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# Agriculture Productivity And returns of Small & Marginal Farmers in Bargarh cluster, Chitrakoot, UP

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An analysis for  
framing micro-  
strategies to enable  
improved returns  
from land  
April, 2016

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# Agriculture productivity and returns of small & marginal farmers in Bargarh cluster, Chitrakoot (UP)

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*An analysis for framing micro-strategies to enable improved returns  
from land*

**Supported by**



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## Introduction

Chitrakoot in UP Bundelkhand is one of the most backward districts of the state and the country. According to the *Planning Atlas, Uttar Pradesh, 2006*, which ranked districts of the state on 36 indicators of economic and human development, Chitrakoot falls in the “very low development” category, along with Banda. Even other districts of UP Bundelkhand have a higher development level.

The reason for poor development in Chitrakoot can be broadly derived from the following facts:

- According to Census 2011, 90.3% of the population of the district lives in rural areas. Nearly 60% of the total population, including 67.7% of the female population is non-working. Cultivators and agricultural labourers form, in roughly equal proportion, 83.4% of the working population. This shows that the district has very low level of urbanization and industrialization, with the result that the overwhelming majority of households (HHs) are dependent on land for their livelihood.
- However, for various reasons discussed later, returns from agriculture are low. The problem is compounded by frequent droughts. As a result, incidence of poverty is high, and even in years of normal monsoons, there is high migration of males or whole families to seek labour work in other locations.

While migration can lead to a substantial increase in family incomes, the migrants from Chitrakoot, and Bundelkhand at large, are at a disadvantage as they generally do not possess education or skills to secure high-wage work in cities. Mostly, they work as construction labourers, and in brick kilns or quarries, under exploitative and hazardous conditions. Migrants’ long periods of stay away from home also affects family life, education of children, and well-being of the aged.

Given this situation, it is imperative for government and non-government agencies to work out multi-pronged, sustainable strategies to improve the economic, education and health status of households in the region. The focus of one of the strategies would have to be improving returns from agriculture. This would have several benefits: distress migration would reduce, family and community bonds would be maintained, and the only asset held by poor families—their land—would be put to better use.

Efforts to increase returns from agriculture would have to be undertaken at the macro and micro levels. At the macro level, large investments and policy initiatives would have to be undertaken under the following generic heads identified by the Niti Aayog, Govt of India, in its occasional paper (Dec 2015) on ‘Raising agricultural productivity and making farming remunerative for farmers’:

- Increase area under irrigation
- Accelerate seed replacement rate with the objective of raising it to 33% in high yielding varieties and 100% in hybrids.
- Revitalise the seed chain with focus on replacing varieties older than ten years by new ones. Incentivise public sector and facilitate private sector to raise quality seed production to generate adequate supply.
- Change fertilizer import and fertilizer subsidy policies to reduce price paid by farmers for urea.
- Explore selective use of transgenic seed varieties with necessary safeguards in areas where conventional technology is not yielding much needed gains.
- Promote technologies such as laser land levelers, self-propelled sprayers, precision seeders and planters, transplanters for rice and vegetable seedlings, multi-crop threshers, and harvesters for cereals to enable efficient farming and resource conservation.
- Reform, restructure and revitalise the national agricultural research system.
- Take measures to improve health and hygiene of livestock, expand cold storage facilities and provide market finance to farmers.
- Change land-lease laws to allow consolidation of operational holdings and fallow lands, easier access to institutional credit, and productive use of agriculture land belonging to people unwilling to do farming.
- Give conclusive ownership titles to landowners; digitize revenue and registration records.
- Reform the Agricultural Produce Marketing Committees Act to give farmers the full right to sell produce to whomsoever they want, so that intermediaries are reduced and farmers receive a higher fraction of the price paid by the consumer.
- Make private investments in marketing and storage infrastructure more attractive.
- Build systems to allow vegetable and fruit buyers to collect and purchase produce at the village level, and supply these directly to retailers including e-retailers in towns and cities.
- Support organic farming with quality input-supply, quality testing, certification and processing facilities. Support value addition and branding of organic produce for export promotion.
- Build a mechanism to deliver quick relief to all farmers affected directly or indirectly by natural disaster.
- Evolve a mechanism to provide a diversified set of crop insurance products by a diverse set of insurer firms, with farmers having less than 2 ha of area given a substantial subsidy on the premium.

