RESEARCH ARTICLE

Agricultural Employment in a Vidarbha Village: Results from a Resurvey

R. Ramakumar* and Karankumar Raut†

Abstract: Vidarbha is a region in which, historically and in the contemporary period, the share of agricultural workers in the working population has been among the highest in the country. This paper discusses the ways in which changes in production conditions between the 1960s and 2000s in one western Vidarbha village – Dongargaon – influenced (a) the number of days of employment for agricultural labourers; (b) the levels of labour absorption in agriculture; and (c) the changes in the nature and extent of labour absorption in agriculture. Such a comparative study was facilitated by the availability of data and information from two surveys of the village: the first in 1963–64 by V. H. Joshi, and a resurvey in 2007 by a team led by the first author. The paper argues that the aggregate number of days of employment gained by agricultural labourers in Dongargaon increased between 1963–64 and 2006–07. This argument is based on indirect evidence with respect to changes in labour absorption in the cultivation of different crops. However, the data and analysis presented in this paper show that, because of increases in the absolute number of agricultural workers and in the share of agricultural workers in the work force, increased labour absorption did not result in a proportionate rise in the number of days of employment available to an individual worker. In 2006–07, primary agricultural labourers in Dongargaon were employed only for about 111 days a year. Underemployment was thus a feature of the life of agricultural labourers. Lack of access to adequate non-agricultural employment, rising landlessness, and large-scale immigration of workers into the village undermined the potential gains of a rise in labour absorption.

Keywords: Vidarbha, village surveys, rural employment, labour absorption, migration.

This paper deals with the employment status of agricultural labourers in a village, Dongargaon, in the Vidarbha region of Maharashtra. Specifically, it attempts to answer the following questions. For how many days in a year, on average, did agricultural labourers in the village find employment? Did the number of days of employment obtained by them differ across social groups, and between men and women? To what extent did each of the different crops grown in the village provide employment to the

*Associate Professor, School of Social Sciences, Tata Institute of Social Sciences, Mumbai.
†M. Phil. student, Tata Institute of Social Sciences, Mumbai.

agricultural labourers? What was the relative importance of agricultural and non-agricultural employment in the employment profile of the labourers?

The number of days of employment obtained by agricultural labourers is affected by both "demand" and "supply" factors. Both historically and in the contemporary period, Vidarbha has been known to be a region with the highest share of India's agricultural labourers. Given the high incidence of agricultural labourers in the region, this paper discusses the ways in which changes in production conditions in the village under study influenced labour absorption in agriculture between the 1960s and 2000s. In particular, it analyses the ways in which the spread of irrigation, changes in cropping pattern, and changes in techniques of production affected the number of days of agricultural employment in the village during these decades.

The primary data used in the paper are from a resurvey, conducted in 2007, of Dongargaon. The village was first surveyed in 1963–64; information from the earlier survey is used here as a benchmark to compare and analyse the changes in labour absorption in agriculture between then and 2007.

DAYS OF EMPLOYMENT OF AGRICULTURAL LABOURERS: SOURCES OF DATA

The only available source of secondary data on employment of agricultural labourers in India is the quinquennial Employment and Unemployment surveys of the National Sample Survey Organization (NSSO). Data on the number of days of employment of agricultural labourers are extracted from the NSSO surveys and published separately as the *Rural Labour Enquiry* (*RLE*) by the Ministry of Labour, Government of India.

This paper uses data on the category of usually occupied workers belonging to rural labour households (RLHs) from the presentation of results in the *RLE* (see Table 1). In 2004–05, which is the last available round of the NSS, the average number of days of wage employment for usually occupied workers in RLHs in Maharashtra was recorded as 225 days for men and 202 days for women. In other words, male workers were employed for 61 per cent of the days in the year and female workers for 55 per cent of the days in the year.

The RLE data also show that workers from Scheduled Caste (SC) RLHs in Maharashtra were employed for a marginally higher number of days in the year 2004–05. Male workers from SC RLHs were employed for 232 days and female workers from SC RLHs were employed for 214 days.

Scholars who work with primary data on Indian villages have for long questioned the reliability of the *RLE* data on the number of days of employment. They have argued that the average number of days of wage employment of agricultural labourers is

Table 1 *Average number of days of wage employment of usually occupied workers in agricultural labour belonging to RLHs, Maharashtra, RLE, 1977–78 to 2004–05,* in number of full days

RLE round/year	Average annual number of days of employment for			
	Men		Women	
	All workers	SC workers	All workers	SC workers
1977–78	250	232	198	202
1983	234	229	184	188
1987–88	247	256	145	119
1993–94	237	228	219	207
1999–2000	225	223	210	202
2004–05	225	232	202	214

Note: SC=Scheduled Caste; *RLE=Rural Labour Enquiry*; RLH=rural labour households.
Source: Bamezai (2010).

considerably lower, in reality, than the *RLE* estimates. For instance, Ramachandran and Swaminathan (2004) note that:

> … we do not have good enough macro-data on the number of days of employment, agricultural and non-agricultural, per worker per year in India. Not only do the data from the Rural Labour Enquiries appear intuitively to be incorrect … it is also well-recognized that employment data from micro studies show consistently lower volumes of employment than Rural Labour Enquiry data.

Mukherjee (1998; cited in Bamezai 2010) states that the differences between NSS/*RLE* data and village studies data can be explained in terms of an inbuilt, upward bias in the collection and classification of data by the NSS/*RLE*. According to the methodology adopted by the NSS/*RLE*, an individual is considered to be "employed" for a full day if s/he is engaged in gainful employment for four hours or more, and for half a day if s/he is engaged in gainful employment for one hour or more. Such an approach leads to classification (i) of a larger number of individuals as gainfully "employed"; and (ii) of individuals engaged in low income-generating "replacement activities", for lack of gainful employment opportunities, as gainfully "employed". Mukherjee further points out that most village studies record only the number of days of gainful employment and hence a lower number of days of employment in a year.

In sum, *RLE* data on the days of employment of agricultural labourers are inadequate to understand the conditions of employment in rural India. Primary data from village studies provide more meaningful estimates of the days of employment of

rural workers. Further, primary data help us to understand various socio-economic characteristics of agricultural labour. For instance, field-level data allow us to study the links between specific farming and cropping patterns, on the one hand, and the number of days of employment of labourers, on the other (which is not possible with secondary data).

THE STUDY REGION AND THE DATABASE

Dongargaon belongs to Akola tehsil in Akola district, in the Vidarbha region of Maharashtra (see Map Panel). The village is located at a distance of about 13 kilometres from the town of Akola on the National Highway (NH) 6 that connects Akola to Amravati and Nagpur. The village settlement (*gaothan*) is situated at less than 1 kilometre off NH 6, towards the south. The market-town of Murtizapur is about 32 kilometres away from the village, to the east. Dongargaon is surrounded by the villages of Sisa, Masa, Kumbhari, and Babulgaon, located at distances of between 3 to 5 kilometres.

This paper is based on data collected from the village of Dongargaon as part of a larger study of agrarian relations in the villages of Maharashtra. Dongargaon was surveyed by the study team of investigators in the summer of 2007, with agricultural year 2006–07 as the reference year. At the time of the survey there were 357 households in the village, and a census-type socio-economic survey was conducted of all 357 households using detailed questionnaires (see Table 2 for the demographic and agricultural details of the village). The survey began in the last week of April 2007 and was completed by the third week of May the same year. An earlier survey of Dongargaon had been conducted in 1963, by V. H. Joshi of the College of Agriculture, Akola (see Joshi 1967).

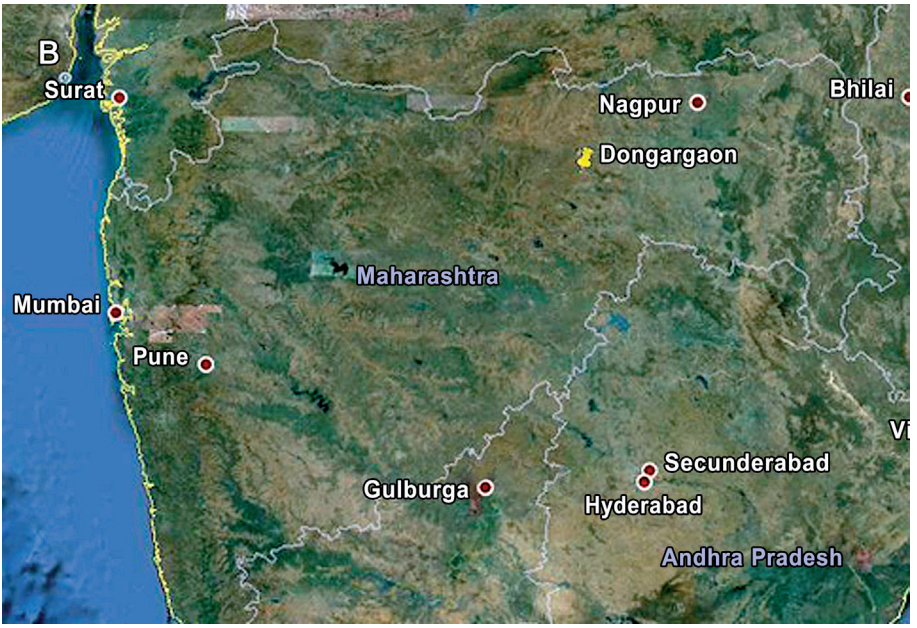
There were five major caste groups among the households of Dongargaon: Maratha, Mali, Chambhar, Navbaudh, and Gowari. Of these, the Navbaudhs (Dalit/SC) were the largest group, constituting 28.1 per cent of the population. Malis (OBC or Other Backward Classes) constituted 17.4 per cent, Chambhars (Dalit/SC) 13.8 per cent, and Marathas (Other Caste) 12 per cent of the population. The share in population of Gowaris (Adivasi/ST) was 8 per cent.

