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Neither Corporate, Nor Family: The Indian "Patronal" Farm

Claire Aubron[1,2*†], *Sébastien Bainville*[3†], *Olivier Philippon*[1] *and Bruno Dorin*[2,4]

[1] SELMET, Univ. Montpellier, CIRAD, INRAE, Institut Agro, Montpellier, France, [2] CSH, UMIFRE MAE-CNRS, New Delhi, India, [3] MOISA, Univ. Montpellier, CIHEAM-IAM, CIRAD, INRAE, Institut Agro, Montpellier, France, [4] CIRAD, UMR CIRED, Nogent sur Marne, France

After the disappearance of socialist State farms and cooperatives, the diversity of farms in the world seemed to have been reduced to a simple dichotomy: family farms on the one hand and corporate farming on the other. The former category, the dominant model on the planet, includes undertakings where labor is provided by the family, while corporate farming that was long limited to South America, is exclusively based on hired labor. This reading grid, however, turns out to be particularly problematic when looking at the Indian case. Despite their small size, a considerable number of Indian farms make use of a combination of family and hired labor. Based on an analysis of national statistics and fieldwork in 13 small regions, this article characterizes agricultural work and how family and hired labor function together on Indian farms. It shows that alongside family farms where wage labor (either hiring or being hired) serves to ensure full employment for family labor, there is another type of farm, which we define as "patronal farm", where hiring agricultural laborers increases the income earned by family labor. In our surveys, this is systematically the case for irrigated agriculture, where wages paid to laborers are lower than the agricultural labor productivity per workday. After describing the characteristics of this original model, the article discusses its coherence with India's political economy and questions its sustainability.

Keywords: agricultural labor, patronal farming, family farming, wage labor, India, comparative agriculture

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***Correspondence:**
Claire Aubron
claire.aubron@supagro.fr

[†] These authors have contributed equally to this work and share first authorship

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INTRODUCTION

Following the collapse of most of the socialist regimes that extolled State farms and production cooperatives, the diversity of agricultural holdings in the world seemed to have been reduced to a simple dichotomy: family farming on the one hand and corporate farming on the other (Purseigle, 2012).

There is a wide consensus on the definition of the latter category of farms. Though marginal in agriculture, corporate firms are indeed predominant in other sectors: investors tie up their capital to rent or buy land, buildings, equipment and inputs, and employ managers and workers to draw a profit from these investments (Bélières et al., 2014). As mentioned by Cochet (2018), "the labor force is remunerated with a salary, while the owner of the capital is remunerated with profit as a return on investment". In other words, in this type of farm the labor force is exclusively hired. This corporate form of agriculture remained limited to Latin America for a long time, but has recently spread to other continents, attracting media attention to what is sometimes described as "land grabbing" (Dell'Angelo et al., 2017; Schoneveld, 2017; Cochet, 2018).

Family farming, on the contrary, has been largely celebrated in recent years. The year 2014 was declared the international year of family farming and was marked by numerous seminars and academic articles dedicated to this type of farm. The multiple benefits of family farms are widely recognized (particularly in terms of employment and food security), and the United Nations General Assembly declared the period 2019–2028 "the decade of family farming". This wide academic and political consensus is paradoxical as, while we are capable of demonstrating the benefits of family farming, we have few tools to actually define it today (Lowder et al., 2021). There is a range of definitions and all of them are not unanimously accepted (Bélières et al., 2014). Garner and de la Campos (2014) have identified and compared 36 definitions taken from the academic, political or civil society worlds. Despite this great diversity of definitions and approaches, the authors agree that on family farms, family members are involved in both the working and management of the farm. Unfortunately, the degree of this involvement remains unclear and "family farming" encompasses a wide range of situations, from farms relying exclusively on family labor to farms combining family and hired labor. The limitations of such a vague definition appeared clearly in Latin America during the late 1990s when a variety of policy instruments targeted family farms (Sabourin et al., 2020). In Brazil or Mexico, for a farm to be considered a family farm, "most of the work" must be done by the family. In Argentina, a "family farm" can employ temporary workers but no permanent staff. In Uruguay, there can be no more than two permanent employees (Graeub et al., 2016). These criteria exclude numerous farms and fail to take into account the multiple possible combinations of family and hired labor.

Next to "group farming" that have emerged more specifically in France since the 1960s (Agarwal and Dorin, 2019), there is a third "farm model" cited in the international literature, although rarely considered and used, called "family business farming" in English (e.g., Gasson et al., 1988; Sourisseau, 2018) or "agriculture patronale" in French (e.g., Bélières et al., 2014). In this case, family members work on the farm but also employ laborers. Based on research carried out in the UK (Gasson et al., 1988), Australia (Pritchard et al., 2007; Weller et al., 2013), Indonesia (Barral, 2018), Brazil (de Souza et al., 2018) or Argentina (Chaxel et al., 2018), various authors have underlined the inadequacy of the categories "family farming" and "corporate farming" to refer to some of the farms they studied. To name this intermediate category, we prefer the term "patronal" because it draws attention to the relationships between farmers and wage laborers rather than the specificities of managing a family business (intra-family working relationships including gender and generational issues, investment planning and attitude to risk, interconnection with off-farm activities, intergenerational transfer of assets or evolution of the farm over the family's life cycle, etc.) as detailed, for instance, in Gasson et al. (1988), Weller et al. (2013), Chaxel et al. (2018) or Fitz-Koch et al. (2019).

Adding this third analytical category helps pose the problem, but does not resolve our central question: how do we now differentiate between family farming and patronal farming? In national agricultural censuses, the type of labor is rarely recorded, and even more rarely measured (Lowder et al., 2016). As a result, "patronal farms" are excluded from the analyses and "family farms" are generally counted as the smallest in size. The size of the farm can be measured on the basis of the cultivated area, as is the case in India where the agricultural census distinguishes five classes: "Marginal" below 1 ha; "Small" between 1 and 2 ha; "Semi-medium" between 2 and 4 ha; "Medium" between 4 and 10 ha; "Large" above 10 ha. It can also be measured using economic performance, as in the USA where farms are classified as small, mid-size or large-scale family farms according to their Gross Cash Farm Income (GCFI) (Hoppe, 2014). Sometimes the classification combines area and economic results like the "Reference Units" in France, which are defined as the size needed to ensure the economic viability of the holding (HLPE, 2013).

Such approaches, which makes "patronal farming" invisible, is far from satisfactory (Bélières et al., 2014). In France (Darpeix et al., 2014) as in most OECD countries (Findeis, 2002), as the size of farms increases, they shift from family farming to an entrepreneurial model that uses hired labor. Nonetheless the quantity and nature of the work invested in a farm does not depend solely on its size, but also on the production system implemented, which can be more or less labor intensive (Mazoyer and Roudart, 2006). Moreover, beyond these technical questions, the use of hired labor depends on its cost and profitability, on workers' availability and, more generally, on the context of labor market (Darpeix et al., 2014; Oya and Pontara, 2015) and the overall path of structural transformation of the economy (Dorin, 2017).

These semantic and statistical issues are crucial in India, not only because of the demographic scale of the country, which is home to 24% of the world's farms (Lowder et al., 2019), but also because, in 2015, 86% of farms in the country were smaller than 2 hectares (MINAG, 2018). As a result, on the maps provided by Graeub et al. (2016), the Indian territory seems to be covered with nothing but family farms. This conclusion may be somewhat hasty. As already underlined in the early 1980s, farmers relying solely on family labor constitute only a part of India's agricultural population (Bardhan, 1982). Moreover, the number of agricultural laborers has steadily increased since the 1950s, and today they are more numerous than those known as "cultivators" in India (Dorin and Aubron, 2016). The size of the salaried workforce in agriculture has not increased with the development of corporate farming, which remains the exception in India, despite being encouraged by national agricultural policy for the last few years (Singh, 2006).

