was achieved solely due to the lift irrigation project.

CONCLUSION

In the light of above investigations, it could be concluded that in where cropping systems are rice based, having the annual rainfall of about 1200 mm, this is well known truth about all the villages that there are some natural streams or tanks which were having more than sufficient water during the rainy and some onward seasons but it was found and observed that these water is largely waste thorugh the high runoff, deep percolation and other fosses. Therefore, it may be suggested that there is an urgent need to check these huge amount of runoff water by the natural syreams may be by constructing check dams on these streams in different locations and by lifting this water to the tanks or deep wells this may be directly used to provide atleast life saving or protective irrigation to the kharif crops as well as rabi crops and also to some area of summer crops for obtaining higher yields and minimizing the risk factors which were often occurs in this region. The water table are generally so low to lift out the underground water by the tube wells or hand pumps and also in the dug wells it was generally very low during the post rainy seasons which was generally not available for agricultural purpose in rabi and summer seasons. The increases in availability of water in dug wells and wells also enhanced the cultivation of vegetables and dairy. It is thus suggested that this type of rain-water management practices should also be extended to all other villages having similar conditions. For this purpose, in additon to Government to support, motivation of villagers and their cooperation is more important for sustainable development.

REFERENCES

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