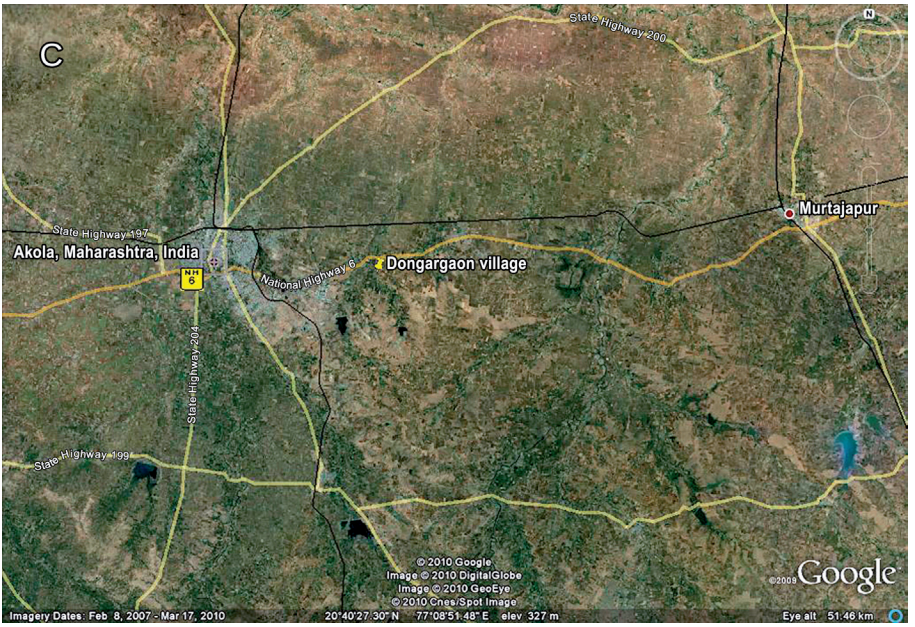
Dongargaon's Location in a Labour-Surplus Region

Dongargaon is located in the Berar area of western Vidarbha, a region which, as mentioned earlier, has the highest incidence of agricultural labourers in India (see Reddy 1988).[1] The growth of a large population of landless agricultural workers in Berar began during the cotton boom of the 1860s and continued well into the

1 In the contemporary period, Berar region would include the districts of Buldhana, Akola, Washim, Wardha, Amravati, and Yavatmal, in Maharashtra.

Map Panel (from top to bottom): Map of India showing Maharashtra State; Map of Maharashtra showing Dongargaon in Akola district; Location of Dongargaon between Akola and Murtizapur towns; A closer view of the location of Dongargaon and the nearby Borgaon market

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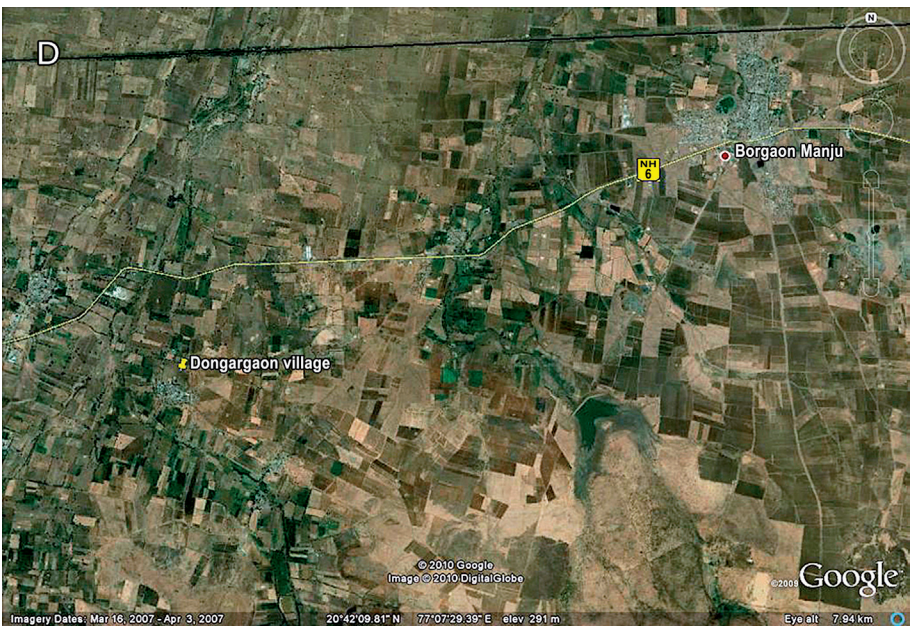
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Table 2 *Some basic demographic and agricultural details of Dongargaon, 2007* in number, acres and per cent

Item	Number/ Extent	Share in total population/households/ working population (%)
Total number of households	357	-
Total population	1680	-
Number of men	855	51.0
Number of women	825	49.2
Total number of SC households	161	45.1
Total number of ST households	45	12.6
Total number of VJNT households	14	3.9
Population (>6 yrs) who are fully literate	1202	80.3
Population (>6 yrs) who never went to school	258	17.2
Average household size	4.7	-
Number of workers with primary occupation as:		
Agricultural labourer	362	46.6
Cultivator	246	31.7
Total area under ownership holdings (acres)	668.3	-
Extent of area irrigated	270.5	40.5
Share of area owned by the top 5 per cent of households	-	46.0

Note: SC=Scheduled Caste; ST=Scheduled Tribe; VJNT=Vimuktya Jati and Nomadic Tribes.
Source: Survey data 2007.

twentieth century. Using two different sources and estimates, Reddy (1988) shows that while in the 1860s, agricultural labourers in Berar accounted for between 14 to 33 per cent of the total work force, by the 1881 Census, the proportion of agricultural labourers had risen sharply, to about 50 per cent. In conclusion, he notes that:

> … right through the regime of agrarian expansion beginning from the 1860s and ending in the 1920s, there were processes which created a substantial "demand" for agricultural labour in Berar, while market forces and colonial regulations maintained a high "supply" of landless labour. *(Ibid.,* p. 202)

Even at the 2001 Census, more than 50 years after India's Independence, Berar claimed the largest share of India's agricultural labourers (see Ramakumar, Raut,

and Kumar 2009), showing that the supply of labour to Berar's agrarian economy proceeded unhindered over all these years. At the state level too, in 2001, the share of agricultural labourers in the work force of Amravati division (which roughly comprises Berar and includes Akola district), at 53.7 per cent, was the highest in Maharashtra. Between 1961 and 2001, the share of agricultural labourers in Amravati's work force increased by 1.3 per cent, from 52.4 to 53.7 per cent. Among the female work force the rise in share was higher: 65.4 per cent of the female workers in Amravati division were agricultural labourers in 2001, as opposed to 62.5 per cent in 1961. Among the Scheduled Caste (SC) workers of Amravati, 72.6 per cent were agricultural labourers in 2001; and the share of female SC agricultural labourers, at 82.1 per cent, was even higher.

In sum, it is clear that Berar is home to a large and growing population of agricultural labourers, and that Dalits constitute a significant share of the agricultural labour work force of the region.

The village of Dongargaon shares the above characteristics with Berar (see Ramakumar, Raut, and Kumar 2009), as revealed by the following data. (i) Census of India data show that there was a dramatic increase in the share of workers employed as agricultural labourers in the village between 1961 and 2001, from 47.7 per cent to 71.1 per cent. (ii) During every inter-censal period between 1961 and 2001, except 1991–2001, the rate of increase in the number of agricultural labourers in the village was higher than the rate of increase of the population.[2] In other words, there were major changes in the internal composition of the work force of Dongargaon between 1961 and 2001. (iii) A comparison of data from the 2007 survey with Joshi's 1967 data shows that, between 1963–64 and 2006–07, Dongargaon registered a rise in the share of workers with agricultural labour as their primary occupation. (iv) The dependence on agricultural employment in the village was higher for female workers as compared to male workers. In 2006–07, agricultural labour was the primary occupation for 37.2 per cent of the male workers, while the corresponding share for female workers was 60.8 per cent (see Table 3 for details).

The 2007 survey data reveal an extremely unequal pattern of land ownership in Dongargaon. Landlessness in the village increased sharply between 1963 and 2007, with the share of landless households rising from 27.7 per cent to 63.6 per cent. Marathas and Kunbis were seen to be the most dominant landowners in 2007, with 48 per cent of the total land-holdings in their possession although they constituted only 18.1 per cent of the population. In contrast, members of the Navbaudh religious

2 Between 1961 and 1971, the total population rose by 42.1 per cent and the agricultural labourer population rose by 79.4 per cent. Between 1971 and 1981, the total population rose by 12.9 per cent and the agricultural labourer population by 18.7 per cent. Between 1981 and 1991, the total population rose by 27.6 per cent and the agricultural labourer population by 37.3 per cent. Between 1991 and 2001, the total population rose by 12.7 per cent and the agricultural labourer population rose by 12.5 per cent. (See Ramakumar, Raut, and Kumar 2009.)

Table 3 *Distribution of workers by primary occupation, by sex, Dongargaon, 2006–07* in numbers and per cent

Primary occupation	Male workers		Female workers		All workers	
	Number	Share (%)	Number	Share (%)	Number	Share (%)
Agricultural labour	174	37.2	188	60.8	362	46.6
Cultivation	149	31.8	97	31.4	246	31.7
Self-employed	36	7.7	14	4.5	50	6.4
Non-agricultural manual work	51	10.9	3	1.0	54	6.9
Non-agricultural non-manual work	35	7.5	4	1.3	39	5.0
Salaried work	22	4.7	3	1.0	25	3.2
Allied activities in agriculture	1	0.2	0	0.0	1	0.1
Total	468	100.0	309	100.0	777	100.0

Source: Survey data 2007.

community, who accounted for 28.1 per cent of the population, owned only 10.2 per cent of the land.

The sharp rise in landlessness in Dongargaon between 1963 and 2007, as we have argued elsewhere (Ramakumar, Raut, and Kumar 2009), was due to two main factors. First, the rise in demand for labour generated by the spread and intensification of cotton cultivation, over a period, attracted a substantial number of landless Dalit, Adivasi and VJNT (Vimuktya Jati and Nomadic Tribe) labourers from outside the village. It is also possible that migration into Dongargaon, and into Akola as a whole, was driven by the severe and recurrent droughts that affected large parts of Maharashtra in the early 1970s.