As shown by Oya and Pontara (2015), wage labor in agriculture plays a critical role in developing countries in terms of both rural employment and poverty reduction, with agricultural wage workers often being among the poorest. Research on patronal farms and the place of wage labor within them is therefore crucial and yet lacking. Drawing on the Indian case, this article seeks to fill this research gap by characterizing patronal farms in technical and economic terms, in order to better understand what fundamentally distinguishes them from both family and corporate farming. To this end, based on available secondary statistical data and fieldwork, we carried out a detailed analysis of the work on Indian farms (number of days, annual calendar, contribution of family and hired labor, etc.) to assess

the daily productivity of this agricultural work as well as the value distribution between family farmers and wage laborers. We then discuss the contribution of such research to improving the understanding of farm models and the place of patronal farming–threatened in recent years–in India's political economy.

DATA AND METHODS

Secondary Data and Limitations

The secondary data we used in this study are from the national censuses (every 10 years for the population and every 5 years for agriculture), as well as major national surveys carried out occasionally on smaller samples: the NSS (National Sample Survey) and the IHDS (India Human Development Survey). But even in India where we find one of the best data collection systems on labor issues among developing countries, they have limitations especially when it comes to agricultural wage labor. In large household surveys, Oya and Pontara (2015) highlighted for example: (i) the problematic notion of 'main job-holding' and reference periods in contexts of multiple, irregular and highly seasonal occupations; (ii) the unclear distinction between wage employment and self-employment; (iii) under-reporting of stigmatized jobs (such as physical work for higher castes or women in many regions of India); (iv) inadequate translations into vernacular language of statistical categories and concepts. In addition, there is lack of technical data on the more or less labor-intensive nature of the diverse cropping and livestock farming systems and the distribution of agricultural work over the year. To overcome these limits, we therefore had to rely primarily on our own fieldwork.

Fieldwork Objectives

The main aim of our fieldwork was twofold: (1) to measure, at the farm level, the amount of work provided and its distribution between family members and wage laborers; (2) to understand why laborers are hired: is it a necessity or an opportunity?

To meet the first objective, the strategy was to reconstitute annual working calendars for the different crop and livestock activities in each farm surveyed, identifying the operations and tasks carried out as well as the workload associated with each of them (in hours or days, with a day representing 8 h of work) during each agricultural season. By comparing this calendar with the pool of family labor, it would then be possible to identify the periods when it was necessary to hire labor to cope with the workload.

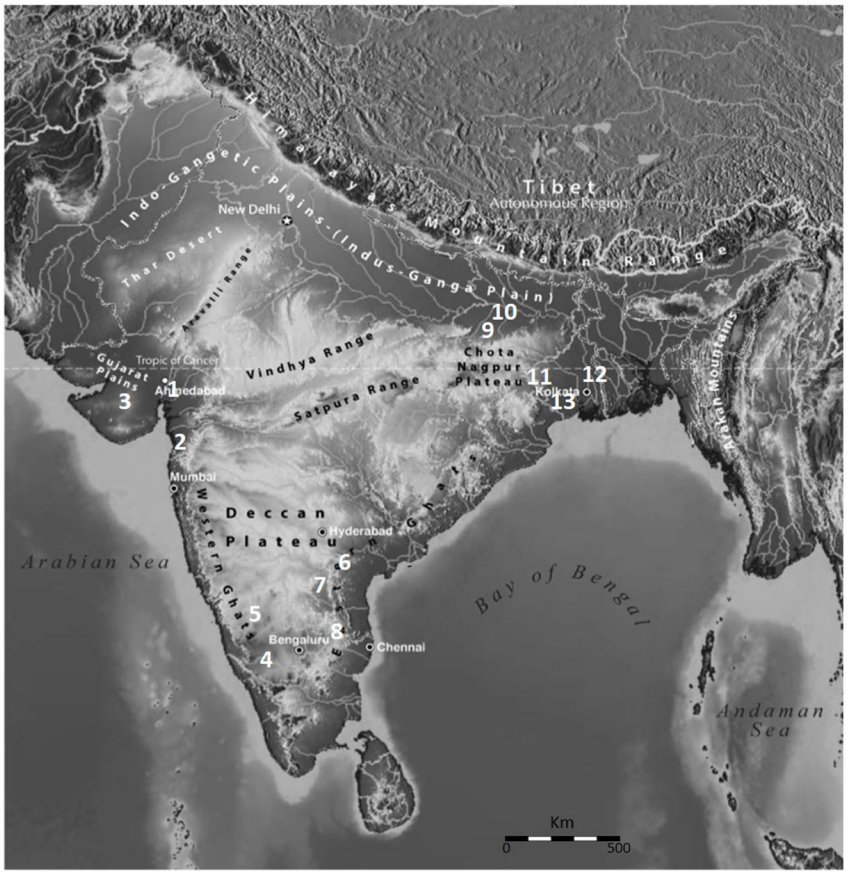
To meet the second objective, the strategy was to assess and work with three economic indicators. The first is daily (or hourly) labor productivity, equal to the agricultural value added divided by the number of days (or hours) of total work required to create it (Aubron et al., 2009), regardless of whether this work is provided by family members or wage laborers. If this labor productivity is higher than the local laborer's daily or hourly wage, we can then assume that a wage worker produces more economic value than he/she costs, hence hiring him/her is more of an opportunity than a necessity. The second indicator is the gross margin (value added minus salaries paid to the laborers) per day of family work. The third indicator is the agricultural income per family member obtained within the farm. When the family running the farm also works as hired labor on other farms, locally or by migrating, the income from wage work was included in the total income related to agriculture. Here, we could not add wages from non-farming activities (this is one of the limitations of our research) but it is worth noting that nonfarm diversification was not systematically observed in our study, with many of the poorest households working solely in agriculture.

Fieldwork Methodology

Surveys to meet the above objectives take time and without significant funding, can only be carried out on a limited number of farms, on a purposive sample. To do this, we carried out what is called an "agrarian diagnosis", using the conceptual framework of comparative agriculture (Cochet, 2012, 2015), in 13 small study regions in India (**Figure 1**). These 13 small regions were gradually selected in the framework of a research project dealing with the role of livestock farming in Indian agriculture (IndiaMilk project, 2014–2019) so as to cover a range of contrasting situations in terms of biophysical environment, land tenure, historical development of irrigated agriculture and dairy farming. Thanks to a characterization of the biophysical milieu and a reconstitution of the recent agrarian history based on interviews with older farmers (20 to 50 in each small region), the agrarian diagnoses allowed us to rapidly grasp the diversity of the cultivated land and to capture the historical circumstances that led to the way land is distributed amongst farmers in each area (Cochet and Devienne, 2006; Lacoste et al., 2018). This allowed us to establish a preliminary typology of farms in each small study region.

In a second series of interviews with a purposive sample comprising 30 to 60 active farmers in each of the small regions, we carried out in-depth studies of the production systems in place, the associated workload and economic results, in such a way that farm types identified during the first phase were covered and gradually refined. The interviews dealt with the structure and functioning of each type of farm at both the technical and socio-economic levels. The structure of the farm refers to the cultivated area, equipment and buildings, and the labor force. The functioning of the farm is defined by cropping practices (choice of crops and cultivars, crop rotation and associations, calendar of technical operations for each crop, associated working calendar and workload, yields, etc.), and livestock farming practices (choice of breeds, breeding, feeding and animal health management, use of outputs, associated working calendar and workload, yields, etc.). It also includes flows of matter and energy between crops and livestock, as well as the work organization at the farm level. The social relationships considered involve land (e.g., land rental or sharecropping), work (e.g., employment of daily laborers to carry out certain tasks), capital (e.g., loan to dig a borewell), agricultural inputs and products (e.g. milk delivery to a cooperative). Data on prices, agricultural laborers' wages and equipment lifetime were collected through the same interviews to calculate the economic indicators.