While the above initiatives may take years to roll out and yield positive results, some micro-level initiatives can be taken right away, to ensure:

## AGRICULTURE STUDY, BARGARH: ABSSS, 2016

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- Optimum use of available soil and water resources in a sustainable way; development of new water resources; construction of structures to conserve soil and water
- Appropriate selection of crops/varieties and crop rotation according to soil-moisture conditions, farmers' needs, risk-taking abilities, and market value of produce
- Optimum use of nutrients, including nutrients obtainable from locally available resources like cow dung and urine
- Cultivation of high-value crops on a scale that do not impose high finance and risk burden on farmers
- Aggregated sale of produce to get best market price.

To initiate action on above fronts what is first required is a sound understanding of current agriculture practices and constraints faced by farmers.

With this understanding, a study of agriculture productivity and returns of small and marginal farmers was undertaken in the Bargarh cluster of Mau block of Chitrakoot district in February-March 2016 by Akhil Bhartiya Samaj Sewa Sansthan (ABSSS). ABSSS is a reputed NGO headquartered in Chitrakoot and working in the Bargarh cluster since 2015 under multi-dimensional projects focused on children and youth with support from ChildFund India (CFI). CFI is a child development organization "representing the voice of deprived, excluded and vulnerable children in India regardless of their race, creed and gender". It is a part of ChildFund International, a global child development and protection agency, headquartered in US, serving more than 17.8 million children and family members in 30 countries.

The next sections of this document describe:

- Agriculture profile of the study region
- Objective, methodology and limitations of study
- Profile of study area & sample farmers
- Key findings
- Actionable implications of findings

Looking forward for your kind suggestions & feedback,

**Bhagwat Prasad**

Director

## 1. Agriculture profile of study region

Chitrakoot district is part of UP Bundelkhand, a hot, sub-humid region characterized by hard rocks and undulating terrain of varied slopes.

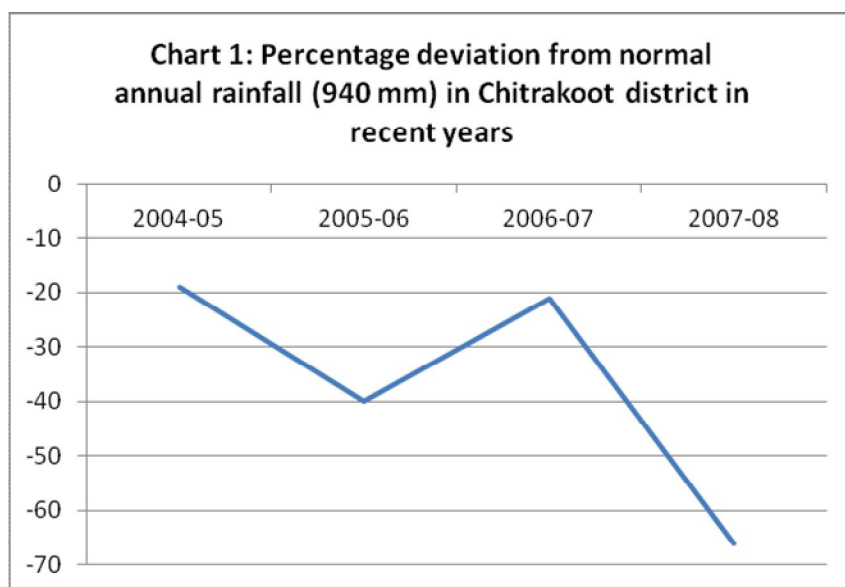
### Soils

The major types of soils found here are: *Rakar* (17.6% of total area) and *Parwa* (38.5%) in the red-soil group; and *Kabar* (31.4%) and *Mar* (12.4%) in the black-soil group (Plate-III). These soils require specific cultivation practices.

*Rakar* soils are shallow, gravelly, and extremely porous and have low organic matter and water-holding capacity. They are thus not suitable for large-scale agriculture. *Parwa* soils are coarse-grained, clayey grey to grayish brown in colour, have higher water-retaining capacity and are suitable for cultivation. However, the soils are usually found only in low-lying areas of the district. *Kabar* and *Mar* soils are brown/reddish-black and generally have low organic matter.