However, distress migration alone does not explain the significant increase in the Dalit population of the village between the 1960s and 2000s (*ibid.*). Among the Dalit households of Dongargaon, there was a practice of sons-in-law being brought to the village after marriage and of newly married couples being settled there, rather than daughters being sent to their marital homes/villages. Dalit men who married from Dongargaon did not, on the other hand, move out to their brides' villages. In interviews with Dalit elders of the village during the 2007 survey, this was repeatedly and consistently pointed out as a major reason for the increase in the Dalit population. The readiness with which sons-in-law moved to Dongargaon was related to the rise in employment opportunities in and around the village.

The second important reason for the sharp rise in landlessness in Dongargaon was the increase in the purchase of village land by persons from outside, due to the spread of cotton cultivation, and due to the proximity of the village to the National Highway and the MIDC (Maharashtra Industrial Development Corporation) in Babhulgaon. This led to a net loss of land-holdings among inhabitants of the village (*ibid.*).

In terms of employment opportunities in agriculture, the expansion in the supply of labour in the village has been a major depressing factor (for historical evidence of this in Berar, see Reddy 1988; for a review of the literature, see Bardhan 1977). There has also been a rise in demand for labour in cotton cultivation, attracting a large number of migrant workers from the less prosperous regions of Maharashtra. As noted later in this paper, Dongargaon has witnessed an increase in both cotton-cultivated land and in irrigated land. Further, changes in methods of cotton cultivation, such as through the introduction of bio-chemical inputs, have been largely labour-using. Thus demand-side factors have overall tended to raise labour use in the village.

This paper attempts to understand the changes in the employment available to agricultural labourers in Dongargaon in the context of these changes in the pattern of labour absorption. Given the increase in labour supply over the years, what role has been played by the rise in demand for labour in determining the number of days of employment available to agricultural labourers? More importantly, are there limits to such an expansion of employment?

THE AGRICULTURAL WORK CALENDAR IN DONGARGAON

Employment opportunities in the cultivation of kharif crops in Dongargaon arise in the month of April, when the clearing and ploughing operations begin (Table 4). Ploughing continues till about the middle of June and then, once the rains arrive, the sowing operations begin. Thus the peak employment season for male labourers begins in April and the peak season for female labourers begins later, in June. July and August are the months for weeding and fertilizer application. Cotton-picking and the harvesting of sorghum (*jowar)* and pulses begin in the month of September and continue till November. Extension of the kharif harvest season till November has been due to the introduction of Bt cotton varieties, which involve a larger number of rounds of picking. Much of the employment generated between September and November is for female labourers.

From October onwards, as and when harvesting is completed, shallow ploughing and sowing of the second crop begin in irrigated plots. All sowings are completed by November. The months of December and January are set aside for weeding, irrigation, and fertilizer/pesticide application in the cultivation of wheat, red gram (*tur)*, and vegetables. While wheat and vegetables are harvested in the month of February, red gram is harvested a little later, in March.

Table 4 *Calendar of operations for major crops, by months, Dongargaon, 2006–07*

Month	Operations	Major crops grown
April	Deep ploughing, shallow ploughing, clearing the land	Cotton, sorghum, pulses, soyabean
May	Deep ploughing, shallow ploughing, clearing the land	Cotton, sorghum, pulses, soyabean
June	Shallow ploughing, sowing, fertilizer application, row making	Cotton, sorghum, pulses, soyabean
July	Hand weeding, animal weeding, fertilizer application	Cotton, sorghum, pulses, soyabean
August	Hand weeding, animal weeding, pesticide application	Cotton, sorghum, pulses, soyabean
September	Harvesting/picking, threshing	Cotton, sorghum, pulses, soyabean
October	Harvesting/picking, threshing (kharif) shallow ploughing, sowing (rabi)	Cotton, sorghum, pulses, soyabean (kharif) wheat, red gram, vegetables (rabi)
November	Harvesting/picking, threshing (kharif) shallow ploughing, sowing, fertilizer application (rabi)	Cotton, sorghum, pulses, soyabean (kharif) wheat, red gram, vegetables (rabi)
December	Hand weeding, irrigation, fertilizer application	Wheat, red gram, vegetables
January	Hand weeding, irrigation, fertilizer application, pesticide application	Wheat, red gram, vegetables
February	Harvesting, threshing	Wheat, vegetables
March	Harvesting, threshing	Red gram

Source: Notes taken during the 2007 survey of the village.

NUMBER OF DAYS OF EMPLOYMENT IN AGRICULTURE

Classification of the Working Population

Based on the 2007 survey, the working population of Dongargaon may be divided into four broad groups:

(i) workers who are primarily employed as agricultural labourers;
(ii) workers who are primarily employed in non-agricultural manual work and whose secondary occupation is agricultural labour;
(iii) workers for whom cultivation is the primary occupation and agricultural labour a secondary occupation;
(iv) workers who are exclusively employed in the non-agricultural sector.

In the discussion here of the number of days of employment in agriculture, only the first three groups of workers are considered for analysis.

Number of Days of Employment

There were 317 primary agricultural labourers (group i) in the village in 2007, and their average number of days of employment in 2006–07 was 111 (Table 5). Thus primary agricultural labourers in Dongargaon were employed for just about four months a year, on average. This group of labourers was almost completely dependent on agricultural work, with as much as 94 per cent of their days of employment coming from agriculture and only 6 per cent from outside agriculture. Agriculture provided an average of 104 days of employment to a primary agricultural labourer. In other words, the access to non-agricultural employment for primary agricultural labourers taken as a whole was limited.

The difference between male and female primary agricultural workers in terms of the number of days of employment was marginal. In 2006–07, men were employed for an average of 118 days and women for an average of 105 days. This difference in the average number of days of employment between males and females was accounted for by the days of non-agricultural employment obtained by male workers. If men obtained an average of 12 days of work in a year in the non-agricultural sector, the corresponding number of days of such work for women was only 2. On the other hand, within agriculture, the difference in the number of days of employment between men and women was small: in 2006–07, men obtained 106 days and women obtained 103 days of agricultural work.

For secondary agricultural labourers with non-agricultural manual work as their primary occupation (group ii), who were 63 in number in 2006–07, the average number of days of employment in a year was higher than for primary agricultural

Table 5 *Number of days of employment, primary and secondary agricultural workers, by sector, Dongargaon, 2006–07* in days per year

Category	Agriculture		Non-agriculture		Total	
	Days	Share (%)	Days	Share (%)	Days	Share (%)
(a) Primary agricultural labourers (N=317):						
Men	106	89.8	12	10.2	118	100.0
Women	103	98.1	2	1.9	105	100.0
All persons	104	93.7	7	6.3	111	100.0
(b) Secondary agricultural labourers with daily non-agricultural employment as primary occupation (N=63):						
Men	69	39.7	105	60.3	174	100.0
Women	55	47.0	62	53.0	117	100.0
All persons	65	41.1	93	58.9	158	100.0
(c) Secondary agricultural labourers with cultivation as primary occupation (N=102):						
Men	70	85.4	12	14.6	82	100.0
Women	102	100.0	0	0.0	102	100.0
All persons	83	92.2	7	7.8	90	100.0

Source: Survey data 2007.

labourers, at 158 days. This group of workers was engaged in agriculture for only 41 per cent of their total number of days of employment; the larger share of their days of employment (59 per cent or 93 days) came from the non-agricultural sector.[3] It was seen that male labourers in this group obtained a significantly larger number of days of employment than female labourers; on average, the number of days of employment for men was 174 days and for women, 117 days. As was the case with the first group, namely primary agricultural labourers, there was not much of a difference between men and women in this group in terms of the number of days of agricultural employment. However, the annual number of days of non-agricultural employment was significantly higher for men (105 days) as compared to women (62 days).

3 While agriculture was the predominant provider of employment in Dongargaon in 2006–07, non-agricultural employment supplemented it in many important ways. In all, 184 workers were employed in the non-agricultural sector in 2006–07, in various forms of work. Of these 184 workers, 121 workers (66 per cent) were under daily wage contracts and only 47 workers (26 per cent) were under monthly (salary-based and more permanent) contracts. Of the total number of workers in the non-agricultural sector, about 91 per cent were men. Among the male workers, 37 per cent were employed in construction work and 22 per cent were employed under different wage contracts in industrial firms in the nearby MIDC complex in Babulgaon, about 4 kilometres away from Dongargaon. There were 13 government employees in the village, of whom 12 were men.

For the third group of workers, those with cultivation as primary occupation and agricultural labour as secondary occupation, the average number of days of employment in a year, at 90 days, was the lowest. One reason for this low figure could be the fact that while the survey collected worker-wise data for agricultural *wage* labour, it did not collect worker-wise data for family labour in agriculture. The survey data record only the *total* number of family labour days, sex-wise, for each operation in each crop. As a result, the number of days spent on the family farm was not considered while calculating the total number of days of employment for workers whose primary occupation was cultivation and secondary occupation was agricultural labour. Yet, what is notable is that for women belonging to this group of workers, the number of days of employment in agriculture (102 days) was almost the same as for women in the first group of primary agricultural labourers. The 39 female workers in this third group put in only a limited number of days of work on the family farm. On the other hand, male workers in the third group were more involved in family labour than in hired labour; therefore, in 2006–07, the number of days of employment in agriculture for men (70 days) was considerably lower than that for women (102 days) in this group.

As noted above, the *average* number of days of agricultural employment for primary agricultural labourers (group i) in 2006–07 was 106 days for men and 103 days for women. However, roughly half of these male and female agricultural labourers obtained less than 100 days of employment (see Table 6) during the year, with

Table 6 *Distribution of workers by size-classes of number of days of employment in agriculture, primary agricultural labourers, Dongargaon, 2006–07* in number and per cent

Size-classes of days of employment	Men		Women	
	Number of days	Share of labourers	Number of days	Share of labourers
Less than 50	20	13.2	20	12.1
50 to 75	29	19.1	37	22.4
75 to 100	26	17.1	31	18.8
100 to 125	24	15.8	23	13.9
125 to 150	16	10.5	25	15.2
150 to 175	21	13.8	15	9.1
175 to 200	9	5.9	6	3.6
More than 200	7	4.6	8	4.8
Total	152	100.0	165	100.0

Source: Survey data 2007.