Archetypes of each production systems can then be modeled. Similar to Weberian ideal-types, they do not correspond to real



GUJARAT
1. **Petlad** *(Anand District) 2014*
2. **Dharampur** *(Valsad District) 2014*
3. **Gondal** *(Rajkot District)* 2016

KARNATAKA
4. **Gundlupet** *(Chamarajanagar District) 2016*
5. **Channagiri** *(Davangere District) 2019*

ANDHRA PRADESH
6. **Vinukonda** *(Guntur District) 2016*
7. **Banagana Palli** *(Kurnool District) 2017*
8. **Palamaner** *(Chittoor District) 2018*

BIHAR
9. **Bodhgaya** *(Gaya District) 2015*
10. **Ekangarsarai** *(Nalanda Dstrict) 2015*

WEST BENGAL
11. **Hirbandh** *(Bankura District) 2018*
12. **Bangaon** *(North 24 Parganas District) 2018*
13. **Debra** *(Medinipur District) 2019*

FIGURE 1 | Location and year of the field studies (Source: O. Philippon).

farms nor to the averages of the three to eight farms surveyed by farm type. They are constructed models (Aubron et al., 2016). Considering all the information gathered during each interview, the aim is to identify what structurally characterizes the type studied, differentiating it from what is provoked by a specific conjuncture (Perrot and Landais, 1993), such as the illness of one of the family members in the past year. Step by step we thus carried out an "informed reduction of the observed variation" (Lacoste et al., 2018). The data presented in this article (**Tables 1**, **2** and **Figures 6**, **7**) derives from this modeling process, and each farm mentioned corresponds to one of the archetypes we modeled.

These archetypes are contrasting cases showing the diversity of farms in each small region even when one of them is largely dominant. Their use in this article does not seek to statistically represent Indian farms but to capture, document and understand in depth main typical cases dealing with our research question even if some of these are statistically marginal. For example, our archetypes are not accurate representations of rainfed agriculture because "patronal agriculture" that we have tried to document and understand is mainly present in irrigated areas. Moreover, for lack of space, we were unable to present all the results obtained in the 13 small regions studied, but the reports for each of them are available on request from the authors.

RESULTS

Land Inequality With High Labor Intensity

In this preliminary section, based on the literature and our own investigations, we characterize the structure of the working population and the labor requirements in Indian agriculture, as well as the way they have evolved over time driven by the agrarian reforms and the agricultural Green and White Revolutions.

The size of farms clearly plays a role in structuring labor requirements. In India, with an average size of 1.08 ha in 2015, farms are extremely small in size (**Figure 2**). This is a well-known feature of Indian agriculture, which is reinforced over time as a result of inheritance and land division between generations. The other key characteristic of the Indian land structure, which is less often highlighted, is a result of the unequal distribution of land amongst agricultural workers. While the agrarian reforms introduced in the decades following India's independence undoubtedly allowed farmers and former tenants to formally own private property, and ended the taxation system that existed earlier, there was no large-scale distribution of land, and numerous families, mostly from lower castes, remained landless. Cultivated land is hence very unequally distributed among cultivators (**Figure 2**), alongside a large contingent of landless farming households accounting for about 40% of India's

TABLE 1 | Labor requirements and ratio between daily labor productivity and agricultural wage for the main cropping and livestock farming systems of three study areas.

			Labor requirements	Labor productivity/daily wage
Gundlupet	Rainfed cropping systems	Finger millet/horsegram	180	1,0
(Karnataka)		Sunflower/horsegram	112	1,3
		Sorghum/horsegram	137	1,3
		Maize/horsegram	143	1,4
		Marigold/horsegram	269	2,0
	Irrigated cropping systems	Associated turmeric	716	2,3
		Vegetables (3 cycles a year)	736	2,7
		Vegetables and bananas on a two-year cycle	308	4,0
		Ginger associated with chili	777	6,9
		Bananas	200	12,8
	Livestock farming systems	2 crossbred local cows with grazing	470	0,2
		1 HF or Jersey cow with irrigated forage	157	1,0
Petlad	Irrigated cropping systems	Tobacco	299	2,8
(Gujarat)		Tobacco/Millet	398	2,9
		Tobacco/Rice	437	3,1
		Wheat/Rice	225	3,5
		Mustard/Millet	176	3,7
		Chili	466	4,5
		Tobacco//Banana	417	5,0
	Livestock farming systems	1 buffalo with collected grass	153	0,7
		10 local cows with grazing	405	1,6
		3 Jersey cows & 1 buffalo with irrigated forage	220	3,4
		30 HF or Jersey cows with irrigated forage	1,036	5,6
Debra	Rainfed cropping systems	Aman rice	179	1,0
(West Bengal)	Irrigated cropping systems	Aman rice/boro rice	326	2,5
		Cabbage+cucumber+chili	845	2,6
		Mulberry	940	3,1
		Aman rice/marigold	875	11,0
	Livestock farming systems	1 goat with natural forage	138	0,1
		1 local cow with paddy straw	175	0,3
		3 Jersey cows with paddy straw	240	0,9

Source: C. Aubron, S. Bainville and O. Philippon based on agrarian diagnoses IndiaMilk project (Lucas, 2014; Tessier and Taghavi, 2019; Fischer et al., 2022).
Labor requirements are in workdays/ha/year for the cropping systems and in workdays/herd/year for the livestock farming systems. Labor productivity is the gross value added per workday in Rupees (Rs). The agricultural daily wage was 250 Rs in Gundlupet in 2016, 120 Rs in Petlad in 2014 and 250 Rs in Debra in 2019.

rural households (Rawal, 2008, based on NSS data). In the 2011 Census, for the first time, out of a total of 263 million farmers (including "marginal" workers), the number of agricultural laborers (144 million) surpassed the number of cultivators (119 million) (Dorin and Aubron, 2016: **Figure 3**).

The Green wheat and rice Revolution, boosted by proactive public policies since the mid-1960s (Dorin and Landy, 2009), had a profound effect on agricultural work. Irrigated areas have more than doubled since 1970, mainly thanks to groundwater lifted with diesel or electric pumps. This irrigation, combined with short-cycle seed varieties, made it possible to increase crop intensity (number of crop cycles per year on the same plot) from one to two or even three. The average was about 140% in 2017 India-wide (**Figure 4**). The multiplication of crop cycles combined with the increase in yields owing to subsidized inputs (especially chemical fertilizers and energy to

TABLE 2 | Use of paid work in the production systems in five study regions.

		Production	Area/family worker or landowner (ha)	Total workdays/ha	Share of hired labor (%)
					(Days hired /total workdays)
Bodgaya (Bihar)	Landless	1 cow	0	-	0
		pig farming	0	-	0
	Irrigated	rice/wheat/mustard −1 cow	0,075	1,860	0
		rice/wheat/mustard −1 cow	0,3	660	0
		rice/wheat/mustard −1 cow	0,3	943	11
		rice/wheat/mustard −1 cow	0,35	704	13
		rice/wheat/mustard-vegetables −2 cows	0,35	1,426	41
		rice/wheat/mustard- vegetables −1 cow	0,4	1,300	39
		rice/wheat/mustard- vegetables	0,6	666	18
		rice/wheat/mustard- vegetables −2 cows	0,6	593	31
		rice/wheat/mustard-lentil −1 cow	1	432	36
		rice/wheat/mustard −1 cow	1	528	44
Palamaner (Andhra Pradesh)	Landless	pastoral livestock	0	-	0
		1 cow	0	-	0
	Rainfed	groundnut −2 cows	0,4	543	18
		groundnut-mango −2 cows	0,4	659	9
	Irrigated	rice-sugarcane −2 cows	0,4	544	17
		rice-vegetables −2 cows	0,45	637	34
		silkworm −2 cows	0,45	793	24
		vegetables −2 cows	0,6	715	47
		rice-sugarcane −4 cows	0,7	339	28
		rice-silkworm −4 cows	0,8	625	28
		rice-silkworm-mango −4 cows	1,3	182	28
		mango	5,4	529	87
		poultry	0,4	2,520	100
Debra (West Bengal)	Rainfed	rice	0,1	201	36
	Irrigated	rice-vegetables-silkworm −1 cow	0,2	1,011	13
		rice −1 cow	0,2	776	22
		rice −2 cows	0,5	585	27
		rice-vegetables-silkworm −1 cow	0,5	808	28
		rice-flowers-vegetables −1 cow	0,5	1,029	24
		rice −3 cows	1,5	469	43
		rice-flowers-vegetables −3 cows	1,5	1,368	39
		rice-poultry −2 cows	2	388	46
Gondal (Gujarat)	Rainfed	melon	0,4	151	4
	Irrigated	coton/groundnut/wheat −3 cows	1	152	21
		coton/groundnut −30 cows	1,5	318	35
	Rainfed	beans/groundnut	2,7	198	84
	Irrigated	coton-fruits	2,7	287	65
		coton/groundnut/chili - 3 cows	3,2	223	67
		coton-jerbera	3,2	355	85
		melon/chili/coton −2 cows	3,2	168	65
		coton/groundnut −3 cows	6	129	75
		coton/groundnut/chili - 5 cows & buffaloes	6,4	204	78
		coton/groundnut	8	148	98
Gundlupet (Karnataka)	Landless	2 cows	0	-	0
	Rainfed	marigold/grains	0,4	300	17
		sunflower/grains −2 cows-11 sheep	0,4	800	6
		sunflower/grains −2 cows −2 bullocks	1	352	21
		marigold/grains −2 cows	1	408	27
	Irrigated	turmeric/vegetables −1 cow	0,3	1,933	31
		turmeric/banana/vegetables −1 cow	1,75	606	62
		coconut-ginger-banana	8	110	100

