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AGRICULTURAL DIVERSIFICATION IN RURAL NORTH-WEST INDIA
Understanding transitions and their socio-ecological implications*

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ABSTRACT. Transformation through agricultural diversification, in particular crop diversification, is considered to be one of the factors indicating whether agricultural development and economic growth in a region have happened or not (Rahaman 2021). Most such studies on India focus on macro-level analyses of the agrarian transition overlooking the impact of farm-level decision-making practices and processes of social change on diverse farming communities (Bharucha, Mitjans and Pretty 2020). This paper investigates farmers' perspectives and experiences of moving towards alternative approaches to agriculture and the changing character of farming in Haryana villages. During eleven months of fieldwork (2020–2021), I collected data using in-depth interviews and group discussions in villages of Sonipat district. My research revealed that transitions in agriculture occur in three ways: (1) crop diversification, specifically by moving from wheat and rice to other crops like baby-corn, sweetcorn, bell peppers, mushrooms, and seasonal fruits and vegetables; (2) diversification through changes in land use from agriculture to agro-based industry; and (3) the adoption of horticulture through natural farming practices. However, these transitions have different implications for small and marginal farmers. Moreover, the nature of women's participation changes with changes in agricultural practices: women farmers are mostly recognized as labourers in industrial agriculture producing high-value crops, while they are acknowledged as active contributors in sustainable farming practices. This is likely to have an impact on their social position within the household and community. Studying these transitions by

* In line with the University of Edinburgh's ethical requirements, the proposal was submitted for ethical approval through the School of Social and Political Science (SPS) research ethics process (via https://ethics.sps.ed.ac.uk/ethics_form/form). Also, in light of the outbreak of Covid-19, participants were approached following the University of Edinburgh's and home country's guidelines. Online and other interviews were recorded on audio-recording devices with due consent by the participants and for their comfort. The village names have been coded for reasons of confidentiality. I followed the University guidelines on online data protection as mentioned here: https://www.ed.ac.uk/data-protection/data-protection-policy. Online interviews were conducted by either Skype or WhatsApp. All interviews were transcribed from Hindi to English. Wherever required, I took photos and collected other documentary evidence for analysis with the due consent of the participants. This work was supported by the Sustainable Asian Nitrogen Hub (SANH) and the School of Social and Political Studies at the University of Edinburgh.

recognizing different pathways and social outcomes to the transition is important in developing an alternative framework for understanding sustainable transitions that acknowledge the importance of place-based differences and knowledge of farming practices at a given time. This framework may be suitable in the current socio-economic context in India.

> I grow mustard in a polyhouse with natural farming methods but have suffered from low production and a lack of knowledge to handle pest attacks. I then added some chemical pesticides. But I still believe my farming method is revolutionary and challenges the conventional practices, as I not only moved to different crops but also tried to adopt sustainable farming practices.[1]

The above statement by one of my respondents during my field visits to Haryana villages shows how one individual farmer understands 'transition' and how he responds to current farming practices and searches for alternative methods of agriculture. Arvind questioned the common understandings and practices of agriculture and decided to change his current farming methods by adopting different crops and farming practices. He claimed that such 'experiments in transitions' could benefit farmers by adopting diverse practices in agriculture and switching from previous farming practices of wheat and rice cultivation to more sustainable production.

In this paper, I study farmers' perspectives on how and why some farmers in the 'breadbasket of India' are giving up on cereal production, especially wheat and rice cultivation, and changing or 'transitioning' to alternative forms of agriculture. By focusing on the different new farming methods that are emerging in the villages, I argue that farmers' perspectives and the specific attributes they see in farms and farming practices are important for understanding the complexity of agricultural transitions in the given socio-economic context. Moreover, I maintain that the social outcomes of such transitions must be considered through farmers' understandings of the changes at the farm and household level and across diverse caste, class and gender groups.

The paper is divided into four sections. First, it introduces the research context of the paper, arguing specifically that agricultural transitions should be studied in India and identifying the research gaps in existing studies. Second, it discusses the research methods used in conducting this study.

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1 Interview with Arvind, a male farmer changing to natural farming, village M, 23 June 2021.

Third, it describes the research findings with reference to the two types of agricultural transition – crop diversification and natural farming methods – as well as discussing their socio-ecological implications. This is followed by a fourth section, the conclusion.

1. Introduction: why study agricultural transitions in India?

In India, a transition to alternative approaches to agriculture is being mooted in response to the growing socio-economic and environmental concerns arising from the Green Revolution's technologies and policies.[2] For instance, in rural north-west India, the intensification of agriculture has raised severe environmental concerns, such as increased soil erosion, land and groundwater contamination, growing pest resistance and reduced biodiversity.[3] Socio-economic impacts are also evident through rising social inequalities due to farmer's' disproportionate access to technologies, lack of economic resources, the stagnation of productivity and income, rural out-migration and the 'feminization of agriculture'.[4] The negative impacts of intensive agriculture have led to a call for alternative farming models for food production.