49.3 per cent of the men working for less than 100 days and 53.3 per cent of the women working for less than 100 days. Further, roughly a third of this group of workers – 32.3 per cent of men and 34.5 per cent of women – worked for less than 75 days a year. This goes to show that underemployment was an important feature of the work profile of agricultural labourers in Dongargaon in 2006–07. Lack of access to adequate non-agricultural employment and in-migration to the village were factors that contributed to the underemployment.

Number of Days of Employment by Caste Group

Differences across caste groups in the average annual number of days of employment, ranging between 101 and 120 days (Table 7), were not large among *male* primary agricultural labourers. Dalit male labourers obtained the largest number of days of employment, at 120 days, followed by OBC males at 118 days and Adivasi males at 116 days. On the other hand, the number of days of employment for *female* agricultural labourers registered wider differences across caste groups. Adivasi women had the

Table 7 *Number of days of employment, primary and secondary agricultural workers, by caste and sector, Dongargaon, 2006-07* in days per year

Category	Agriculture		Non-agriculture		Total	
	Men	Women	Men	Women	Men	Women
(a) Primary agricultural labourers (N=317):						
General (5)	88	55	13	0	101	55
OBC (72)	108	94	10	0	118	94
Dalits (172)	103	104	17	3	120	107
Adivasis (59)	110	112	6	2	116	114
VJNT (9)	109	84	0	7	109	91
All workers (317)	**106**	**103**	**12**	**2**	**118**	**105**
(b) Secondary agricultural labourers with daily non-agricultural employment as primary occupation (N=63):						
General (6)	66	10	128	0	194	10
OBC (10)	70	50	40	0	110	50
Dalits (24)	51	63	152	30	203	93
Adivasis (4)	72	60	60	125	132	185
VJNT (19)	96	70	64	137	160	207
All workers (63)	**69**	**55**	**105**	**62**	**174**	**117**

Source: Survey data 2007.

largest number of days of employment, at 114 days, followed by Dalit women at 107 days. Women from the VJNT and OBC categories had fewer days of employment in 2006–07 than Dalit and Adivasi women.

The data relating to primary agricultural labourers contained in Table 7 are presented in a different format in Figure 1. Here, the plotting is in terms of the number of days of employment for agricultural labourers by caste group. The figure shows that a significant proportion of labourers from all caste groups obtained less than 100 days of employment in 2006–07. Of the major caste groups, only among Dalits and Adivasis did more than 50 per cent of the primary agricultural labourers obtain more than 100 days of employment.

For secondary agricultural labourers from all the caste groups, except for OBCs whose access to non-agricultural employment was relatively limited, the number of days of employment was higher than for primary agricultural labourers (Table 7). Male Dalit secondary agricultural labourers recorded the highest average number of days of employment, 203 days, in 2006–07. Male Dalit labourers also obtained the highest number of days of non-agricultural employment as compared to the other caste groups.[4]

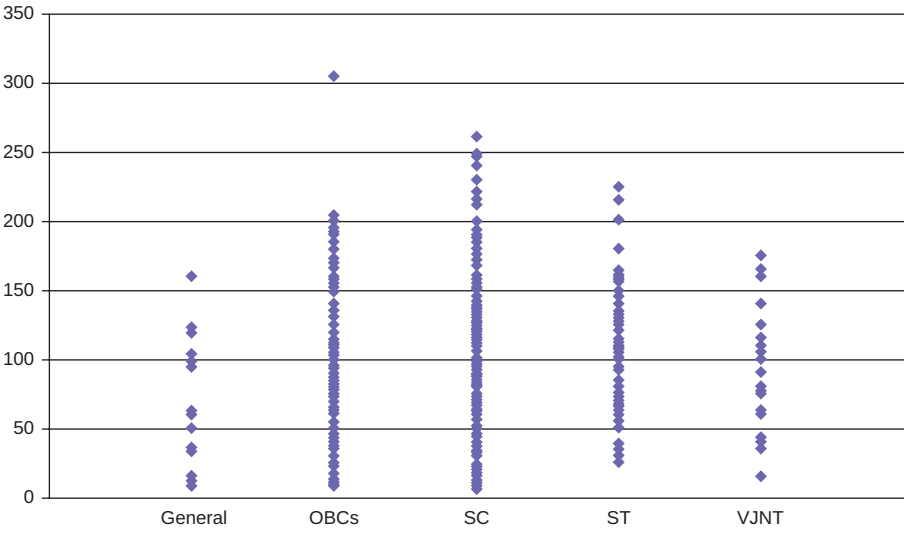
The women among secondary agricultural labourers worked in agriculture only during the peak season of cotton/sorghum sowing, cotton picking, and wheat harvesting, which accounted for roughly two months in the year. Among them, the VJNT caste group recorded the largest number of days of employment, 207 days, in 2006–07. For both men and women belonging to the VJNT group, selling pieces of cutlery in nearby villages was an important form of non-agricultural employment. The relatively high number of days of non-agricultural employment among VJNT women reflected this occupational pattern.

Number of Days of Employment across Crops

As noted earlier, while cotton, sorghum, and wheat were the most important mono-crops grown in the village, a large area of land was also devoted to inter-crops of cotton, sorghum, and pulses. During the 2007 survey, it was seen that agricultural labourers often found it difficult to precisely identify the crops that were, or would be, grown on the plots on which they worked. For instance, male agricultural labourers did not always know if the field they had ploughed would be planted

4 Among non-agricultural workers receiving daily wages, Dalit workers formed the largest proportion; Dalits accounted for 53 per cent of all workers and 56 per cent of all daily workers, in non-agriculture. Both among construction workers and MIDC labourers, where daily contracts were the rule, Dalits predominated; about 73 per cent of construction workers and 51 per cent of MIDC labourers were Dalits. In most other non-agricultural occupations too, such as among drivers, masons, and hotel waiters, Dalits were the most numerous.

Figure 1 *Scatter plot of the number of days of employment in agriculture, primary agricultural labourers, by caste group, Dongargaon, 2006-07* in number



Source: Survey data 2007.

with a mono-crop or an inter-crop. Even when they knew, the large number of days of employment provided by cotton, sorghum, pulses, and their inter-crops made it difficult for them to report the exact number of working days for each of these. This paper presents crop-wise data on employment wherever available, and aggregates the rest under inter-crops.

Taken together, cotton, sorghum, pulses, and their inter-crops accounted for 91 per cent of the total number of days of employment for men and 88 per cent of days of employment for women in Dongargaon, in 2006–07 (Table 8). Inter-crops of cotton, sorghum, and pulses provided about half the average number of days of employment for men and one-third the average number of days of employment for women. The lower number of days recorded for women under inter-cropping was due to the fact that they were able to identify the crops on which they worked more easily. Women were largely occupied in the sowing and harvesting of specific crops, which they could therefore identify, as against tasks like ploughing and weeding that were common across plots. Thus it was seen that about 42 per cent of the average number of days of employment of female agricultural labourers were devoted to tasks in cotton cultivation.

Cultivation of crops like wheat and soyabean did not account for a significant share of the number of days of employment of primary agricultural labourers (Table 8). This was partly due to the lower shares of these crops in the gross cropped area, and

Table 8 *Average number of days of employment, primary agricultural labourers, by crop, Dongargaon, 2001* in days per year and per cent

Crop	Men		Women	
	Number of labour days	Share of labour days	Number of labour days	Share of labour days
Cotton	26	24.9	43	41.9
Sorghum	17	16.1	13	12.2
Red gram, black gram (*urad*) and green gram (*moong*)	2	1.6	3	2.5
Inter-crops: cotton, sorghum, and pulses	53	49.8	35	33.5
Soyabean	3	2.6	1	1.2
Wheat	4	4.0	1	1.3
Vegetables	1	0.7	7	6.4
Other crops	0	0.4	1	0.9
All crops	106	100.0	103	100.0

Note: The figures for each crop are normalized to reflect proportions in the overall average.
Source: Survey data 2007.

partly because of the lower labour absorption in these crops as compared to crops like cotton.

In Table 9, disaggregated figures are presented for the employment of agricultural labourers in cotton, sorghum, pulses, and their inter-crops (which together provided 91 per cent of all employment). It will be seen that the average number of days of employment here (102 for men and 94 for women) are different from the figures given in Table 5; this is because these averages are only for cotton, sorghum, pulses, and their inter-crops, and not for all crops.

For male agricultural labourers, deep and shallow ploughing accounted for about 31 per cent, and animal and hand weeding for about 34 per cent of the average annual number of days of agricultural employment. Apart from these, the only other agricultural task that provided substantial employment to male agricultural labourers was harvesting in sorghum cultivation. Taken together, ploughing, weeding, and sorghum harvesting accounted for about 77 per cent of their average number of days of employment.

Table 9 *Number of days of employment obtained in plots in which cotton, sorghum, pulses, and other crops are inter-cropped, primary agricultural labourers, by operation, Dongargaon, 2006–07* in days per year

Operation	Male workers		Female workers	
	Days	Share (%)	Days	Share (%)
Clearing the land	2	2.0	5	5.3
Deep ploughing	15	14.7	0	0.0
Shallow ploughing	16	15.7	0	0.0
Sowing	8	7.8	8	8.5
Manure application	0	0.0	0	0.0
Fertilizer application	3	2.9	6	6.4
Pesticide application	1	1.0	0	0.0
Animal weeding	17	16.7	0	0.0
Hand weeding	18	17.6	35	37.2
Irrigation	1	1.0	0	0.0
Harvesting: cotton	6	5.9	28	29.8
Harvesting: sorghum	13	12.7	9	9.6
Harvesting: red gram	1	1.0	0	0.0
Harvesting: other crops	1	1.0	3	3.2
All operations	102	100.0	94	100.0

Source: Survey data 2007.