### Rainfall

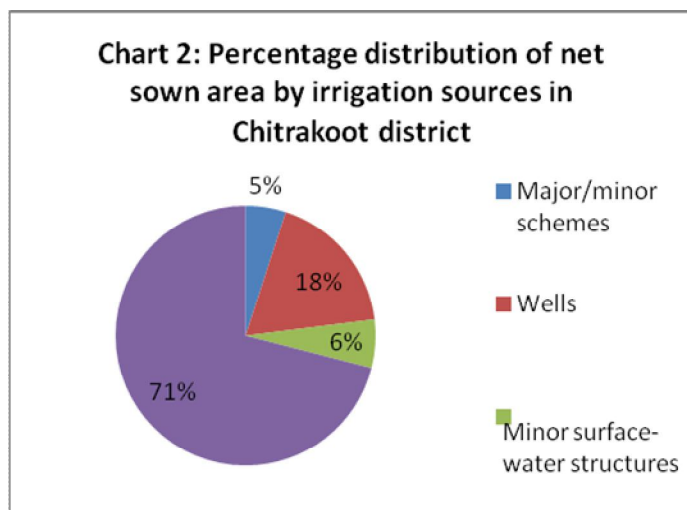
The region receives rainfall mainly during the monsoons and normal annual rainfall is 800-950 mm. However, as Chart 1 shows<sup>1</sup>, there has been wide negative deviation from normal rainfall in recent years. Further, within years, there are wide variations in intensity and frequency of rainfall. Only major rivers, namely Ken, Betwa and Dhasan, are perennial as their catchments lie in the higher rainfall zones in Madhya Pradesh. Other rivers are generally seasonal.



<sup>1</sup> Report of the Inter-Ministerial Central Team on Drought Mitigation Strategy for Bundelkhand Region of UP and MP, 2008

## Irrigation

The spread of irrigation facilities in large parts of UP Bundelkhand is poor. Only around 16% of the cultivated area in the region is irrigated by major/medium schemes and 26% is irrigated by ground water sources. Ground water available for irrigation is inadequate as dug wells do not hold water through the year, and the region's hard-rock substratum makes construction of bore wells risky and costly. Efficiency of major and medium projects is only around 50%. Hence, more than 60% of the net sown area is dependent on rainfall<sup>2</sup>. In Chitrakoot district, the situation is more dismal as shown in Chart 2<sup>3</sup>.



## Land use for agriculture

Only around 50% of the district's geographical area is used for agriculture, and cropping intensity is only 131%<sup>4</sup>, which means that less than one-third of the land is cropped twice in a year. The low land use is clearly a result of poor irrigation facilities.

## Land-holdings

As in most parts of the rest of the country, the majority of land-holdings in the district comprise small plots (Chart 3)<sup>5</sup>.

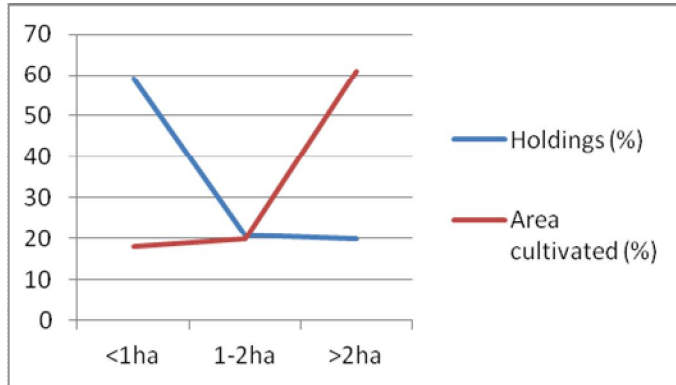
## Chart 3: Percentage-wise distribution of total land holdings by total area cultivated

<sup>2</sup> ibid

<sup>3</sup> Minor irrigation census (2001)