However, it is worth noting that not all approaches to industrial agriculture were sustainable in their time. For instance, practical responses may include innovations in organic and sustainable farming, the revival of indigenous practices, experiments with information and communication technologies, genetically modified techniques, alternative cropping technologies and crop diversification. In India, transitions in agriculture haven taken various forms, such as organized development initiatives, organic or natural farming methods, farm collectives (e.g., seed-saving and seed-sharing), use of local or organic inputs, science-based farming, or the recent wave of 'neoliberal agro-entrepreneurship'.[5] Lately, states have led initiatives to follow a particular form of agricultural model, such as the 'organic village' or 'climate-smart village', which are being promoted currently through organic farming policies or regulations in Sikkim, Himachal Pradesh, Punjab and Haryana (Bharu-

2 During the mid-1960s, the approaches of the Green Revolution were underpinned by the use of modern technology, including high-yielding variety seeds, chemical fertilisers and pesticides, tractors, mechanized irrigation facilities, improved farm implements, land reforms and the supply of agricultural credit (Pingali 2012).

3 Gill (1992), Randhawa (1992), Singh (2000), Basu and Scholten (2012)

4 Basu and Scholten (2012), Agarwal (2014), Jodhka (2014), Ohlan (2016)

5 Hegde and Basu (2016), Khadse and Rosset (2019), Bharucha, Mitjans and Pretty (2020)

cha, Mitjans and Pretty 2020). Nevertheless, the merits of these techniques and practices in offering sustainable alternatives have different implications for the deeply stratified society of rural India. The social context in which alternatives are developed significantly influences outcomes regarding how widely they are accepted and which groups benefit from them (Brown 2016, 2018). Therefore, two additional factors may be considered while studying such transitions:

First, although some of these practices have proved beneficial to farmers whose socio-ecological situations are best suited to them, attempts to generalize from a few successes have usually failed to generate wider support. For instance, some farmers in the southern Indian states have not found Zero Budget Natural Farming schemes[6] to be beneficial due to the increased labour costs, harder work, lower economic gains in the initial years and other state and institutional dependencies.[7] Similarly, some farmers in north India found access to material and discursive resources, low crop yields, small landholdings, the scarcity of biomass, a lack of awareness and financial support, and market and infrastructural problems to be major constraints in adopting natural or organic farming practices.[8] Also, the costs and benefits associated with the change in agricultural practices are, for the most part, distributed unequally among the various actors. Inequalities based on gender, class and the agrarian social structure are often reinforced due to disproportionate access to land, natural resources and technologies (Agarwal 2014, Edelman *et al.* 2014). Thus, questions about deciding which specific practice is suitable and sustainable, based on local farming conditions, must consider both the social and ecological aspects, such as how readily accessible such methods are to local farmers, how impactful they are on food production, ecological conditions and human well-being, and what socio-economic impacts these choices generate. Insufficient attention has been paid to how sustainable transitions in agricultural practices impinge on social outcomes such as existing or resurfacing social inequalities, gendered power structures and rural migration in India.

Second, studies of sustainable approaches to agriculture in India draw on macro-level analyses of agrarian transitions that either began as grass-

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6 Zero Budget Natural Farming is a grassroots agrarian movement in Andhra Pradesh that has now spread to other south Indian states. It is a low-cost, locally sourced natural farming method that does not rely on the use of agrochemicals and has the potential to meet the twin goals of global food security and conservation of the environment.

7 Khadse and Rosset (2019), Veluguri *et al.* (2021), Duddigan *et al.* (2022)

8 Brown (2015, 2018), Wani, Jakkula and Singh (2017), Azam and Shaheen (2019)

roots social movements and evolved into a major policy initiative,[9] or were primarily sponsored by the state and other agricultural institutions[10] and, in a few cases of sustainable farming, were initiatives led by rural farming communities across the country.[11] While many of these existing studies focus on a particular kind of transition, specifically a transition from industrial farming practice to organic agriculture or agro-ecology, in this article, I show that responses to the transition in agriculture may be multidimensional. For instance, farmers may have moved away from an industrial form of farming practice without necessarily adopting natural or organic farming practices. Some farmers were still using chemicals or switched to polyhouse farming and yet claimed to be 'sustainable' farmers. These farmers did not adopt the same paths to the transition as they had diverse understandings of sustainable agriculture. That said, a key set of questions for further research centres on the need to consider different levels of engagement and types of adoption practices across different farms and between different groups of farmers (Bharucha, Mitjans and Pretty 2020). Consequently, norms and values that steer farmers' perspectives must be carefully examined to describe transition pathways (i.e., different farming practices), including their socio-political dimensions.

Thus, the overarching aims of this paper are two-fold: first, to study farmers' perspectives on why some farmers are adopting alternative agriculture and giving up on conventional farming production, especially wheat and rice cultivation; and second, to examine the social implications of these transitions at the household and community levels. For this purpose, I use qualitative approaches that engage with the farmers involved in diverse forms of the agricultural transition in Haryana villages.