For female agricultural labourers, about 67 per cent of the average number of days of employment came from hand weeding and cotton picking. Harvesting in sorghum provided 9.6 per cent of the days of employment, and sowing provided another 8.5 per cent. In other words, the tasks providing employment to women were less diverse than those for men.

DEMAND FACTORS ASSOCIATED WITH CHANGES IN DAYS OF EMPLOYMENT

Since the study by Joshi (1967) does not provide estimates of the number of days of employment of Dongargaon's agricultural labourers in 1964, it has not been possible to quantify the changes in the number of days of employment in the village between 1963–64 and 2006–07. What Joshi's study does provide, however, are estimates of labour absorption per acre for each crop, as well as an account of the methods of production in each crop, in 1963–64. Information is also available

on the changes in the larger agrarian economy of Dongargaon between the 1960s and 2000s.

Based on the available information, it may be surmised that the average annual number of days of employment of agricultural labourers in Dongargaon has increased between 1963–64 and 2006–07, due to the following reasons. First, there has been a spread of irrigation in the village, which has led to a larger number of crops being grown as well as more intensive cultivation within each crop. Secondly, changes in the cropping pattern have been in favour of crops that are more labour-absorbing. Thirdly, changes in the methods of production have raised the net levels of labour absorption, especially of women workers. It should be noted, though, that in spite of the general increase in labour absorption, the average number of days of employment for agricultural labourers has not increased beyond four months a year. It would appear that the rise in the "supply" of labour has stymied increased availability of employment in the village.

Changes in Irrigation and Labour Use

In 1963–64, Dongargaon was primarily a rainfed village. Only about 16 acres of land, accounting for 3.1 per cent of the net cropped area, were irrigated (Joshi 1967). As Joshi wrote:

> The area is principally a kharif tract. More than ninety per cent of the gross cropped area is under kharif crops. The principal kharif crops are cotton, sorghum, ground nut and red gram. The principal rabi crops are wheat and vegetables. Cotton and sorghum, between themselves, account for about three-fourths of the area. (*Ibid.*, p. 80.)

About 96 per cent of the gross cropped area in Dongargaon was first-season land in 1963–64 (Table 10), of which 55.2 per cent was cultivated with sorghum and 33.8 per cent with cotton; sorghum and cotton together accounted for 89 per cent of the gross cropped area. In the second season, vegetables, mainly brinjal and onion, were cultivated. According to Joshi:

> The main reason for the infrequency of the rabi crop is on account of the *complete absence of irrigation facilities*. Whatever irrigation is there is from wells, and naturally, this costly irrigation facility is used for more paying crops like vegetables, fruit crops or sugarcane. (*Ibid.*, p. 80; emphasis added.)

Crop rotation (the successive cultivation of different crops in a specified sequence on the same field) was commonly practised in Dongargaon in 1963. According to Joshi (1967), the most important crops cultivated in this manner were cotton and sorghum, in cycles of one- or two-year rotation. In other words, cotton and sorghum were cultivated in turn either every alternate year, or every two years. On some plots of land, crop rotation between sorghum and groundnut was also seen.

Table 10 *Cropping pattern in Dongargaon, 1963* in acres and per cent

Crop	Cultivated area (acres)	Share in gross cropped area (%)	Share of area within season (%)
1. Kharif and dry crops:			
Sorghum	264.50	53.42	55.15
Bajra	0.25	0.05	0.05
Red gram	7.87	1.59	1.64
Black gram	2.20	0.44	0.46
Green gram	7.12	1.44	1.48
Other pulses	0.10	0.02	0.02
Cotton	162.05	32.73	33.79
Groundnut	35.50	7.17	7.40
All kharif crops	**479.59**	**96.87**	**100.00**
2. Rabi and irrigated crops:			
Chilli	0.21	0.04	1.38
Banana	1.00	0.20	6.55
Brinjal	7.00	1.41	45.84
Onion	3.20	0.65	20.96
Other vegetables	1.66	0.34	10.87
Sugarcane	1.20	0.24	7.86
Wheat	1.00	0.20	6.55
All rabi crops	**15.27**	**3.08**	**100.00**
Gross cropped area	**495.11**	**100.00**	-

Source: Joshi (1967).

By 2007, agriculture in Dongargaon had undergone a total transformation. The expansion of irrigation, along with technical advances and the growth of markets, had led to major changes in the types of crops grown, the number of crops grown each year, and the nature of inter-cropping. The village was no longer dry and predominantly kharif, as it was in 1963–64. In 2006–07, of the 534 acres of land owned by inhabitants of the village, 179 acres (or 33.5 per cent) were irrigated. If only the area of cultivated land (excluding land left fallow that year) is considered, the share of irrigated land increases to 40.5 per cent. Expansion of irrigation had a major impact on the availability of employment in agriculture in Dongargaon, as shown below.

Changes in Cropping Pattern and Labour Use

Between 1963 and 2007 the cropping pattern in the village witnessed major changes (see Table 11), although the major crops continued to be sorghum and cotton in the first season, and wheat and vegetables in the second season. First, the area under cotton in 2007 was significantly larger than in 1963, and it exceeded the area under sorghum by a large margin. Secondly, along with traditional and hybrid varieties of cotton, Bt cotton was also widely cultivated. Bt cotton was primarily grown as a mono-crop, though it was sometimes inter-cropped with sorghum and red gram. Thirdly, soyabean had emerged as an important crop cultivated in the first season. Fourthly, there was a significant growth in the land area devoted to second-season crops, the most important of which was wheat, followed by vegetables. In terms of the area under cultivation, wheat had become the third most important crop in the village. Fifthly, there was a major increase in the variety of vegetables grown in the second season, alongside a rise in the total land area under vegetables.

An important feature of the cropping pattern in Dongargaon in 2007 was the wide variety of inter-crops. The survey noted the existence of about 45 different combinations of crops (mono-crops and inter-crops taken together). A summary of the area under each of these crop combinations is given in Table 11. Mono-cropping of cotton accounted for the single largest share of gross cropped area, with 32.3 per cent of the cultivated land devoted to solely cotton/Bt cotton. Cotton was also cultivated as an inter-crop, along with red gram, sorghum, soyabean, and black gram, in an additional 9.1 per cent of the gross cropped area. Thus cotton cultivation accounted for a total of about 41 per cent of the gross cropped area. Sorghum was the second most important mono-crop, cultivated in 21.7 per cent of the gross cropped area. It was also cultivated as an inter-crop with red gram, black gram and green gram, taking the total area under sorghum cultivation up to about 27 per cent of gross cropped area. Wheat in the second season and soyabean in the first season were the third and fourth most important mono-crops, in that order.

The changes seen from 1963 to 2007 in the type and combination of crops cultivated in the village were brought about and deeply influenced by the availability of irrigation. For instance, by 2007, about 37 per cent of the gross irrigated cropped area was cultivated with wheat, which was exclusively a second-season crop. The expansion of wheat cultivation in the second season can be attributed exclusively to the spread of irrigation. Increased vegetable cultivation in the second season was also a result of the spread of irrigation; vegetables occupied 11.2 per cent of the gross irrigated cropped area, as against only 1.2 per cent of the gross non-irrigated cropped area (see Table 11). Annual cultivation of a larger number of crops was a major feature of the change in the production environment, which in turn had an effect on the number of days of employment available to labourers.

Table 11 *Area under different crops and gross cropped area, Dongargaon, 2006–07* in acres and per cent

Crop combinations	Irrigated area		Unirrigated area		Gross cropped area	
	Area (acres)	Share in total (%)	Area (acres)	Share in total (%)	Area (acres)	Share in total (%)
Cotton	**30.5**	**11.3**	**156.3**	**39.3**	**186.8**	**27.9**
Bt cotton	24.0	8.9	5.0	1.3	29.0	4.3
Sorghum	**43.5**	**16.1**	**101.3**	**25.4**	**144.8**	**21.7**
Wheat	**99.8**	**36.9**	**4.0**	**1.0**	**103.8**	**15.5**
Cotton + red gram	0.0	0.0	25.0	6.3	25.0	3.7
Cotton + sorghum + red gram	3.0	1.1	6.0	1.5	9.0	1.3
Cotton + red gram + soyabean	3.5	1.3	0.0	0.0	3.5	0.5
Cotton + black gram	0.0	0.0	3.0	0.8	3.0	0.4
Bt cotton + red gram	0.0	0.0	12.0	3.0	12.0	1.8
Bt cotton + sorghum + red gram	4.0	1.5	0.0	0.0	4.0	0.6
Cotton + sorghum	0.0	0.0	4.0	1.0	4.0	0.6
Sorghum + red gram	1.5	0.6	9.0	2.3	10.5	1.6
Sorghum + black gram + green gram	5.3	2.0	2.0	0.5	7.3	1.1
Soyabean	9.0	3.3	30.0	7.5	39.0	5.8
Red gram	8.5	3.1	16.1	4.1	24.6	3.7
Red gram + soyabean	3.6	1.3	8.0	2.0	11.6	1.7
Red gram + black gram + green gram	0.0	0.0	4.0	1.0	4.0	0.6
Black gram	2.5	0.9	5.0	1.3	7.5	1.1
Green gram	1.5	0.6	2.5	0.6	4.0	0.6
Cabbage	3.3	1.2	0.0	0.0	3.3	0.5
Others, including vegetables	27.1	10.0	4.8	1.2	31.8	4.8
Total	270.5	100.0	397.9	100.0	668.3	100.0

Note: "Cotton" refers to the traditional variety of cotton.

Source: Survey data 2007.

Another important change in cropping pattern brought about by the spread of irrigation was the opening up of the possibility of cultivating Bt cotton. The higher yield of Bt cotton, as compared to traditional varieties of cotton, hinged on the availability of water; the risks were high in cultivating Bt cotton on non-irrigated land. In 2006–07, about 10.4 per cent of the gross irrigated cropped area was under Bt cotton, as compared to about 4.3 per cent of the gross non-irrigated cropped area; in the non-irrigated plots, Bt cotton was largely inter-cropped with red gram. The spread of Bt cotton, as noted later in this paper, also led to major changes in labour use in cotton cultivation.