<sup>4</sup> Potential Linked Credit Plan, NABARD, Chitrakoot, 2008-09

<sup>5</sup> ibid

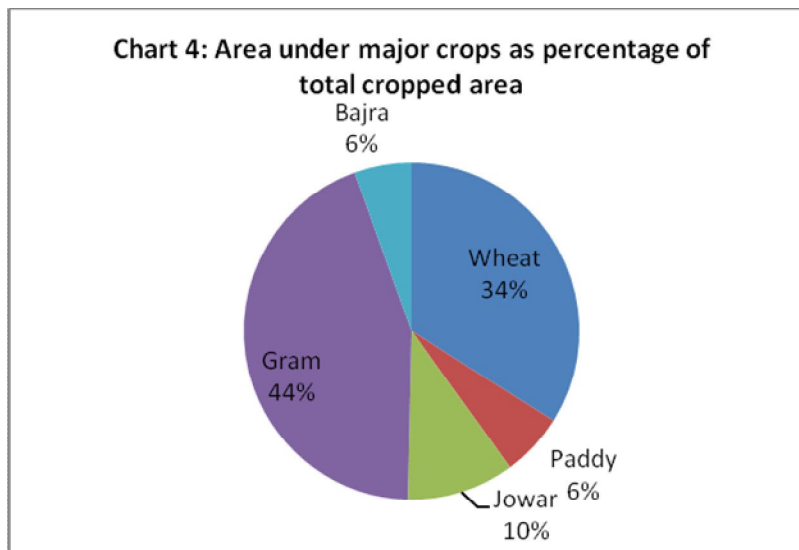


Plots of individual farmers also tend to be scattered. This situation poses several problems including:

- Difficulty in achieving economies of scale for production of any particular crop
- Difficulty in optimum crop management/supervision
- Limited scope for use of farm machinery

### Crop preferences

Across UP Bundelkhand the preferred crops are wheat, pulses and oilseeds. However, district-wise variations are seen in particular crop choices. Inter-district variations are also seen according to soils and availability of irrigation facilities. Major crops grown in Chitrakoot are shown in Chart 4<sup>6</sup>.



<sup>6</sup> ibid



### **Yields**

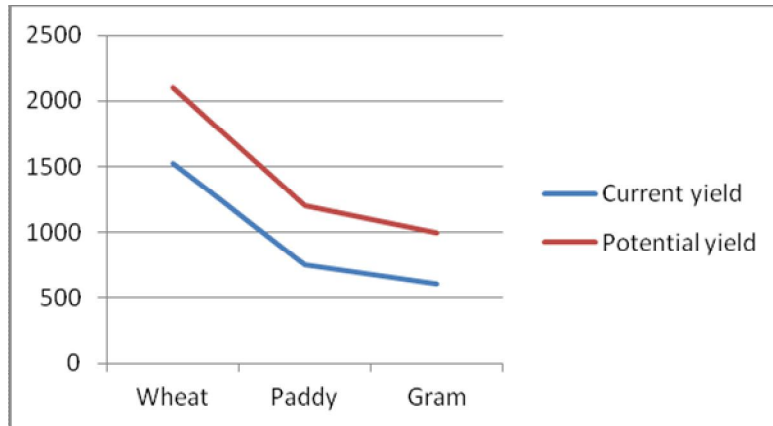
As in the rest of UP Bundelkhand, yields of crops in Chitrakoot are low compared to yields obtained in other parts of the state. However, according to NABARD there is some scope for increasing yields in the district (Chart 5)<sup>7</sup>.

Through a project funded by Sir Dorabji Tata Trust (SDTT) in an area comparable to the Bargarh cluster (in neighbouring Manikpur block), ABSSS has also previously demonstrated that higher much yields are obtainable through use of high-quality seeds, optimum supply of nutrients, and use of techniques like System of Rice Intensification.

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<sup>7</sup> *ibid*

**Chart 5: Current and potential yields (kg/ha)**



## 2. Objective, methodology & limitations of study

The objective of the study was to: estimate (i) main and minor crops cultivated in different seasons (ii) average paid-out input costs per major crop (iii) and average net returns per major crop cultivated by small and marginal farmers in Bargarh cluster of Chitrakoot district. The hypothesis was there is scope for significant enhancement of crop yields and net returns for small and marginal farmers in the study area.

The methodology adopted was: (i) review of agriculture-productivity data from the region, followed by (ii) survey of sample of target-group farmers randomly selected under the criterion that the majority should be marginal farmers and should belong to SC groups (mainly Kol).

The survey was conducted through questionnaire in Hindi covering several data-items including: farmer's age, social group, number of family members and land holding; source of irrigation water; equipment/machinery owned; seasons in which land is cultivated and crop-wise cultivation area and production in normal-monsoon and current years; actual costs incurred by farmers for purchase of seeds and fertilizers, hire of tractor and labour, use of water, etc; local market-rate for sale of produce or actual rate obtained by farmer in case he did sold produce.