2. *Research methods and location of the field study*

The fieldwork on which this study is based was conducted in Haryana for eleven months between September 2020 and July 2021 (Fig. 1). However, I did not work or stay in the field throughout this time, as the study was interrupted by Covid-19 restrictions and farmers' protests on the Delhi-Haryana

9 Khadse *et al.* (2017), Khadse and Rosset (2019), Duddigan *et al.* (2022)

10 Suma and Großmann (2017), Wani, Jakkula and Singh (2017), Azam and Shaheen (2019), Chebrolu and Dutta (2021)

11 Ohlan (2016), Yadav, Yadav and Rajender (2018), Baskaur, Tyagi and Kumari (2021)

border (2020–2021). This also had a significant impact on the course of my fieldwork. For instance, for the first half of my fieldwork period, I decided to visit the villages closer to Delhi and could not visit the remoter villages until January 2021, when Covid-19 restrictions had been eased somewhat. I tried to overcome these challenges by switching to telephone interviews, though there were some difficulties conducting interviews over the phone, such as lack of initial rapport-building with the participants, the disadvantage of not knowing nonverbal cues or body language to understand participants' perceptions and experiences, and the non-availability of smart phones and proper internet access to some farmers. While these challenges severely hampered my research methods, I tried to make additional efforts to connect with my respondents, be more self-reflexive and make adjustments according to the circumstances.

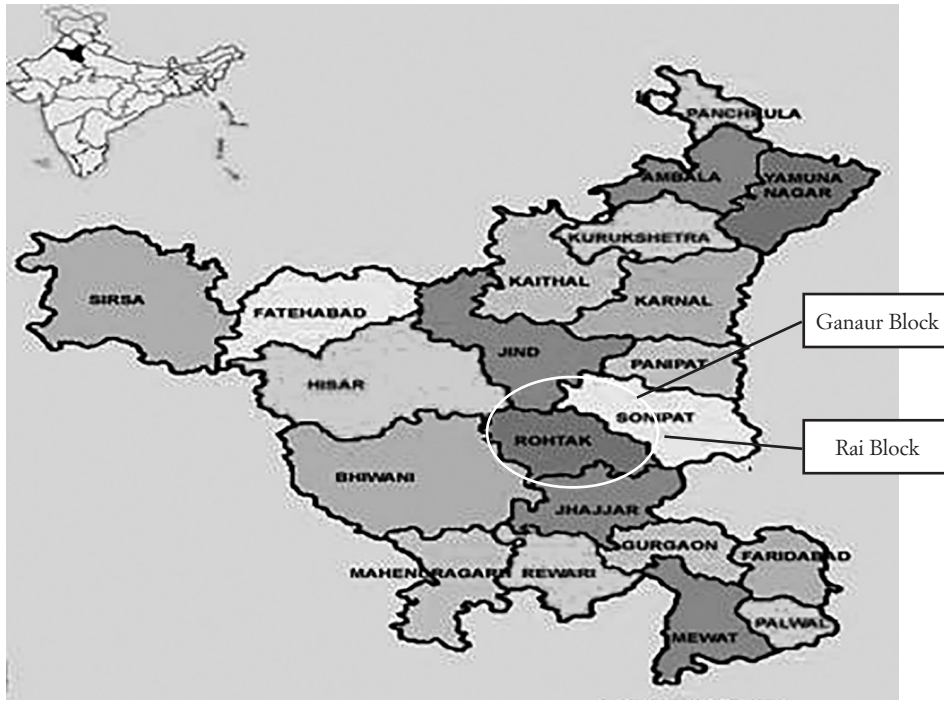

Figure 1: Location of field study (Sonipat district, Haryana) (www.veethi.com)

To conduct this research, I used qualitative methods such as semi-structured and in-depth interviews, small-group discussions and participant observation, as well as comparative case studies to substantiate my research. Qualitative methods are useful when they are used to discover how the respondent

sees the world, social reality, and everyday life. Schutz observes, 'the observation field of the social scientists – social reality – has a specific meaning and relevance structure for the beings living, acting, and thinking within it' (1962:51). In this approach, the main task is 'to capture this process of interpretation' (Bogdan and Taylor 1975:13). While these approaches helped me to conduct most interviews smoothly, my positionality as an insider-outsider was never static and needed self-reflexivity throughout the fieldwork. As an insider, not only was I born and raised in Delhi, but I am also fluent in the Haryanvi language and acquainted with local Haryana culture. As a woman, I felt I could empathize with and understand the experiences of the local women in Haryana villages. However, after a few weeks into my fieldwork, I realised that my linguistic ability did not necessarily translate into cultural fluency. Although I tried to assimilate myself into the culture by wearing similar kinds of clothes, keeping a simple hairstyle and using a Haryanvi tone in my accent, my participants could sense the 'privileged position' I had in terms of my economic circumstances (due to my frequent travels in a taxi, which I took as a Covid-19 safety measure to avoid public transportation), my education, my caste (belonging to the dominant 'Jat' community) and my independent way of life. This easily projected me as an 'outsider', an 'urban middle-class' dweller and 'foreign' educated (referring to my ongoing education in the UK). The lack of cultural fluency also obstructed me while I was trying to understand sustainable farming practices and used the words 'traditional' ('paramparagat') and 'organic' ('jaivik') to refer to 'sustainability'. Some of my respondents corrected me and told me to use 'sanadharniye' or 'tikaoo' as better terms for 'sustainability'.