Changes in Labour Absorption across Crops

Labour Use in Cotton (Traditional and Hybrid)

Joshi's study (1967) documents the average annual labour absorption (including hired and family labour) in cotton and sorghum for the year 1963–64.[5] The total labour use in sorghum was estimated to be 24 days per acre, and in cotton, 34 days per acre (Table 12). In sorghum, the number of male labour days was higher than the number of female labour days. In cotton, the number of male and female labour days used were almost equal.

Based on the 2007 survey data, separate estimates are given here of the number of labour days in 2006–07 for non-Bt cotton, Bt cotton, sorghum, and a set of typical

Table 12 *Labour absorption in different crops, Dongargaon, 1963–64*, in number of 8-hour days per acre

Operation	Sorghum		Cotton	
	Men	Women	Men	Women
Preparatory tillage	5.0	2.0	8.0	2.0
Sowing	2.0	0.5	2.0	1.0
Manuring	1.0	0.5	1.0	1.0
Weeding	2.5	3.0	6.0	11.0
Harvesting and threshing	4.0	3.5	0.5	1.5
Total	14.5	9.5	17.5	16.5

Source: Survey data 2007.

5 Guha (1990) uses data from Farm Management studies in Akola and Amravati to estimate the extent of labour absorption in cotton and jowar for the period 1954–57. He notes that the extent of labour absorption per acre in "cotton mixture" was 23 days and in "jowar mixture", 16 days.

Table 13 *Labour absorption in non-Bt cotton, Dongargaon, 2006—07* in number of 8-hour days per acre

Operation	Plots using machines		Plots using bullocks/human labour	
	Men	Women	Men	Women
Deep ploughing	1	0	4	0
Shallow ploughing	1	0	2	0
Sowing	1	4	1	4
Animal weeding	2–6	0	2–6	0
Hand weeding	1–3	15–20	1–3	15–20
Fertilizer application	0	2–3	0	2–3
Pesticide application	1–2	0	1–2	0
Irrigation	0–8	0	0–8	0
Harvesting and transport	4–10	25–40	4–10	25–40
Total	**11–32**	**46–67**	**15–36**	**46–67**

Note: The figures separated by a dash are for non-irrigated and irrigated plots, respectively.
Source: Survey data 2007.

inter-crops including cotton, sorghum, red gram, and wheat. The estimates of labour use in non-Bt cotton, Bt cotton, and sorghum are from plots of land where they were grown as mono-crops. For each of these crops/crop combinations, separate estimates are also given, wherever possible, for plots that used machines and plots that used human labour in every operation. Further, the range of labour days used by irrigated and unirrigated plots for each operation is also presented. Data on family labour by sex and by operation were collected for all the crops. All the estimates presented include both hired labour days and family labour days.

Between 1963–64 and 2006–07, the number of labour days used per acre in Dongargaon increased for both cotton and sorghum. On 1 acre of land under cotton, the average number of labour days used in 2006–07, under different conditions, was as follows (see Table 13). Where operations were mechanized with the use of tractors, the number of labour days for unirrigated plots was 57 and for irrigated plots, 99. Where only human/manual labour was used, the number of labour days for unirrigated plots was 61 and for irrigated plots, 103. A common feature in all instances was that the number of female labour days exceeded the number of male labour days by a considerable margin. The division of labour between men and women was clearly laid out: male labour was most commonly used for deep ploughing, shallow

ploughing, animal weeding, pesticide application, and irrigation; female labour was most commonly used for sowing, hand weeding, and harvesting. [6]

In cotton cultivation, the operation that accounted for the largest number of labour days was harvesting/picking, followed by hand weeding. Female labour was predominantly used in both these operations, leading to a significant rise in the overall level of female labour use in cotton. The spread of cotton cultivation meant an immediate increase in the demand for female labourers in picking and hand weeding.

The only two operations for which machines were used in cotton cultivation were deep and shallow ploughing. Mechanization of ploughing did not make a significant difference to the total labour use in cotton, however; the use of bullocks increased labour use by only about 4 labour days.

It is clear that labour absorption in cotton rose significantly between 1963–64 and 2006–07 (see Tables 12 and 13). Joshi (1967) estimated that about 34 labour days were used in cultivating cotton on 1 acre of land in 1963–64. In 2006–07, on the other hand, even if plots that were *mechanized and non-irrigated* plots are taken as a benchmark, the number of labour days was 57 per acre of land. On irrigated land under cotton, the extent of labour use was higher. A comparative study of crop operations as described in Joshi (1967), and the accounts of peasants belonging to the older generation as recorded in interviews conducted during the 2007 survey, shows that there have been several changes in the methods of cultivation in the village, which have had an effect on labour use. These were as follows.

First, one of the most important reasons for the overall increase in labour use in cotton was the rise in labour use in the picking operation. Between 1963–64 and 2006–07, there was an increase in the average yield of non-Bt cotton in Dongargaon from about 1.8 quintals per acre to about 2.8 quintals per acre (Table 14). In 1963–64, owing to lower yield levels, there were just two rounds of pickings in cotton. The increase in yield led both to more rounds of pickings and to higher intensity at each picking. As a result, more labour days went into the picking of cotton in 2006–07, when there were about four to five rounds of picking even on non-irrigated plots. The larger part of the overall increase in labour days was accounted for by female labour days.

6 In Dongargaon, use of contract labour for ploughing or harvesting operations was insignificant. Only six households used contract labour for harvesting in 2006–07; piece-rated labour was more common. For the piece-rated labour and the six instances of contract labour, the employers reported exactly how many men and women had come for work, and such data were accordingly recorded. In the data presented in this paper, the number of labour days reported by the employers has been used for estimations.

Table 14 *Average yields of major mono-crops, Dongargaon, 1963–64 and 2006–07* in quintals/acre

Crop	Yield in 1963 (in Q)	Yield in 2007 (in Q)
Sorghum	3.5	7.5
Cotton	1.8	2.8
Bt cotton	-	6.8
Red gram	3.5	3.7
Wheat	3.5	9.0

Source: Joshi (1967); survey data 2007.

Secondly, the area under cotton in the village increased significantly between 1963–64 and 2006–07. And since a unit area of cotton absorbed more labour days than a unit area of sorghum, there was a corresponding rise in the demand for labour use.

Thirdly, the weeding operation in cotton cultivation appears to have gained in importance between the 1960s and the 2000s. In 1963–64, there were just two rounds of weeding, one using the *dawara* (plough) and bullocks, and the other with human labour. In 2006–07, on the other hand, there were two to three rounds of hand weeding, in addition to one round of animal weeding using the *dawara*. While male workers were employed in animal weeding, a task that could be completed by them in one day for 1 acre of land, women workers were predominantly employed in the more labour-intensive task of hand weeding. The increase in the rounds of hand weeding led to a rise in female labour absorption in cotton cultivation between 1963–64 and 2006–07.

Fourthly, fertilizers and pesticides were generally not used in cotton cultivation in 1963–64 (Joshi 1967), when 5 to 10 carts of manure per acre of cotton was the only known form of nutrient. By 2007, however, most of the cotton farmers were using fertilizers and pesticides, with female workers engaged in the application of fertilizers and male workers in pesticides. The labour days used in the application of fertilizers and pesticides in 2007 was larger in number than the labour days used for applying manure in 1963.

Fifthly, the increase in spread of irrigation in Dongargaon between the 1960s and 2000s had a major impact on labour absorption. The extent of labour use on non-irrigated and irrigated plots differed. An additional 8 labour days per acre were used on irrigated land. If there were one or two rounds of animal weeding and hand weeding on non-irrigated plots, there were at least three rounds of these operations on irrigated plots. As the yields were higher, there were also more rounds of picking on irrigated plots than on non-irrigated plots. Further, as there was a larger quantity

of the harvested cotton to be transported from irrigated plots, the number of labour days used for transportation was also higher in these.

Sixthly, a cotton cultivation operation in which there was a decline in labour absorption in 2007 as compared to 1963 was ploughing. In 1963–64, ploughing was a painstaking operation in the village. Joshi noted that "manuring with 5 to 10 cart loads was a common practice", and that "mixing [the manure] and harrowing with 3 to 4 times was followed" (Joshi 1967, p. 93). Interviews conducted in the village during the 2007 survey revealed that the ploughing operation on plots of hard soil involved just one round of *nangarne* (deep ploughing) followed by one round of *mogda* (breaking clods of soil with a long wooden hammer). Thus, as noted by Joshi, whereas 8 male labour days and 2 female labour days were required to complete the preparatory tillage in 1963–64, in 2006–07 the norm was one round of deep ploughing, largely with tractors and sometimes with bullocks, followed by one round of shallow ploughing. The task of deep ploughing on 1 acre of land could be completed by one day of male labour with tractor or four days of male labour with bullocks; similarly, one labour day with a tractor or two labour days with bullocks could complete the task of shallow ploughing on 1 acre of land. The *mogda* operation was not required in 2006–07 because the superior quality of the ploughshares ensured that very few clods of soil remained after *nangarne*; and if clods were present, they were broken by means of a *panchi* (a heavy, five-blade metal plough used to turn the land) or a *thiree* (a heavy, three-blade metal plough used to turn the land), as a part of the *nangarne* contract itself.

In sum, between the 1960s and 2000s, there was (i) a fall in the number of male labour days employed in ploughing; (ii) a rise in the number of male labour days used in pesticide application and irrigation (on irrigated plots); and (iii) a significant rise in the number of female labour days employed in weeding and harvesting.

Labour Use in Bt cotton

The number of labour days used in the cultivation of Bt cotton in Dongargaon in 2006–07 are given in Table 15. Since Bt cotton came to the village only in 2003–04, a comparison of labour absorption between the years 1963–64 and 2006–07 could be made only for non-Bt cotton cultivation.