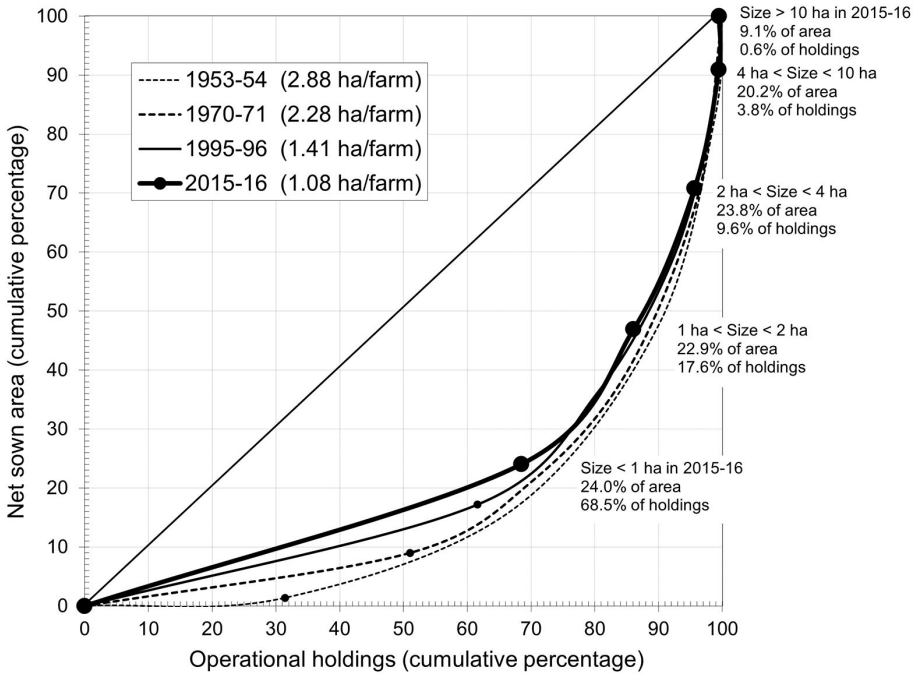


FIGURE 2 | Agricultural land distribution according to farm size (1953, 1970, 1990, 2015). Source: B. Dorin, based on Dorin and Landy (2009), Bhattacharjee (2020).

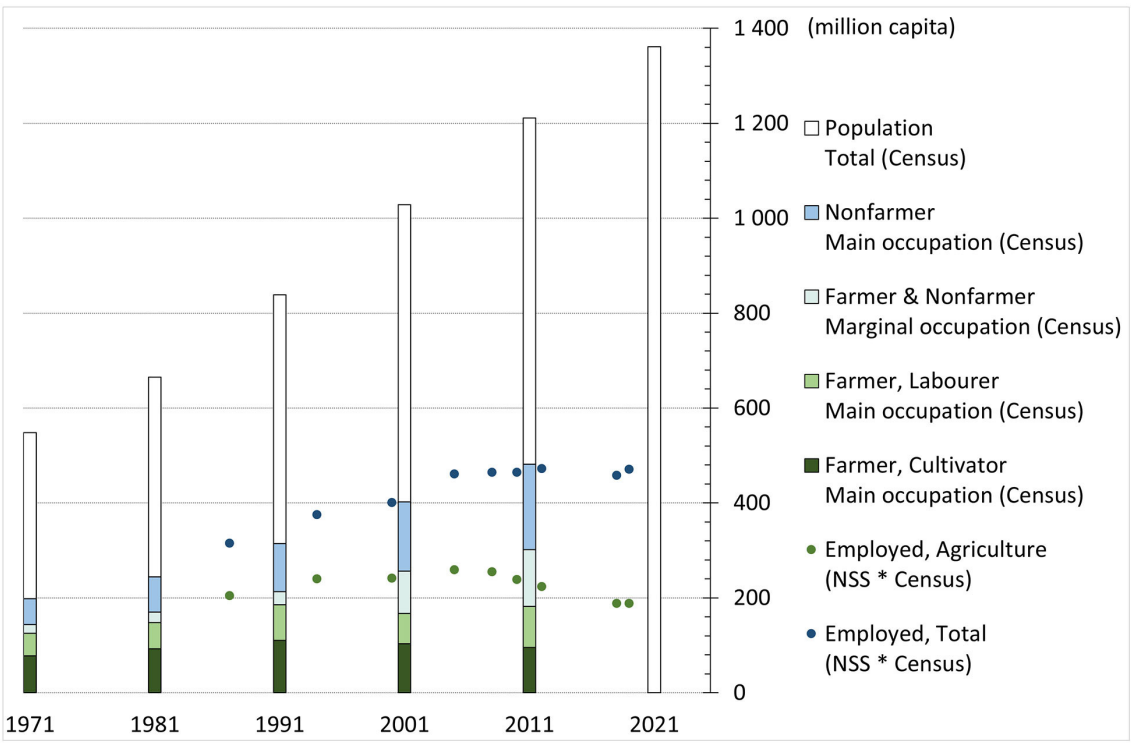


FIGURE 3 | Population and composition of the labor force: Census of India and NSS (1971–2019). Source: B. Dorin, estimated from data/reports published by the Censuses of India and the National Sample Surveys. Note: after 2011, total population based on Samir et al. (2018)'s projections.

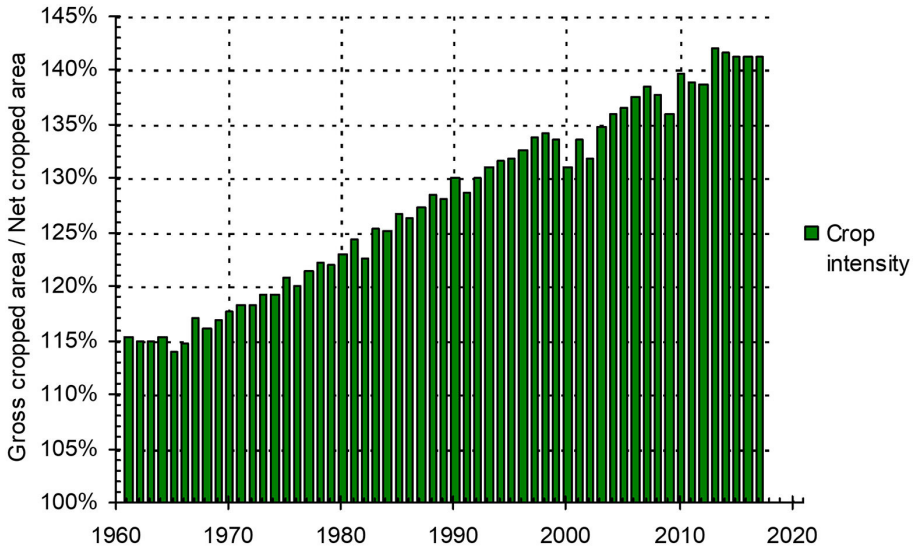


FIGURE 4 | Crop intensity (India, 1961–2017). Source: Dorin, 2020, mostly based on EPWRF (2020).

pump groundwater) has increased production and the time dedicated to harvest and post-harvest activities which remained little mechanized (see Konduru et al., 2013 for cotton). Indeed, since the 1990s, in irrigated zones the tractor has become a common sight on the largest farms—which rent its services to neighboring farms—(Gulati and Juneja, 2020), but its usage is often limited to soil preparation and transportation operations. Moreover, on certain irrigated farms, cereals, sugarcane or even cotton were replaced in the 2000s by market gardening. The association and rapid succession of several vegetables crops on a same plot make these new cropping systems even more labor intensive in terms of manual work. The Green Revolution thus represented a vast process of labor intensification, alongside the high intensification in inputs (lab-seeds, chemical fertilizers, pesticides…) and irrigation equipment. According to the data we collected in three regions (**Table 1**), the number of workdays required per hectare per year to cultivate irrigated crops is between 176 and 940, as compared to only 112 to 269 for rainfed crops.