I was also aware that my positionality as an urban educated woman may compromise my rapport with informants, given the nature of my fieldwork. Rural Haryana is a male-dominated society where caste values are key and where interviewing women in general and lower caste women in particular is a challenging task. Keeping this in mind, I planned to conduct the discussions in different groups of lower- and upper-caste females. I interviewed Dalit (formerly Untouchable or Harijan; see note 13) women mainly at their work locations, such as factories or in the fields, and in groups, so that they could talk and discuss matters among themselves and feel more comfortable with me. To build a good rapport, I used to help them with their work and offered tea and snacks before initiating the discussion on my research topics.

In this article, I discuss a sample of forty male farmers across the two blocks of Rai and Ganaur and three focus-group discussions (comprising

four to six members) with women who work on their family farms and as agricultural labourers on other farms. To tap the diversity of farmers' responses, I chose purposive sampling in which respondents were chosen strategically to include farmers of both genders and across class (based on land-size holding) and caste groups (discussed below). All interviews were conducted having obtained oral informed consent. However, sometimes some personal interviews were interrupted by other family members or other bystanders. It was difficult to get informed consent from all these people every time, but it was managed as and when possible. A practice of strict confidentiality was followed, and the guarantees of confidentiality and anonymity were given to research participants and honoured until the end of the research process. Most interviews lasted approximately two to three hours, depending on the context.

The choice of the community as a category of village-level development seemed to work much better than any other grouping during my fieldwork.[12] My respondents often articulated their different experiences of the sections of their village that were interested in development over the past forty years through the prism of communities, particularly class and caste communities. Furthermore, they classified the village population in terms of these communities and recognized the socio-economic experiences of different agricultural transitions among the rural population and diverse communities. Under the 'class' category, land ownership and non-ownership were important factors in determining the structure of opportunities and socio-economic well-being of households in rural India. Therefore, during my fieldwork, I worked with a category of social class that was loosely defined by land ownership. According to the Ministry of Agriculture and Farmers Welfare (a survey body of the Government of India), land ownership is categorized under five classes: marginal, small, semi-medium, medium, and large. As in my research, farmers talked about their amounts of land in terms of hectares and acres, I use both units to describe the size of their farms. For ease and convenience, I categorized my sample into three land-size classifications: (1) small-scale and marginal farmers between zero and two hectares (or zero to 4.94 acres); (2) medium-scale farmers with two to ten hectares (or 4.94 to

12 While mainstream economics has moved from simple calculations of income and productivity to the complex realities of 'human development', sociologists and other social scientists in India have rediscovered the notion and meaning of 'communities' (Jodhka 2001) and have started to give much more importance to other forms of subjectivities, including the way people constructed their own notions of 'well-being'.

24.7 acres); and (3) large-scale farmers with above ten hectares (or above 24.7 acres).

However, the category of social class cannot be studied in India without an analysis of caste.[13] As in most other parts of the country, agricultural land in rural north-west India was owned mainly by a few caste groups during the post-independence period. After the adoption of Green Revolution technologies during the 1960s, it was the 'big' and 'rich' landowners from some upper classes and castes who suddenly emerged as the new regional elite that stemmed from previous 'upper-caste' communities (Jodhka 2014). Unlike most other parts of India, the Punjab-Haryana region is also dominated by a single caste, the Jats (commonly pronounced as 'Jutts' in Punjab and 'Jaats' in Haryana). Even though the two states have several other caste communities also owning agricultural land, none has the numbers and economic power to compete with the Jats at the regional level.

In my research, I classify farmers into three caste categories: (1) Dominant Castes (DC) such as the Jats, Ahirs, Gujjars, Sainis, Aroras and Bishnois;[14] (2) Other Backward Classes (OBC) such as Aherias, Naiks, Thoris, Barras, Bagis, Changars, Dhobis, Daiyas, Khohlis, Gaurias and Kurmis;[15]

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13 In South Asia, the caste system has dominated social organization for at least three and a half millennia, since the earliest Indo-European invasion. A caste, generally designated by the term 'jati' ('birth'), refers to a strictly regulated social community into which one is born. Some *jatis* have occupational names, but the connection between caste and occupational specialization is limited. In general, a person is expected to marry someone within the same *jati*, follow a particular set of rules for proper behaviour in such matters as kinship, occupation and diet, and interact with other *jati*s according to the group's position in the social hierarchy. Among Hindus, *jati*s are usually assigned to one of four large caste clusters, called *varna*s, each of which has a traditional social function: Brahmans (priests), at the top of the social hierarchy, and in descending rank order, Kshatriyas (warriors), Vaishyas (originally peasants but later merchants) and Shudras (artisans and labourers). A fifth group, the Panchamas (from Sanskrit 'panch', meaning 'five'), were theoretically excluded from the system because their occupations and ways of life typically brought them in contact with impurities. They were formerly called 'untouchables' (because their touch, believed by the upper castes to transmit pollution, was avoided), but the nationalist leader Mohandas (Mahatma) Gandhi referred to them as Harijan ('Children of God'), a name that for a time gained popular usage. More recently, members of this class have adopted the term 'Dalit' ('Oppressed') to describe themselves. Officially, such groups are referred to as Scheduled Castes.