The survey was administered after pilot testing by field staff who were given proper orientation. All filled in questionnaires were scrutinized before data entry, to check for incomplete/doubtful data.

The study had the following limitations:

- Data was collected in a drought year (2016), when area under cultivation and production was very low. To estimate area under cultivation and production in normal-monsoon years, farmers were asked to recollect this information.
- Cultivation/production/cost data was recorded as it was reported by farmers, and not independently verified. However, gross deviations from average numbers were cross-checked.
- Farmers do not maintain records for costs incurred. Hence, they could recall cost data only in gross/approximate numbers.
- The survey was limited to the ABSSS project's target-group farmers: no comparison could be made with other farmers, or farmers of another area.

The above limitations were substantially addressed by making comparisons with data from other sources, including data obtained by ABSSS through its SDTT-supported project in the nearby Manikpur block. Further, collection of data in a drought year gave information about the impact of low rainfall on agriculture in the study area. This information could be used to devise low-risk strategies for increasing production and returns.

### **Profile of study area & sample farmers**

The study was conducted in Bargarh cluster of Mau block, which has a population of 1.61 lakh persons (2011 Census) living entirely in villages. Bargarh cluster, which is located around 60km from Allahabad, has 10 large villages, and around 45 smaller settlements with distinctive names. There are no factories or large businesses here and agriculture or wage-labour are the main livelihood sources, apart from minor trading and services. There is no canal irrigation in the study area and farmers lift water from wells or streams for cultivation of crops.

The target-group mainly comprises families from Scheduled Caste (SC) and Other Backward Class (OBC) families. The main SC group is Kol, which is an adivasi (tribal) group that is severely marginalized and deprived.

Education levels of adults in the target-group are low. An ABSSS survey found that 40% of male adults and 73% of female adults are illiterate. Only 35% males and 15% females have studied above primary level<sup>8</sup>.

The study-sample comprised 115 farmers of 25 settlements in the cluster. All the farmers belong to target group; 75% belong to SC (mainly Kol) groups. All farmers belong to small and marginal landholding categories.

The study found that:

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<sup>8</sup> 'Why do children stay absent from school? A study of causes in Bargarh cluster, Chitrakoot district, Uttar Pradesh', ABSSS, April 2016

- Agriculture is main source of livelihood for 23% of surveyed farmers. The rest depend on agriculture and wage labour.
- The average number of household (HH) members per farmer is 8.
- Average land holding is 1.1 hectare (ha). Gross cultivated area is around 130 ha in a normal monsoon year.
- 20% farmers have no irrigation facility.
- 55% farmers lift water from wells for irrigation. 25% lift water from streams. These sources are not perennial and provide little water in drought years.
- Nearly 50% farmers own an irrigation pump. None have a tractor.
- 20% farmers are “extremely poor” and rest are “poor” according to field surveyors’ assessments.

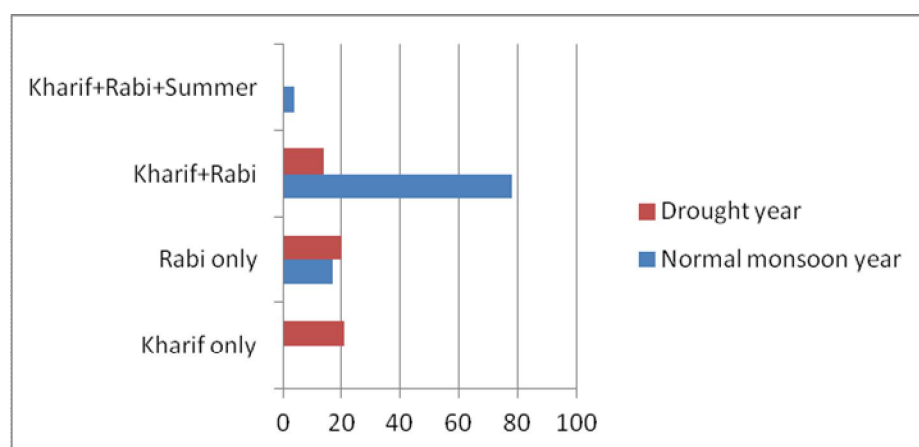
### 3. Key findings

As the study was conducted in a drought-year, it was possible to compare data with normal-monsoon years under the following heads:

#### Cultivation by season

As chart 6 shows the majority of farmers cultivate in kharif and rabi seasons (not necessarily on the same plots). But in a drought year, this percentage drops sharply, and around 20% farmers cultivate in kharif only. Around 20% farmers cultivate in rabi only.