The role of livestock and the work associated with it have also been greatly transformed over the last decades. In irrigated zones, livestock has to face the challenge of reduced spaces and grazing periods as a result of the development of irrigated crops and the replacement of its two historical roles (draught and manure) by equipment or inputs (Aubron et al., 2019). This situation has led certain irrigated farms to abandon livestock and to specialize in crop production. On the contrary, smaller farms, or farms that did not have access to water, maintained or even developed their livestock activity to take advantage of its traditional roles (draught and manure) as well as to produce milk, for which a market now exists, particularly via the dairy cooperatives created by the Indian White Revolution from the 1970s onwards (Dorin and Landy, 2009; Scholten, 2010). In some regions, this dairy farming even involves agricultural laborers with no access to cultivated land, who thus develop landless livestock farms. Estimates vary greatly, but between 40 and 90 million families were involved in dairy farming in India in the early 2010s (30% of Indian households according to Dorin et al., 2019), with an average herd of 3 cows or buffaloes, including 1 to 1.3 milk-producing animals (Government of India, 2012; Dorin et al., 2019). 70% of India's cows and female buffaloes are bred on farms with access to cultivated land of less than one hectare (NSSO, 2006). The work time for breeding activities depends on the availability of fodder resources. A larger amount of time is required when farms have limited access to land and water, i.e., to straws and cultivated fodder. This makes them largely dependent on natural vegetation, which involves time-consuming gathering and grazing activities, even for small herds (Aubron et al., 2019).

Family Work With Wide Use of Hired Labor

In the 13 study regions, the use of hired workers is noteworthy (see **Table 2** for five small regions). The vast majority of farms employ workers, most often day laborers from lower castes, to carry out a part, or even over half the agricultural work, alongside the family. Production systems where all the work is carried out by family labor are actually quite rare, and while a few cases correspond to farms that function solely on the basis of hired labor, with the family making no contribution in terms of work, such cases are even rarer in our sample.

The results obtained in all the study regions reveal the following trends:

(i) The use of hired labor (share of hired labor on the total workdays) increases with the size of the farm. Landless livestock farmers do not employ wage laborers, and farms smaller than a certain area (0.3 to 0.4 ha in the cases shown in

Table 2), mainly or even exclusively make use of family labor to carry out the agricultural work.

(ii) Irrigated farms are more dependent on hired labor than farms with less access to water. **Table 2** shows that the eight rainfed farms (cultivating mango and groundnut in Palamaner, rice in Debra, flood recession melon in Gondal and sunflower and marigold in Gundlupet) employ few wage laborers. Rainfed crops, grown by the tribal populations in the Dharampur mountains, in the south of Gujarat, only make use of family labor, although they cultivate half a hectare per worker.

(iii) Livestock is almost universally present on farms employing few wage laborers, and is sometimes absent on farms that make the most use of wage labor.

The households surveyed across the country by the IHDS in 2011–12 (IHDS, 2011), largely confirm these results. Among the 16,409 households shown in **Figure 5A**, we note that, with a few exceptions, the use of hired labor remains high, even on farms smaller than 1 ha. The general (unweighted) average is 30 days/year, or 32 days/ha (for 1.15 ha/household on average). However, on holdings smaller than 0.4 ha, this average falls to 7 days/year (37 days/ha for 0.19 ha/ household on average), while with 5 ha or more, it rises to 182 days/year (<21 days/ha for 9.27 ha/household on average). Hence the more the farm size increases, the more employees there are per farm. However, we also note that the intensity of wage labor per hectare decreases when the size of the farm increases (**Figure 5B**) which can be explained by less labor-intensive crop choices or a higher rate of mechanization in large farms.

The Specific Rationale of Patronal Agriculture

A Wide Range of Combinations of Family and Hired Labor

The regions studied reveal a wide range of situations regarding the use of wage labor. The different types of farms identified in Gundlupet in Karnataka (**Table 2**, last section) clearly show the gradient that runs from farms where family members hire out their labor for part of the year, to corporate farms where work is exclusively provided by hired workers.

In the case of landless families with two family workers that nonetheless have a dairy herd of 2 cows, the work with livestock is done exclusively by the family and represents 470 days per year (**Table 2**, last section, landless). The relatively homogenous distribution of work over the year allows one of the two family workers to engage in off-farm agricultural day labor for about 60 days a year. The family thus supplements its income from dairy farming (20,000 Rs per worker per year, 2016) to obtain a total income of 30,000 Rs per worker per year, a sum slightly higher than the poverty threshold, which was estimated at 25,000 Rs for a worker with a dependent child (Planning Commission Government of India, 2014).

When a few hectares of unirrigated land is available, changes of work organization are observed. A couple of farmers cultivating 2 hectares with cereals, sunflower, and raising 2 milk cows and a pair of bullocks has work throughout the year, but this work is seasonal (**Figure 6A**). During the monsoon, family labor is rapidly insufficient to carry out all the crop operations. Sowing and harvesting which cannot be delayed are not only periods of more intense work (with days longer than 8 h of work) but require the hiring of day laborers (**Figure 6A**). On the contrary, in the dry season, about 20 days of family work can be hired out on neighboring farms that cultivate irrigated crops. The salary earned here usefully supplements the low agricultural income from rainfed crops, allowing families to earn more than the poverty threshold, with a total income of 30,000 Rs per family worker per year. In such a case, the employment of day laborers during the monsoon (kharif) and the hiring out of family labor during the dry season (rabi) allow the family workforce to be fully employed during the year despite the irregularity of the crop calendar.

With irrigation, several crop cycles are possible, or crops with longer cycles. The period when it is necessary to employ wage laborers is hence longer. Another farm in Gondal (Gujarat) illustrates this situation (**Figure 6B**). Cotton cultivation, which has become widespread in this region thanks to irrigation, requires a large number of workers from July to January-February. And during the lean season, earnings from off-farm work are far less essential since income from irrigated crops is higher.

Nonetheless, in many cases, the use of hired labor goes beyond the needs to supplement family labor during peak seasons. In Vinukonda (Andhra Pradesh), a farm with two family workers on 2.4 hectares, producing a combination of partially irrigated tobacco, gram, castor oil plants, chili and cotton, and raising two draught animals, employs day laborers including when family labor can carry out the work (periods when the work requirement is <50 days per month for the two family workers, **Figure 6C**). The same can be observed for the farm in Ekangarsarai in Bihar (**Figure 6D**). In such a situation, the importance of wage labor goes beyond a mere supplement to family work and is not the result of calendar constraints.

Hiring to Secure Full Employment of Family Labor or to Generate Surpluses?