14 A caste may be said to be 'dominant' when it preponderates numerically over the other castes and when it also wields preponderant economic and political power. A large and powerful caste group can be more easily dominant if its position in the local caste hierarchy is not too low (Prasad 2021).

15 'Other Backward Classes (OBC)' is a collective term used by the Government of India to classify educationally or socially backward castes (Gehlot 1998). It is one of several

and (3) Dalits (or Scheduled Castes).[16] Overall, understanding rural communities and their social profiles was essential to studying who adopts what farming practices and how far different factors such as social position, age, size of land-holding and caste identities play a role in farmers' motivations to undertake the transition.

3. Research findings

In my research, I found that transitions in agriculture were happening through agricultural diversification in three ways:

1.) crop diversification through polyhouse farming, specifically by moving from wheat and rice cultivation to other vegetables like baby-corn, sweet-corn, bell peppers, mushrooms, and seasonal fruits and vegetables
2.) diversification through changes in land use from agriculture to agro-based industries
3.) adoption of horticulture through natural farming methods.

official classifications of the population of India, along with General Castes, Scheduled Castes (SC) and Scheduled Tribes (ST). They are castes in the Indian social system that are situated above the Dalits but below the so-called 'forward' or upper castes (e.g. Brahmins, Kshatriyas and Vaishyas) and the intermediate castes (mostly peasant proprietors and even dominant castes) (Yadav 2002). The OBCs occupied a subaltern position until they were identified as a separate category and were given reservations in government jobs and educational institutions in 1992, a move that had implications not only for their socio-economic profile but also their political outlook (Jaffrelot 2000). Although the OBCs are strongly represented in the country's development politics, in my research I primarily use the term to denote the diversity among the farmers and their farming practices. In my research, most small and marginal farmers belonged to this category; hence, this category helped me to situate the social position of these farmers under various class and caste categories.

16 'Dalit' is a term used to refer to any member of a wide range of social groups that were historically marginalized in Hindu caste society. The official designation Scheduled Caste is the most common term now used in India for people in these groups. Scheduled Castes include a number of groups that were excluded from the structured social hierarchy imposed by the adherents of caste ideology. In the twentieth century some members of these groups embraced a common Dalit self-identity that reflected their shared history and experience of exclusion from caste society. Bhimrao Ramji Ambedkar was a leading figure in this movement for Dalit consciousness and empowerment.

Figure 2 shows the distribution of farmers according to their agricultural and farming practices.

	Crop diversification	*Land-use change to agro-based industries*	*Horticulture and natural farming*	*Previous cereal production of wheat and rice*
Sample (40)	9 (5 polyhouse owners and 4 small farmers)	1 (also a polyhouse owner)	20	10
Mode of farming	Reduced chemical	Reduced chemical	Natural	Chemical
Location	Rai	Rai	Ganaur	Rai
Factors of motivation	Health and environment; economic benefits	Economic benefits; health and environment	Growing and eating safer non-chemical food; maintaining ecological health of land, soil and water	Lack of economic incentives; social network; transitioning risks such as low productivity, time taking, lack of information and knowledge

Figure 2: Types of farmers

3.1. Crop diversification through polyhouse farming

A polyhouse is a type of protected structure in which plants are grown under controlled conditions. These structures range in size from small sheds to industrial-sized buildings. They are extremely useful when, at particular periods of the year, plants cannot be grown in open country or in areas where the climatic conditions are too harsh to guarantee a good-quality crop (Gusman, Marucci and Salvatori 2008). In India, polyhouse farming was recommended by the National Horticultural Mission in 2005 and promoted by the Ministry of Agriculture and Farmers' Welfare. In Haryana, with the support of the state government and the Ministry, the mission encouraged a move towards alternative farming methods which led many farmers to switch from the traditional farming of wheat and rice to other fruits and vegetables, such as strawberries, papayas, baby-corn, tomatoes, spinach, onions, coriander, chillies, cauliflower, radishes, capsicum, bitter gourd and cabbages (Business Standard 2013).

Figures 3–4: Polyhouse in Village M, Rai Block. Crops grown: bell peppers, sweet-corn, green capsicum, bottle guard and tomatoes

In my research in Rai Block, five polyhouse owners talked about crop diversification and polyhouse farming as an 'alternative' model emerging in agriculture (Figs. 3–4). These farmers told me that, before diversifying their crops, they used to grow wheat and paddy using conventional methods. They said that by the 2000s the farming of these crops had become stagnant and unprofitable, adding to the risks of increasing diseases that forced many farmers to leave agriculture and move to the non-agricultural sector, turning to government jobs or small businesses. Some of them, however, decided to remain in agriculture and looked for better alternatives to improve their farm incomes. Interviews with these farmers raise several interesting issues such as how and why the shift to polyhouses was desirable, which crops were popularly cultivated through this method, and what do these farmers mean by 'alternative methods' of farming.