By 2006–07, the introduction of Bt cotton had brought about a significant rise in labour absorption in cotton in the village (Table 15). Even where machines were used, a non-irrigated plot of Bt cotton accounted for as many as 143 labour days (38 male and 105 female). On irrigated plots using machines, the number of labour days used was higher still, going up to 194. As was the case with non-Bt cotton cultivation, in Bt cotton, too, the use of machines did not result in a significant reduction in the level of labour absorption. Also, much of the difference in the number of labour days

Table 15 *Labour absorption in Bt cotton, Dongargaon, 2006–07* in number of 8-hour days per acre

Operation	Plots using machines		Plots using bullocks/human labour	
	Men	Women	Men	Women
Deep ploughing	1	0	4–8	0
Shallow ploughing	3–2	0	3–2	0
Row making	1	0	1	0
Sowing	1	3–2	1	3–2
Animal weeding	6–4	0	6–4	0
Hand weeding	5	30–15	5	30–15
Fertilizer application	2–1	3–2	2–1	3–2
Pesticide application	3–2	0	3–2	0
Irrigation	0–8	0	0–8	0
Harvesting and transport	20	60–120	20	60–120
Total	38–49	105–145	41–56	105–145

Note: The figures separated by dashes are for non-irrigated and irrigated plots, respectively.
Source: Survey data 2007.

between non-Bt cotton and Bt cotton arose from the increased use of female rather than male labour in the latter.

Increased labour absorption in Bt cotton as compared to non-Bt cotton can be traced to a set of factors. First, Bt cotton had higher yields than non-Bt cotton, at 6.8 quintals per acre on an average. Higher yields, in turn, meant more rounds of pickings and the use of a larger number of labour days in each picking. If there were four or five rounds of picking for non-Bt cotton, Bt cotton allowed for six to seven rounds. Some farmers in the village began picking in November and continued the operation till February the next year, with some inter-cropping of vegetables in the intervening months. The higher yields of Bt cotton also implied that the labour engaged in the transportation of the produce after picking was higher.

Secondly, farmers carried out each operation in Bt cotton cultivation with greater care, as compared to non-Bt cotton. Thus, both for deep ploughing of plots using only human labour, and for shallow ploughing of plots using human labour and machines, an additional round of ploughing was the norm. In both these kinds of ploughing, the increased labour use was in male labour days. Similarly, there was an additional

round of animal weeding and hand weeding in Bt cotton plots, as compared to non-Bt cotton plots. Also, additional amounts of fertilizers and new pesticides were applied in Bt cotton plots, which again meant use of more labour. While the additional round of animal weeding raised the use of male labour days, the additional round of hand weeding and increased fertilizer and pesticide application raised the use of female labour days.

Thirdly, while sowing of non-Bt cotton was undertaken with seed-drills (*tiphan*), Bt cotton was sowed manually by placing the seeds by hand on furrows (*zari*) in the field. Construction of furrows and manual sowing methods meant that a larger number of labour days were used in Bt cotton.

In sum, the shift of land under cotton cultivation from non-Bt cotton to Bt cotton involved greater labour use, with the increase in the number of female labour days being larger than the increase in the number of male labour days.

Labour Use in Sorghum

In plots where sorghum was grown as a mono-crop, the number of labour days was smaller than in plots where non-Bt cotton was grown as a mono-crop. Sorghum was almost exclusively grown in non-irrigated plots. In plots that had mechanized operations using tractors, the number of labour days was 37 per acre, while in plots that used human labour or bullocks, the number of labour days was 40 per acre (Table 16). A feature of labour absorption in sorghum cultivation was that, just as in cotton, the female labour days used was higher than the male labour days.

In 1963–64, the number of labour days used in sorghum was 24 days per acre, within which the number of male labour days was 14.5 days. In other words, between the 1960s and 2000s, the share of female labour days used in sorghum cultivation rose and surpassed the number of male labour days. The major changes that took place during this period in the number of labour days used in sorghum were as follows.

First, as in cotton, there was a significant rise in the yield of sorghum. Between 1963–64 and 2006–07, the yield per acre of sorghum increased from 3.5 quintals to 7.5 quintals. The rise in yield, in turn, resulted in a rise in the number of labour days used in harvesting, threshing, and transportation. If only 7.5 labour days per acre were used in the harvesting and threshing of sorghum in 1963–64, the corresponding figure for 2006–07 was 13 labour days. Further, in both harvesting and threshing, the predominant labour days used shifted from male labour days in 1963–64 to female labour days in 2006–07.

Secondly, the number of labour days used in weeding increased between 1963–64 and 2006–07. In the earlier period, there were two rounds of weeding in sorghum

Table 16 *Labour absorption in sorghum, Dongargaon, 2006–07* in number of 8-hour days per acre

Operation	Plots using machines		Plots using bullocks/human labour	
	Men	Women	Men	Women
Deep ploughing	1	0	4	0
Shallow ploughing	2	0	2	0
Sowing	2	2	2	2
Animal weeding	2	0	2	0
Hand weeding	0	14	0	14
Fertilizer application	1	0	1	0
Harvesting	2	6	2	6
Threshing	2	3	2	3
Total	12	25	15	25

Source: Survey data 2007.

cultivation, both of which were undertaken with the aid of bullocks and a full-blade hoe (*kolpi*), and which required the use of two male labour days and three female labour days per acre. In 2006–07, two rounds of hand weeding were undertaken in addition to two rounds of animal weeding, and the number of female labour days used in hand weeding alone was 14 per acre.

Thirdly, there was a fall in the number of male labour days used in ploughing, due to the changes that had come about in the nature of preparatory tillage for sorghum, between the 1960s and 2000s. In 1963–64, according to Joshi, "preparatory tillage in sorghum consists of multiple harrowings. Ploughing for sorghum is not a practice in vogue. Two to four harrowings are given after the removal of stalks" (Joshi 1967, p. 92). In 2006–07, preparatory tillage included one round each of deep ploughing (ploughing, as in Joshi) and shallow ploughing (harrowing, as in Joshi).[7]

Thus, there was an increase in the total number of labour days per acre used in sorghum cultivation between 1963–64 and 2006–07. Much of this increase was accounted for by female labour days; for men, there was a marginal fall in the number of labour days used under conditions of mechanization/tractorization.

7 In Dongargaon, in 2006–07, deep ploughing and shallow ploughing were carried out using both tractors and bullocks. The number of fields that were deep-ploughed with tractors was larger than the number of fields deep-ploughed with bullocks. For shallow ploughing, tractors were used only in large plots and bullocks were more commonly used in the smaller plots. There were five tractors in Dongargaon in 2007, all owned by the three largest landowning Maratha households.

Labour Use in Inter-crops of Cotton, Sorghum, and Red Gram

In this section of the paper on labour use in inter-crops, only the three major types of inter-cropping seen in Dongargaon in 2006–07 are considered, namely, cotton–red gram, cotton–sorghum, and sorghum–red gram. All these crop combinations had the following set of operations in common: ploughing, sowing, weeding, and fertilizer application. Considering the labour days across these operations as common, the differences in labour use for each crop combination are provided in Table 17.

First, among the three crop combinations, there was a rise in the labour days used wherever cotton was involved. Cotton picking is a highly employment-intensive operation compared to sorghum or red gram harvesting, and therefore labour

Table 17 *Labour absorption in inter-crops, Dongargaon, 2006–07* in number of 8-hour days per acre

Operation	Plots using machines		Plots using bullocks/ human labour	
	Men	Women	Men	Women
Common operations:				
Deep ploughing	1	0	4	0
Shallow ploughing	2	0	2	0
Sowing	2	2	2	2
Animal weeding	2	0	2	0
Hand weeding	0	14	0	14
Fertilizer application	1	0	1	0
Specific to cotton + red gram				
Cotton harvesting	5	35	5	35
Red gram harvesting	2	8	2	8
Cotton + red gram total	**15**	**59**	**18**	**59**
Specific to cotton + sorghum				
Harvesting	5	40	5	40
Cotton + sorghum total	**13**	**56**	**16**	**56**
Specific to sorghum + red gram				
Sorghum harvesting	2	4	2	4
Red gram harvesting	3	10	3	10
Sorghum + red gram total	**13**	**30**	**16**	**30**

Source: Survey data 2007.

absorption was higher when cotton was a part of the crop combination. Thus, while the total number of labour days in mechanized plots using tractors was 74 per acre in cotton–red gram and 69 per acre in cotton–sorghum, it was only 33 per acre in sorghum–red gram. However, in all the crop combinations, the predominance of female labour days was evident. Here again, the difference between the number of male and female labour days was wider where cotton was involved as an inter-crop.

Secondly, an important aspect of the introduction of red gram into a crop combination was that red gram harvesting had to be organized separately in February, much after the harvesting of cotton or sorghum was completed. Thus an additional number of labour days had to be employed in red gram harvesting, which raised the total labour absorption in a crop combination that included red gram. Even within the different crop combinations that included red gram, there was a variation in the number of labour days employed in red gram harvesting: 10 labour days were used in a cotton–red gram combination and 13 labour days in a sorghum–red gram combination. This variation was due to the following reasons. In a cotton–red gram combination, more rows were devoted to cotton as compared to red gram. On the other hand, in a sorghum–red gram combination, the number of rows devoted to each crop was more or less equal. As a result, the number of labour days required to harvest red gram separately in February was higher when cotton was not involved in the crop combination.

Thirdly, compared to the cultivation of cotton as a mono-crop, the number of labour days employed per acre for a crop combination including cotton was different. Labour absorption in a cotton–red gram combination or a cotton–sorghum combination was *moderately higher* than labour absorption in a mono-crop of non-irrigated cotton, but *significantly lower* than labour absorption in a mono-crop of irrigated cotton. In the comparisons cited above, it was primarily the number of labour days used in cotton picking, and then the number of labour days used in weeding, that accounted for the difference. Needless to say, all the above crop combinations had a *significantly lower* labour absorption than in a mono-crop of Bt cotton.

Labour Use in Wheat

The spread of second-season wheat cultivation in Dongargaon was essentially a phenomenon of the late 1980s and after, following the expansion of irrigation. Irrigation allowed a second crop to be cultivated, and led to a rise in overall labour absorption and number of days of employment.