The economic assessment of crop and livestock systems, and a comparison of labor productivity and day laborers' wages, help to understand why farms employ hired labor (**Table 1**). In all the regions studied, the gross value added (GVA) created per day of total work (labor productivity) in irrigated cropping systems is far higher than the daily wage for agricultural labor. In the three study areas presented in **Table 1**, the GVA varies between 340 and 3,200 Rs per workday, and is 2.3 to 10 times higher than the local daily wage. When it comes to rainfed crops, labor productivity is similar to, or lower than, the daily labor wage. Livestock systems do not permit a level of labor productivity higher than a salary, except when the number of animals is >3–4 heads.

The difference in labor productivity between rainfed and irrigated crops, leads us to clearly distinguish two major rationales in the employment of agricultural laborers: the first is to supplement family labor during peak seasons, the second to generate a surplus from wage labor.

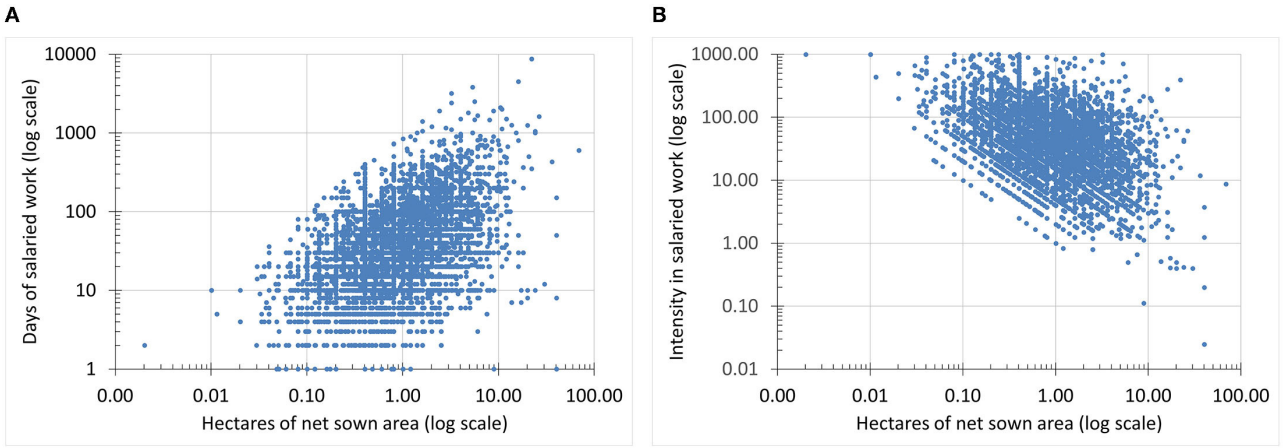


FIGURE 5 | Relationships between farm size and salaried work. **(A)** The more the size increases, the more employees there are per farm **(B)** but the more the size increases, the fewer employees there are per hectare Source: B. Dorin, based on IHDS-II and Dorin et al. (2019). Note: Of the 42,152 households surveyed by the India Human Development Survey II (IHDS survey 2011–12), 16,475 have a net sown area greater than zero, those shown in the graph after removing a few outliers (66 households).

Employing laborers to work on rainfed crops is not, so to say, "economically profitable". The labor productivity they generate is generally close to the laborers' daily wage. Employing workers is hence equivalent to paying them the value added they generate per family worker. This employment represents neither a gain nor a loss for employers but allows them to farm the total available land surface. Without this additional labor, a part of the land would not be cultivated and outside peak periods, family labor would be largely underemployed. In these circumstances, hiring contributes paradoxically to the full employment of the family workforce. In the Indian context, this is the type of farming we would specifically call "family farming".

This is not the case of irrigated farms or dairy farming with above 3–4 heads of cattle. In these cases, the labor productivity is far higher than the wage of a daily laborer. Independently of any calendar constraints, it is profitable to hire laborers as their wages remain lower than the value added generated (**Table 1**). With hired labor, the employer keeps an appreciable gross margin (value added minus the cost of salaries). On these farms, hiring laborers is a means of increasing family earnings to a level above its actual labor productivity. This can be measured by dividing the gross margin by the number of days of family work. This is particularly visible on vegetable farms in Bangaon in West Bengal. The labor productivity of these irrigated crops is higher than the daily wage (**Figure 7A**). For such labor intensive cropping systems, a major part of the labor required can be hired (**Figure 7B**). Hiring workers allows the family to actually increase its earnings (**Figure 7C**). We characterized these farms as "patronal faming".

Corporate farms (the final case presented in Gundlupet in **Table 2**, last section) differ from family and patronal farms. When investors invest their capital in farming, all the work is provided by employees. Wage labor is a cost that has to be as low as possible and the production systems implemented demand less labor per unit of land or per animal (**Table 3**). In Gundlupet for example, coconut groves covering 4 to 40 ha are planted with rotating crops alternating irrigated ginger and banana trees. Once they are established, banana and coconut trees require little care. Ginger cultivation is more labor intensive, but as it is sensitive to fungal diseases it requires long fallow periods and is only grown 1 year out of 10. The absentee owner entrusts the plantation to a part-time manager. The sowing, weeding and harvesting of ginger, banana and coconut are left to day laborers, hired by the manager or the buyer in the case of banana and coconut harvesting. The whole process requires far less work per hectare than the production systems followed on family or patronal farms. However, since corporate farms cover larger areas, they employ all in all more salaried workers than the other farms.

DISCUSSION

Wage Labor and Farming Models: Insights From a Technical and Economic Approach

The Indian countryside is hence filled with lessons on how agricultural wage labor can help both identify and explain farming models. Numerous Indian farms are clearly family farms. They correspond to families who invest their labor to earn an income, but wage labor is nonetheless present. This wage labor ensure that the family workforce is fully occupied and paid for its work during the year, either by hiring out its labor during fallow periods in the calendar when the means of production are lacking (land, animals, irrigation), or by hiring in laborers when family labor is insufficient during peak periods.

But there are also numerous patronal farms in India. As they have greater means available to them, particularly good access to irrigation, they can implement cropping systems that are more productive, despite being more labor intensive. They hire laborers