Two farmers talked about the role of extension workers and public institutions in providing support and knowledge about crop diversification. Dinesh (46, male, DC, large-scale, village M) said, 'I learned about polyhouse farming – its structure, functions and crops grown – through extension workers appointed by the agriculture department of Haryana' (5 February 2021). Arun (45, male, DC, large-scale, village M) said, 'the government provided subsidies and knowledge support to those farmers who were willing to adopt new farming techniques' (12 January 2021). Two other farmers told me that they attended workshops and seminars (conducted by the governmental agencies) to learn how to grow baby-corn and mushrooms and were sometimes supported in fulfilling informational gaps by the extension workers during their transition period. These agencies also supplied seeds, fertilisers and other inputs as incentives to motivate farmers to change to alternative farming methods.

While talking about the multiple benefits of doing polyhouse farming, Arvind (40, male, DC, large-scale, village M) informed me that, using a polyhouse structure, he was able to grow certain crops like cucumbers, cabbages, bottle gourds and capsicum throughout the year and would not have to wait for their cropping season. Dinesh talked about the reduced risks of pests and insect attack, the safety of crops from extreme climatic conditions and the better quality of the produce as other benefits. Similarly, Arun told me how polyhouse farming was advantageous in providing the right environmental conditions for different crops to grow at a perfect temperature. He also told me that using polyhouse farming, he was able to increase his production of vegetables like bell peppers, bottle gourds and tomatoes without much use of chemical fertilisers. Two other farmers (Kanwal Singh Chauhan and his son Rahul) talked about how, after switching to different crops like baby-corn and mushrooms, they used less fertiliser and fewer pesticides and were able to save a considerable income that had previously been spent on chemical inputs. This helped them to gradually reduce the chemical inputs and aim for ecological sustainability. They now also owned food-processing units and sold packaged baby-corn to urban and high-end supermarkets.[17]

[17] Kanwal Singh Chauhan (40, male, DC, large-scale, village A2) has been awarded a prize as one of the most progressive farmers in the village. In most villages around Sonipat district, he is known as a 'revolutionary' farmer or 'the father of baby-corn' and has encouraged many other farmers to start the cultivation of sweetcorn, baby-corn and mushrooms (ETV Bharat 2020). He started a baby-corn processing unit in 2009 and fixed a minimum guaranteed price for the crop. Gradually, these industries were set up for eight different kinds of products including baby-corn, sweetcorn, pineapples, fruit

Although these farmers talked about crop diversification as an 'alternative' model, they did not mention conventional farming methods as a factor limiting sustainability:

> I believe that a progressive farmer is one who experiments with his farming practices and improves his lifestyle accordingly. Even if a farmer is doing something different and not following other farmers blindly, he is doing his part in 'sustainability' (Dinesh, 5 February 2021).

> I am using fertilisers in a controlled way but am unable to stop using them completely. Moving to different crops is one way, but I wanted to change my farming practices by reducing chemical inputs. Polyhouse farming gave me an option to do both, as I was able to diversify my crops and reduce fertiliser input by sixty percent (Arun, 21 January 2021).

In the interviews, these farmers defined 'alternative agriculture' through crop diversification methods and practices. Although they believed that changing farming practices from conventional to natural may be more 'sustainable', they claimed that in the current situation in agriculture, moving away from growing wheat and paddy to high-value crops and vegetables is itself a better alternative. According to them, shifting from traditional crops to vegetables could be useful in improving income-generating opportunities and productivity and might lead to more sustainable practices. Furthermore, polyhouse farming proved a better alternative method for these farmers to adopt crop diversification and look for methods to take up sustainable farming methods (chemical-free) in future.

However, it is important to realize that most of these changes (or alternative cropping practices) require some prerequisite in the form of existing social networks, economic resources and the ownership of land in which to invest and transition to alternative methods of farming. As it appears, all these farmers belonged to upper-caste and upper-class households and already had the financial resources and networks to adopt alternate practices. Also, not all large-scale farmers thought in similar ways. I met three large-scale farmers who did not want to move to alternative forms of agriculture. Moreover, I did not meet any farmer from a lower caste or small farm-holder

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cocktail, button mushrooms and mushroom slices. Presently, a single unit exports 1.5 tonnes of baby-corn and other vegetables to countries like the UK and US and provides employment for around 400 people, mostly women. In 2019, Kanwal Singh Chauhan was awarded Padma Shree, the second highest civilian award in the country.

who was able to adopt sustainable practices along with crop diversification. Only a few small-scale farmers switched to diversifying their cropping practices (for example, growing baby-corn and sweetcorn), and they were dependent on large-scale farmers for the sale of their products and had limited power to negotiate over the price of the product. Finally, Dalits and migrant labourers were already at a disadvantage due to their lower socio-economic positions, which limited the option of adopting alternative forms of agriculture for them.