In 1963–64, the cultivation of wheat in the village was sparse. Further, farmers paid little attention to its cultivation practices. Joshi (1967: 94) noted:

> Wheat was sown in November and harvested in February without any inter-culturing or weeding of the plots. Dry wheat was left uncared for till harvest,

Table 18 *Labour absorption in wheat, Dongargaon, 2006–07* in number of 8-hour days per acre

Operation	Plots using machines		Plots using bullocks/ human labour	
	Men	Women	Men	Women
Deep ploughing	1	0	2	0
Shallow ploughing	1	0	2	0
Sowing	1	0	1	2
Hand weeding	2	10	2	10
Fertilizer application	2	1	2	1
Irrigation and drainage	16	0	16	0
Harvesting and transport	1	0	3	4
Total	24	11	28	17

Source: Survey data 2007.

except the watching of the crop from stray cattle, whereas the irrigated wheat was watered once a week.

However, the spread of irrigation led to the establishment of wheat as a regular crop that was cared for like any other first-season crop. In 2006–07, despite the fact that deep ploughing is generally not undertaken for second crops, a quick round of deep ploughing was carried out for wheat in Dongargaon, followed by a round of shallow ploughing. The sowing of wheat was largely mechanized, and so were harvesting and threshing. No animal weeding was undertaken.

In 2006–07, the number of labour days used in wheat was 35 days per acre in mechanized plots using tractors and 45 days per acre in plots not using tractors (Table 18). The number of labour days used was the highest in the tasks of irrigation and hand weeding. While male labour days predominated in irrigation, female labour days predominated in hand weeding.

The use of machines for ploughing and harvesting operations in wheat cultivation is a relatively recent phenomenon in Dongargaon. The tasks that witnessed significant mechanization were harvesting and threshing. Mechanization reduced the number of labour days used per acre from 7 days to just 1 day.

In sum, the emergence of wheat as a second crop significantly raised overall levels of labour absorption and employment availability in the village between the 1960s and

the 2000s. Although mechanization in wheat cultivation reduced labour absorption, wheat cultivation continued to be a major source of demand for labour in the village in 2006–07.

CONCLUSION

This paper makes an effort to understand three aspects of labour use in Dongargaon, a village in the Vidarbha region of Maharashtra. First, it makes an attempt to estimate the number of days of employment for agricultural labourers in the village. Second, it tries to estimate the levels of labour absorption in agriculture in the village. Third, it attempts to document the changes in the nature and extent of labour absorption in the village.

The Vidarbha region in Maharashtra has a higher incidence of agricultural labour among the total work force than in India as a whole. There has been a continuous rise in the share of agricultural labourers in the work force of the region, from the colonial period to the post-Independence period. While the rising share of agricultural labourers has tended to depress the availability of employment, there has also been a rise in the demand for labour in the region's agriculture. In this paper, an effort is made to understand the availability of employment for agricultural labourers in the context of changes in agricultural production conditions between the 1960s and 2000s. Such a comparative study was facilitated by the availability of data and information from two surveys of the village: a survey conducted in 1963–64 by V. H. Joshi, and a re-survey conducted in 2007 as part of a larger study of agrarian relations in Maharashtra.

In 2006–07, on an average, primary agricultural labourers in Dongargaon were employed for about 111 days or about four months. For workers engaged in non-agricultural work as their primary occupation and agricultural labour as a secondary occupation, the number of days of employment was higher, at 158 days. Thus underemployment was a feature of the life of agricultural labourers in Dongargaon in 2006–07. Lack of access to adequate non-agricultural employment and massive in-migration of workers into the village underlined the severity of underemployment.

Cotton and sorghum were the major crops in the village that provided employment to the agricultural labourers. Taken together, cotton, sorghum, and their inter-crops, with pulses, accounted for 91 per cent of the number of days of employment days for men and 88 per cent for women in 2006–07. For male agricultural labourers, ploughing and weeding provided about 65 per cent of the average number of days of employment. On the other hand, about 67 per cent of the average number of days of employment of female labourers came from hand weeding and cotton picking.

The paper argues that the aggregate demand for agricultural labour in Dongargaon increased between 1963–64 and 2006–07. This argument is based on indirect evidence

with respect to changes in the extent of labour absorption in the cultivation of different crops. In 1963–64, the total labour use in sorghum was 24 days and in cotton, 34 days. In 2007, in plots under non-Bt cotton with mechanized operations, the number of labour days used was between 57 and 99; whereas in plots using human labour, the range of labour days used was between 61 and 103. The operation using the largest number of labour days was harvesting/picking, followed by hand weeding. In both these operations, it was female labour that was predominantly used, which significantly raised the overall levels of female labour use in cotton cultivation.

There were at least four factors that contributed to the overall increase in labour absorption in non-Bt cotton cultivation between 1963–64 and 2006–07. First, there was a rise in labour use in cotton picking. Secondly, the operation of weeding as a whole increased in importance, and the rise in the number of rounds of hand weeding led to a significant rise in female labour absorption. Thirdly, the number of labour days used in the application of fertilizers and pesticides in 2007 was more than the number of labour days used in manuring in 1963. Fourthly, the spread of irrigation had a major positive impact on labour absorption.

In sorghum, too, there was an increase in the number of labour days per acre between 1963–64 and 2006–07. Much of this increase was in respect of female labour days; for men, there was a marginal fall in the number of labour days used under conditions of tractorization.

Introduction of Bt cotton into the village in the 2000s led to a significant rise in labour absorption. Increased labour absorption in Bt cotton as compared to non-Bt cotton varieties can be accounted for by the following factors. First, Bt cotton had higher yields, which meant that more labourers were engaged in picking. Secondly, each operation in Bt cotton cultivation was carried out by farmers in greater detail. Thirdly, sowing of Bt cotton was undertaken by hand, by individually placing seeds on furrows.

The extension of wheat cultivation in the second season in Dongargaon was a development that followed the spread of irrigation. The emergence of wheat as a second crop significantly raised the overall levels of labour absorption and employment availability in the village between the 1960s and the 2000s. Even though the use of tractors in fields under wheat reduced labour absorption, wheat cultivation continued to be a major source of demand for labour in the village in 2006–07.

The data and analysis presented in this paper show that, in the context of a rising incidence of agricultural labour in the work force, increased labour absorption has limits in raising the number of days of employment. Even at times of a major increase in labour absorption between 1963–64 and 2006–07, the average number

of days of employment in Dongargaon did not rise above 120 days a year. This was most notable for female agricultural labourers; despite a sharp rise in female labour absorption between 1963–64 and 2006–07, the number of days of employment for female agricultural labourers was less than that for male agricultural labourers. In sum, rising landlessness and continuing in-migration have undermined the potential gains of a rise in labour absorption to labourers.

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REFERENCES

Bamezai, Apurva (2010), "Conditions of Employment and Earnings of Agricultural Labourers in Rural Maharashtra," M. A. dissertation in Development Studies submitted to the Tata Institute of Social Sciences, Mumbai.

Bardhan, Kalpana (1977), "Rural Employment, Wages and Labour Markets in India: A Survey of Research," *Economic and Political Weekly*, 12, 26, June, pp. A34–A48.

Guha, Sumit (1990), "Labour Intensity in Indian Agriculture, 1880–1970: Some Findings," *Economic and Political Weekly*, 29 December, pp. A189–A192.

Joshi, V. H. (1967), *Dongargaon: A Socio-economic Study*, Research Bulletin, Socio-economic Studies: 4, Department of Agriculture, Maharashtra State, Poona.

Mukherjee, Anindita (1998), "Casual Labour," in Peter Lanjouw and Nicholas Stern (eds.), *Economic Development in Palanpur over Five Decades*, Oxford University Press, New Delhi, pp. 431–61.

Ramachandran, V. K., and Swaminathan, Madhura (2004), "Prospects for Rural Employment in Contemporary India," paper presented at the World Social Forum, Mumbai.

Ramakumar, R., Raut, Karankumar, and Kumar, Awanish (2009), *Agrarian Change in Rural Maharashtra: Resurveys of Selected Villages: A Resurvey of Dongargaon Village, Akola District, Maharashtra*, Research Report, Tata Institute of Social Sciences, Mumbai.

Reddy, C. Rammanohar (1988), "The Incidence of Agricultural Labourers in India: Variations over Time and Space (With a Study of Varhad in Maharashtra)," Ph. D. thesis submitted to Jawaharlal Nehru University, New Delhi.

GLOSSARY

Adivasi	Here synonymous with Scheduled Tribes (ST) as defined in the Indian Constitution
Berar	Name of a region in the eastern part of the State of Maharashtra; now superseded by the term Vidarbha
Bt	*Bacillus thuringiensis*
Dalit	Here synonymous with Scheduled Caste

dawara	A small, single-blade harrow, whose blade is about six inches long
gaothan	The part of a village that is ordinarily used for settlement
jowar	Great millet; sorghum; Sorghum bicolour
kharif	Summer/monsoon crop, usually sown in June–July, at the beginning of the south-west monsoon
kolpi	A full-blade hoe operated with bullocks by labourers; used in weeding
mogda	A ploughing operation that involves breaking soil clods with a long wooden hammer
moong	Green gram; Vigna radiate
nangarne	Deep ploughing
panchi	A ploughing operation that involves a quick turn of the soil using a heavy, five-blade metal plough. This is done primarily to break the big clods that persist even after nangarne, and to level up the field before shallow ploughing begins.
rabi	Winter crop, usually sown in October–November
thiree	A ploughing operation that involves a quick turn of the soil using a heavy, three-blade metal plough. This is done primarily to break the big clods that persist even after nangarne, and to level up the field before shallow ploughing begins.
tiphan	A seed drill used in sowing
tur	Red gram; *Cajanus cajan*
urad	Black gram; *Vigna mungo*
VJNT	Vimuktya Jati and Nomadic Tribe, as in Maharashtra; in India, they are generally termed as De-notified and Nomadic Tribes (DNT)
zari	Rows for sowing; furrows