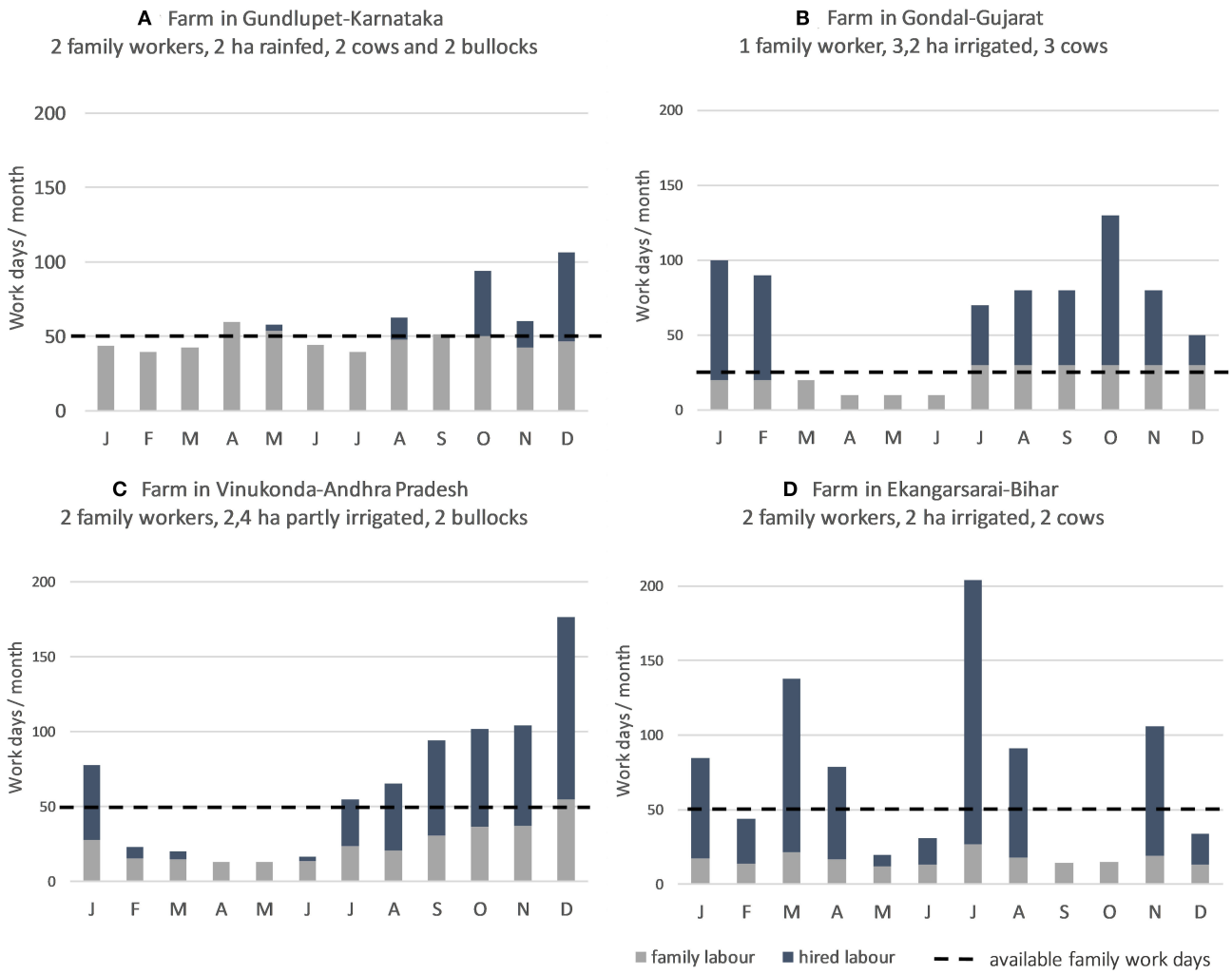


FIGURE 6 | Work calendar for four contrasting types of farm. Source: C. Aubron, S. Bainville and O. Philippon based on agrarian diagnoses IndiaMilk project (Rabassa and Lasina, 2015; Fischer, 2016; Furlan and Bonnard, 2016; Marblé, 2019).

not only to cope with work peaks, but also to generate more income for the family workers. While they are clearly different to family farms, these patronal farms have little in common with "corporate farms". In the latter case, the investors look for a profit from their capital, and not payment for work they do not provide.

We have thus shown that Indian agriculture cannot be reduced to a homogenous series of family farms. The latter differ in terms of surface area, but also greatly in the role they attribute to hired labor. These conclusions are in line with those of several authors (Bélières et al., 2014; Garner and de la Campos, 2014) who stress that farm size is not a sufficient criterion for differentiating family farms from other farming models and like us, they make labor and the use of hired labor central to the analysis. Our technical and economic approach to agricultural labor in India, however, goes further and make the logics at work in the different farming models more explicit.

By characterizing the structure and technical functioning of the farms and the resulting demand for labor over the course of the year, we better understood the place of wage labor in family farms. Hiring of laborers during peak periods, highlighted with our work calendars, is a common practice in family farms in other parts of the world (see for example Zhang, 2015 for China). The same is true of the sale of labor to other farms by family farmers lacking the resources (land especially) to meet their subsistence needs on their own farms, as described for example in Rwanda (Petit and Rizzo, 2015).

Our economic assessment (labor productivity to be compared with daily wages, family gross margin, agricultural income) then clarified the contours of the farming models. It leads to a definition of patronal farming—a farm model in which the use of wage labor makes it possible to increase the earnings of family workers—that clearly distinguishes patronal farming from both family and corporate farming. Family and corporate farms may

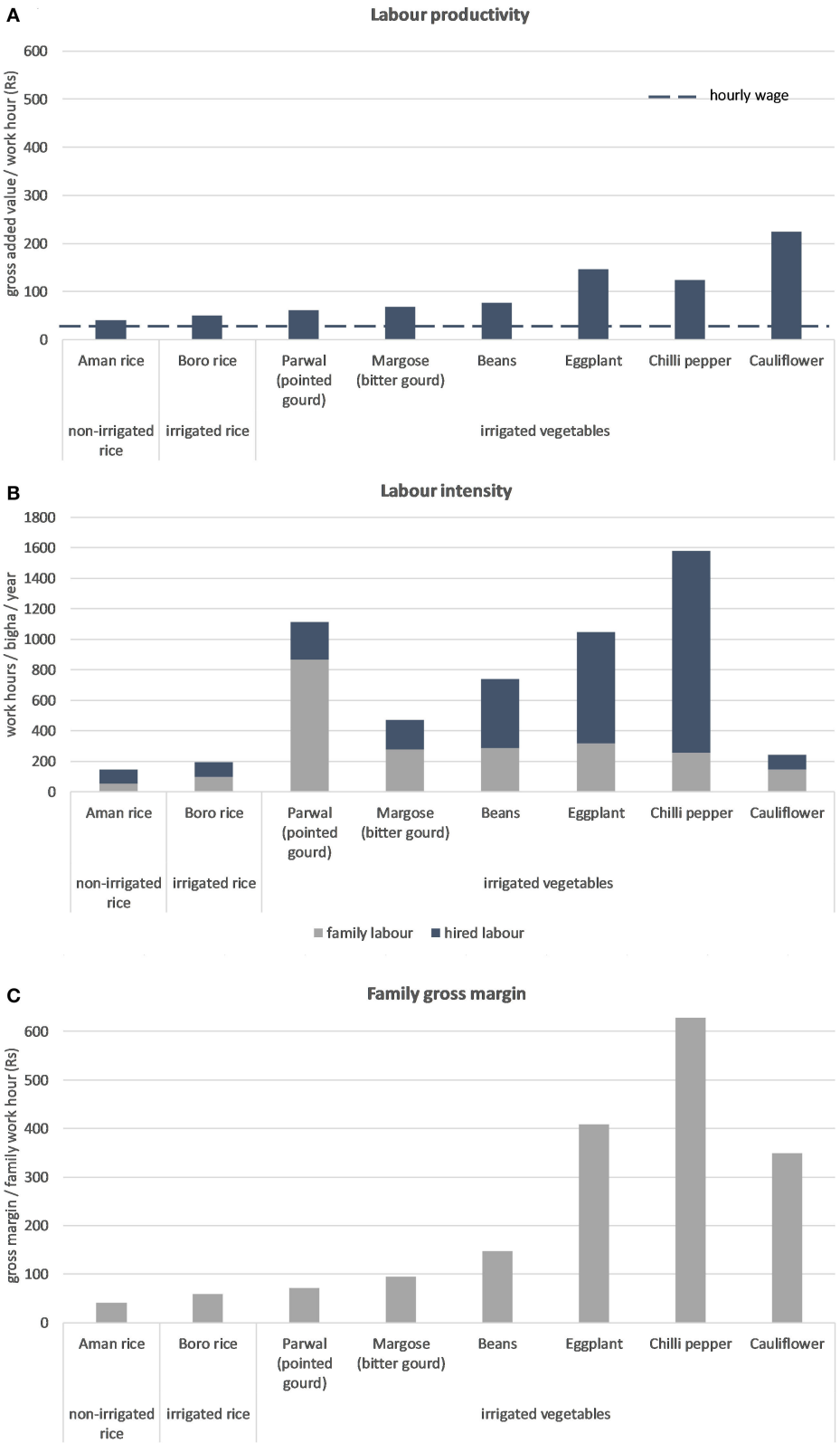


FIGURE 7 | Labor productivity **(A)**, work time **(B)** and gross margin per hour of family labor **(C)** for eight cropping systems in Bangaon, West Bengal (1 bigha = 0.1350 ha) Source: C. Aubron, S. Bainville and O. Philippon based on agrarian diagnoses IndiaMilk project (Josse, 2018).

TABLE 3 | Main features of family, patronal and corporate Indian farming models.