3.2. Natural farming methods

I interviewed twenty farmers in Ganaur Block who transitioned to natural farming practices and worked independently on their farms. Their reasons for adopting horticultural crops through natural farming methods were due to the growing health and environmental risks associated with chemical farming practices. They mentioned 'growing illness (such as diabetes, lung and skin cancer and reproductive issues) in the family or in the village' and 'eating chemically grown food' as some of their major health concerns. The changes to the land, soil and water and the growing air pollution were identified as common ecological concerns in their narratives. These farmers claimed that once they had switched to sustainable farming, they could see improvements on their land and recognize changes in 'soil fertility', the 'taste of the water' and the 'natural surroundings', which kept them motivated to follow similar practices. Other studies in Haryana have reported increasing environmental degradation through the decline in soil fertility, changes in the water table, rising salinity, the resistance of pests to many pesticides, and the overuse of nitrous fertilisers.[18]

In my visits to five natural farming fields in these villages, I saw farmers adopt multi-cropping farming methods on small landholdings (around one to three acres) and using naturally produced fertilisers (Fig. 5). These farmers usually used two big containers to prepare organic soil, as well as waste decomposers. The organic compost was made from all naturally available input in the villages, such as cow dung, cow-urine, buttermilk, jaggery, weeds from other crops and ten different leaves. They prepared this mixture in forty days, sprayed it on the fields when the risks of pest attacks were at their highest, and also used it to improve soil fertility. According to my interviews with these farmers, this method proved useful in growing fifteen different

[18] Nand (1998), Basu and Scholten (2012), Aggrawal *et al.* (2000), Singh (2000)

vegetables in a year, on the ground as well as eucalyptus sticks, with the additional possibility to grow seasonal fruits. They also grew turmeric and ginger at ground level, which helped rejuvenate the soil and protect the crop from pest attacks. Meanwhile, they used vegetable-leaf waste and worms to feed the animals, thus saving on animal feed costs.

Figure 5: Multi-crop model of a natural farmer at village N (Ganaur Block)

Fifteen other farmers in different villages of Ganaur followed similar practices of natural farming on medium-scale farms. Of them, three farmers farmed fruit and vegetables naturally by preparing soil through vermicompost.[19] Two farmers had installed vermicompost and biogas plants in their homes, which helped them prepare organic soil in their backyard, and biogas was used at home for cooking and other purposes. One of them, a seventy-year-old farmer, not only grew food grains and vegetables, but also herbs and medicinal plants all together on seven acres of land. His farm included crops like wheat, bottle gourds, capsicum, spinach, beetroot, onions, tomatoes and herbs and medicines such as Aloe Vera, Amla (Phyllanthus emblica) and Ashwagandha (Withania somnifera). He talked extensively about the importance of worms (Hindi *kheechua*) in natural farming as an excellent source of organic fertiliser with nitrogen-fixating abilities:

19 Vermicompost is the product of a decomposition process using various species of worms, usually red wigglers, white worms and other earthworms, to create a mixture of decomposing vegetable or food waste, bedding materials and vermicast. Vermicompost contains water-soluble nutrients which may be extracted as vermiwash and is an excellent, nutrient-rich organic fertiliser and soil conditioner.

> These *kheechua* are like the best friends of natural farmers. Charles Darwin was the first scientist who noted the activity of this animal and called it an important source for the betterment of soil fertility. Second was Aristotle, who called it 'the intestine of the earth' (83, male, DC, medium-scale, village N, 6 April 2021).

Similar knowledge was shared by two other farmers, who mentioned worms and bacteria within the soil as the real workers in natural farming and followed integrated pest management. Overall, these farmers demonstrated strong ecological thinking and pursued agro-ecological practices by minimizing the unnecessary costs for artificial and external inputs while maximizing the use of naturally available resources and inputs and revitalizing nutrient-cycling on the farm. They showed that their knowledge of sustainable practices and their use of local resources marks a key component in the transition to alternative forms of agriculture. Although these farmers shared their knowledge and practices with one another, most of them worked independently and managed their farms and marketing channels separately.

The terms 'natural' ('praakritik') and 'organic' were used interchangeably by these farmers, yet most of them were able to define what they meant by 'sustainability' or 'sustainable agriculture' by differentiating between natural and organic farming methods and chemically or non-chemically grown food:

> I am doing natural and not organic farming, as the latter requires a lot of input that must be added from outside and follows a certain pattern of farming. However, in natural farming, all inputs are produced locally and reused on the farm. I also try to make my farming sustainable by recycling the waste products from the farm and home into waste decomposers and using water-harvesting methods. This is how sustainable farming should be understood (45, male, DC, medium-scale, Ganaur, 29 November 2020).

> Natural farming (*praakritik kheti*) is important for a healthy body and sustainable living. For sustainable farming, one needs to stop using chemicals completely and try to improve land and soil conditions by using local, natural inputs (37, male, DC, medium-scale, Ganaur, 3 April 2021).

> I believe sustainable agriculture is eating healthy food and keeping our land fertile, but above all it is the choice of a healthy lifestyle (42, male, DC, medium-scale, Ganaur, 3 February 2021).