**Chart 6: Percentage of farmers cultivating in different seasons**



#### Crop preferences

Table 1 shows major crop preferences of sample farmers. Only 2-5 farmers grow crops other than that shown in the table (jowar, soyabean, mung-urad). No farmer grows vegetables for commercial sale.

## AGRICULTURE STUDY, BARGARH: ABSSS, 2016

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As the data shows, surveyed farmers have a strong preference for staple food crops (wheat and paddy), and around 30% of them try to grow these crops even in drought years. This indicates that they do farming mainly to obtain food. However, around 10% of farmers also grow til, to meet household needs of oil and get some cash-income. Til is grown even in a drought year, as the crop does not require much water; excess water in fact destroys the crop.

In a drought year the total area under cultivation drops by half.

**Table 1: Crop-wise number of cultivating farmers and area under cultivation**

Crop	Normal-monsoon year		Drought year (2016)	
	Farmers	Area (ha)	Farmers	Area (ha)
Paddy	49	41.1	36	34.3
Til	13	9.25	15	10.4
Wheat	104	53.6	37	17.8
Gram	38	13.3	5	1.25
Mustard	23	8.5	1	0.25
Barley	7	2.5	0	0
Total cultivated area		128.25		64

### Average yields of main crops and potential to increase yields

Table 2 shows average yields of main crops in a normal-monsoon year, according to normal cultivation area and production reported by farmers. These yields were compared with yields obtained in a comparable area through the ABSSS-SDTT project, to estimate potential to increase yields. Yields obtained in a drought-year are not considered here, as they were obviously very low.

**Table 2: Average yields and yield-increase potential**

Crop	Avg yield in study area (kg/ha)	Yields obtained in comparable area (kg/ha)	Avg yield increase potential (%) in study area
Paddy	800	1500-3000	85
Til	150	300	100
Wheat	1600	1800-3000	10-25
Gram	350	500-1000	40
Mustard	300	500-800	65

As can be seen there is tremendous potential for increasing yields. However, it must be noted that higher yields were obtained in the comparable area after substantial investments were made

for construction of soil and water conservation structures, farm ponds and wells. For paddy investments were made on SRI equipment and training. For all crops farmers were given training and support in the form of high-quality, improved variety of seeds and optimum dose of nutrients.

It must also be noted that higher yields do not necessarily mean higher net returns in the same proportion, as farmers will also have to make higher investments towards purchase of quality seeds, balanced supply of nutrients, etc.

### **Net returns from cultivation**

As already mentioned farmers in the study area do not look at cultivation as a source of income. Nevertheless, as farmers have to make cash investments for cultivation, net returns have to be calculated. If net returns are poor, young farmers will be inclined to move away from agriculture. Already, many youth in the study area are reportedly showing little interest in farming.

To estimate net returns we considered farmer's estimation of costs they had actually incurred under heads like purchase of inputs, hiring of tractors and labour, etc, and gross value of produce according to local-market rates obtained by farmers. (Implied costs such as assumed rental value of land were not considered). For wheat, value of fodder obtained after harvesting was also considered.

Average per ha production costs compared to gross values of produce in a normal-monsoon year are shown in Table 3.

**Table 3: Crop-wise net returns per ha**

<b>Crop</b>	<b>Avg prod cost (Rs)</b>	<b>Avg prod value (Rs)</b>	<b>Net gain (Rs)</b>
Paddy	7000	9250	2250
Til	4000	9000	5000
Wheat	10,100	21,300	11,200
Gram	5000	11,200	6200
Mustard	6000	11,100	5100

It can be seen that except for paddy, all major crops give farmers good returns on investment in a normal-monsoon year. Returns from wheat are assured due to minimum support price. Returns from gram, til and mustard are currently good due to high market prices of these commodities. However, it must be noted that:

- As the average land-holding is only 1.1ha per farmer, the average net return from agriculture with kharif+rabi cultivation (eg, til+wheat) is only around Rs 16,000.