	Family Farm	Patronal Farm	Corporate Farm
Labor used	Family (and hired labor)	Family and hired labor	Only hired labor
Periods when laborers are employed	Work peaks when family labor is insufficient	When work has to be done	For all the work throughout the year
Reason for hiring labor	To cope with work peaks and ensure full family labor employment	To increase income of family work (margin/day of family labor)	To draw a profit from a capital investment
Daily labor productivity	Can be equivalent to, and sometimes even lower than the daily labor wage	Higher than the daily labor wage	As high as possible and always higher than the daily labor wage
Work distribution over the year	Most evenly distributed over the year	Distributed over the year	Concentrated in time so that it can be done mainly by day laborers to avoid hiring permanent staff
Types of operations carried out	Livestock farming with daily chores; diversity of crops and irrigated crops when possible to spread the workload over the year; labor on other farms during the lean periods	Irrigated crops (labor productivity higher than the daily wage); livestock farming sometimes associated with a few daily chores	Specialization in crops that tend to require little labor and with the highest labor productivity: irrigated crops (and more rarely large livestock farms with economies of scale in terms of daily chores)

or do employ wage workers, but with a different rationale from that of patronal farming. This is a step forward from the literature that often presents patronal farm as an intermediate category (Bélières et al., 2014; Marzin et al., 2015; Sourisseau, 2018). This article proposes to consider it as a separate category, with its own logic regarding the hiring of wage workers: neither to cope with work peaks, nor to draw a profit from their capital, but to increase the earnings of family workers.

The Political Economy of India's Patronal Farming

This Indian case-study also provides food for thought on the links between farming models on the one hand and the national development path and employment on the other. The structural importance of patronal farms in India may be a result of its caste system (where physical work is degrading for many upper castes, Bardhan, 1982), but also of the country's history. India experienced an incomplete agrarian reform, which left a large part of the rural workforce landless, and a Green Revolution, which beyond the intensive use of "modern agricultural inputs" was largely based on an intensification of the use of labor, partly provided by hired workers. The working conditions of laborers are clearly better than in the past, when various forms of bonded labor still prevailed (Prakash, 1990; Breman, 2007), but inequalities remain immense and laborers' incomes very low, with a tendency to deteriorate in recent decades (Jha, 2015).

While patronal farming has thus not allowed a large part of the rural Indian population to shift out of poverty, it does employ people and has made it possible to retain a large proportion of the labor force in the countryside. Maintaining or providing employment in agriculture (still 45% of the working population in India according to NSO, 2020), even if many of these jobs are poorly paid, is all the more valuable as, despite an average growth of 7% for 20 years, India's economy is marked by secondary and tertiary sectors that generate few jobs (Dorin, 2021). In such a context, the Indian Union developed a coherent agricultural policy through the Green Revolution, by stabilizing agricultural costs and prices for patronal producers, while subsidizing food through the Public Distribution System (PDS) for the poorest (Dorin et al., 2004). As the latter are often employed on patronal farms, the PDS has also made it possible to keep agricultural salaries low. The White Revolution reinforced this edifice, by giving smallholders, and even landless households, access to a market and thus to a supplementary income through milk (Aubron et al., 2019). This buffering capacity of the Indian agricultural model in terms of employment was highlighted during the COVID-19 crisis, when several millions of workers joined the agricultural sector in the third quarter of 2020 following the lockdown (Dang et al., 2021). Even if these jobs are low-paid—leading the observers to speak of disguised employment—the absorption of such a large flow of workers is notable and would be unthinkable in many other countries. India thus illustrates the capacity of public policies to structure and stabilize the farming models that exist in the country and to use them to orientate not only production but also employment (Bélières et al., 2014; Marzin et al., 2015).

The recent history of Indian agriculture nonetheless questions the sustainability of this patronal farming model. Rural salaries are a key issue today, and changes, however timid, seem to be taking place in agricultural production systems. The Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA), adopted in August 2005, follows on from numerous programmes that since 1970, have sought to create employment for the poor by developing rural infrastructure. But for the first time, this was a legally binding law: the State commits to providing at least 100 days of paid employment to every rural household engaged in unqualified manual labor. The candidates are entitled to unemployment benefits if the local administration does not provide them work within 15 days of their requesting it. This particularly restrictive context seems to have borne fruit, and may even have led to raising salaries (Das and Usami, 2017; Berg et al., 2018; Misra, 2019).

The progress of salaries is probably not unrelated to the more widespread use of motorized mechanization (Bhargava, 2013) which replaces manual work or draught power and thus reduces the workload. In the regions studied here, apart from irrigation equipment, mechanization has long remained marginal. Tractors nonetheless appeared in the countryside in the 1990s, and mechanized cereal harvesting is increasingly common in certain States such as Punjab. Less pronounced, but more problematic, is the growing use of chemical herbicides. The Indian consumption level had remained exceptionally low until present (unlike chemical pesticides). Manual weeding was done by laborers, for whom it was a precious source of fodder. However, over recent years there has been a clear increase in the use of herbicides (Gupta et al., 2017). Soil preparation that is increasingly mechanized is not a very time-consuming activity, but this is not true of weeding and harvesting, which mobilize numerous workers who could gradually be replaced by equipment and synthetic inputs.

In parallel, in several Indian states, land regulations have recently been modified to facilitate the introduction of large corporate holdings and numerous authors question the effects of such measures on rural employment (e.g., Singh, 2006; Swain et al., 2012). More recently, three Farm Bills challenged the public procurement of cereals system and price guarantees for producers in the concerned regions. The latter, often owners of patronal farms where motorized mechanization is underway, in fact strongly contested these bills during protests in Delhi and elsewhere (Jodhka, 2021; Kumar, 2021). These protests lasted more than a year until the laws were repealed in December 2021. The question which then arises is whether the Indian patronal farming model, which provides employment, but is not capable of reducing poverty, is compatible with further liberalization of the Indian economy. If this is not the case and these transformations continue, the type of farming practiced in the Indian subcontinent could change, along with its economic development model.

CONCLUSION

India is not the only region in the world where wage labor in agriculture is an important issue. Wage labor is increasing in the agriculture of industrialized countries (e.g., Agreste, 2021 for France) and a growing casualization of rural work is observed in developing countries by several authors (du Toit and Ally, 2003; Oya and Pontara, 2015). The latter show that a fringe–often the poorest–of the rural population in these countries works as wage laborers at least part of the year and that a significant proportion of this casual wage labor takes place in the agricultural sector. The challenges associated with this development of wage labor in agriculture in terms of rural employment and poverty reduction are major. This article shows, however, that the hiring of wage workers falls under different rationales depending on whether the farms are family, patronal or corporate farms. Investigating the rise of wage labor in agriculture and addressing the associated challenges thus require: (i) the development of knowledge on the functioning of the different farming models and their relationship to wage labor, as we have done in this article by proposing a characterization of patronal farming in technical and economic terms; (ii) the study of the political economy of these models and their coexistence, addressed in the discussion of this article for the case of India, in order to identify the levers of public and collective action in this area (Bélières et al., 2014). To this end, the combination of disciplines and approaches, including those based on fieldwork, appears to be necessary (Oya and Pontara, 2015). Field research with detailed technical and socio-economic studies of agricultural labor, such as those used in this article, are particularly valuable to identify and characterize the existing and emerging farming models in a region. Such field research, however, is time-consuming and can only be carried out in a purposive sample of regions. In this respect, considering rainfed agriculture regions, or conversely bastions of the Green Revolution in the Indo-Gangetic plain, would be useful for a further analysis of Indian patronal farming. These questions also call for a far more extensive consideration of labor in national statistics. Oya and Pontara (2015) identify several areas for improving the quality of statistical data collected on rural wage labor in developing countries. In the Indian case, the research presented in this article suggests that quantifying the number of work days provided by family members and laborers on farms, as well as the agricultural labor productivity and wages for different crop and livestock activities, would be very useful. These parameters are indeed as important as the size of farms, if not more so, to characterize the Indian farming models.

DATA AVAILABILITY STATEMENT

Ongoing process of database building, fieldwork reports available by request. Requests to access the datasets should be directed to claire.aubron@supagro.fr.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

Conceptualization and writing—original draft preparation: CA and SB. Fieldwork methodology and investigation: CA, SB, and OP. Statistical data analysis methodology and investigation: BD. Writing—review and editing: CA, SB, OP, and BD. Visualization and funding acquisition: CA, SB, and BD. Supervision and project administration: CA.

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