- In a drought year, even farmers cultivating paddy and wheat who tried to provide water through available resources obtained 10%-25% lower yields, leading to low returns or even net loss.

### **4. Actionable implications of findings**

Yields of major crops in the study area can be substantially increased by making investments for soil and water conservation, development of water resources, and promotion of optimum seed varieties and nutrient-doses, as recommended by agriculture experts familiar with the area. Investments for soil and water conservation structures can be leveraged through MGNREGA.

While food security is the over-riding concern of farmers in the study area, use of some part of the land for cultivation of cash crops can be encouraged. As some farmers in the study area are already growing til profitably (even in a drought year), it is the most promising cash crop for promotion.

In low-lying areas with black soil, yield of paddy can be significantly increased through promotion of SRI.

Proximity to the Allahabad market can be leveraged to promote small-plot vegetable cultivation among farmers who have assured irrigation facilities.

## AGRICULTURE STUDY, BARGARH: ABSSS, 2016

### AGRICULTURE PRODUCTIVITY SURVEY ( SMALL & MARGINAL FARMERS ONLY: UPTO 8 BIGHAS ONLY)

**Farmer code no:**

**Date of survey:**

**(dd/mm/yy)**

**Name of surveyor:**

No	Item	Entry	Guidelines for entry
1	Name of village/habitation		Write full name
2	Name of farmer		Write full name
3	Farmer's age		Write age in number of years only (eg. 42)
4	Family's social group		If SC write 1, if OBC write 2, if Gen write 3, if Muslim write 4
5	Family's main source of livelihood		If local labour write 1, if agriculture write 2, if local labour+ agriculture write 3, if migrant labour write 4, if employed/ salaried write 5
6	Number of members in family		Write number only (eg. 8)
7	Family's economic level		If very poor write 1, if poor write 2, if not poor write 3
8	Farmer's education level		If not gone to school write 0, if studied only up to primary write 1, if studied only up to middle school write 2, if studied only up to secondary write 3, if studied above secondary write 4
9	Farmer's wife's education level		As above
10	Has farmer attended any agriculture training programme?		If yes write 1, if no write 0
11	Does family do agriculture on family-owned land?		If yes write 1, if no write 0
12	How much cattle does family own? (cows, bulls, buffaloes)		Write total number only (if no cattle write 0)
13	Total area of land cultivated by family		Write area in number of bighas only (eg 7)
14	Number of plots in which cultivated land is divided		Write number only (1, 3 etc)
15	USUAL source of water for cultivation		If rain only write 0, if own open well write 1, if common open well write 2, if tubewell write 3, if nallah write 4, if canal write 5
16	Does family have irrigation pump?		If yes write 1, if no write 0
17	In which seasons does family USUALLY cultivate land?		If kharif only write 1, if rabi only write 2, if kharif+rabi write 3, if kharif+rabi+summer write 4
18	In THIS YEAR (2015-16) family has cultivated land in which seasons?		If not cultivated write 0, if kharif only write 1, if rabi only write 2, if kharif+rabi write 3



## AGRICULTURE STUDY, BARGARH: ABSSS, 2016

DETAILS OF CULTIVATION IN **CURRENT** YEAR: 2015-16 (Enter NUMBERS ONLY)

No	Crop	Area (bighas)	Actual costs paid by farmer (Rs)							Production (quintals)	Market rate per kg (Rs)
			Seed	Tractor	FYM	Chemical fertilizers	Water	Labour	Other		
19	Paddy										
20	Jowar										
21	Soyabean										
22	Til										
23	Moong/Urad										
24	Barley (jau)										
25	Wheat										
26	Mustard										
27	Gram										
28	Vegetable for sale (name below)-write area in sqm										
29	Other (specify)										

## AGRICULTURE STUDY, BARGARH: ABSST, 2016

DETAILS OF CULTIVATION IN **NORMAL** YEARS (Enter NUMBERS ONLY)

No	Crop	Area (bighas)	Actual costs paid by farmer (Rs)							Production (quintals)	Market rate per kg (Rs)
			Seed	Tractor	FYM	Chemical fertilizers	Water	Labour	Other		
30	Paddy										
31	Jowar										
32	Soyabean										
33	Til										
34	Moong/Urad										
35	Barley (jau)										
36	Wheat										
37	Mustard										
38	Gram										
39	Vegetable for sale (name below)-write area in sqm										
40	Other (specify)										