These farmers defined sustainable agriculture as a method of following natural farming practices and emphasised producing chemical-free food, using

naturally occurring resources and making their own natural soil with organic matter. For them, the meaning of sustainability included ecological farming practices, as well as having positive implications for human health. A few mentioned the effects of eating naturally produced food on the human body, mind and overall lifestyle, variously stating that 'sustainable farming is not only about using natural inputs but also developing healthy eating habits and lifestyle' (37, male, OBC, village J, 3 April 2021); 'the quality of life is defined by the quality of the food we eat, and that is what sustainable farming should lead to' (31, male, OBC, village Nr, 6 April 2021); and 'non-vegetarian food develops negative thoughts in your brain, but eating and producing organic food will give satisfaction to your body and mind' (70, male, OBC, village J, 23 June 2021). These statements reflect the fact that these farmers understood sustainability as not just an ecological practice but a lifestyle that brings about a substantial change in human health and well-being.

3.3. The socio-ecological implications of such transitions: research findings and discussion

Several benefits of agricultural diversification are reported in the literature. In the short term these are shifting consumption patterns, improving food security (Vyas 1996), increasing incomes (Chand 1996), increasing employment opportunities (Jha 1996), alleviating poverty (Vyas 1996), improving the productivity of scarce resources (e.g. water) (Ryan and Spencer 2001), promoting exports, and improving environmentally sustainable farming systems through conservation and the enhancement of natural resources (Delgado and Siamwalla 1999). These short-term benefits have implications for the prospects of long-term growth in agriculture, regional equality, gender reforms and sustainable farming systems (Joshi *et al.* 2004). In my study, I focus on three major outcomes: (1) implications for human health and the environment; (2) economic incentives and their implications across caste and class; and (3) gender implications across different types of transition.

Some studies in South-east and South Asia have reported health and environmental awareness as two significant reasons for the adoption of organic agriculture. For example, Karki, Schleenbecker and Hamm (2011) identified environmental awareness factors like 'reduction of soil erosion' and better 'soil fertility' as well as health awareness factors including 'healthy products for the consumers' and 'maximum utilization of farm internal resources' as important motivations for farmers to convert tea plantations to organic in

Nepal. In India, Riar *et al.* (2017) studied the factors for the adoption of organic cotton-based farming systems in the Nimar valley of Madhya Pradesh and reported health and environmental concerns such as perceptions of climate change, long-term sustainability and an interest in growing safer food as 'social motivational factors' for adopting organic farming. However, these studies were based on the survey method and quantitative analyses, often resulting in a limited understanding of decision-making processes as to how and why farmers make the transition and the implications of their doing so for health and the environment.

In my research, all farmers talked about health and environmental awareness as significant factors that motivated them to transition to sustainable farming practices. Studying these perspectives across class, gender and age groups reflects the importance of health and environmental awareness as crucial factors in the everyday lives of these farmers. However, a deeper analysis of their interviews reflects that the transition to alternative agriculture practices was not just related to eating and producing non-chemical food. Indeed, there was a gradual realization of their duty as farmers to provide 'healthy food' and keep village agriculture environmentally friendly and sustainable.

When asked about the type of farmer they consider themselves to be, many interviewees declared that they were 'sustainable' or in a few cases 'organic' farmers. As mentioned earlier, these farmers used the terms 'organic' and 'natural farming' interchangeably. However, they identified their individual farming activities as having long-term health benefits and understood them as a 'healthy alternative for their mind and body'. For instance, Rajeev (40, male, OBC, medium-scale, village R) switched to sustainable farming after learning about the benefits of eating and producing non-chemical-based food: 'I realized the importance of a farmer as food giver (*anna-daata*), but I was selling poison (*zeher*) to the people to make money and, in turn, also degrading my fields' (26 January 2021).

Rajeev's reference to chemically produced food as 'zeher' highlights his perception of chemical-based farming as unethical and dishonourable to the image of a farmer who was known to produce and sell 'healthy and good-quality' food. Thus, his conversion to non-chemical farming method appears to have been an act to go back to the moral duty of a farmer who was supposed to provide 'healthy food' to his family and the public.

Some farmers who had experienced both city and village life described their farming as a 'holistic occupation and lifestyle' that gave them a sense of fulfilment which could not be achieved in the stress of urban life:

> I was able to cure my stomach infection after eating organic food grown on my farm. I like the peaceful, stress-free atmosphere of the villages and would never go back to my city-life. In the cities we talk about the work-life balance. But while farming I do not feel stressed at all. This is now my occupation and my source of peace. My family says I was born to live around trees and farms (Ujjawal, male, DC, large-scale, village A1, 29 October 2020).

Similarly, another farmer mentioned the improvements to his health once he started living around his natural farm in the village. He said, 'I feel mentally and physically active and peaceful from inside since I began living around natural plants on my farm. I even like the smell of cow-dung now' (Sanjay, male, DC, large-scale, village A, 6 April 2021). These farmers also told me that they were able to spend more time working outside on their farms in the villages, as they found the air and natural surroundings less polluted compared to their previous stays in cities like Delhi and Gurugram, where they mostly stayed indoors and worked from home due to the increasing pollution and presence of contagious diseases.

Furthermore, the contribution to ecological sustainability, along with improvements to their health, were an important part of their identification as 'natural' farmers. Six farmers who had transitioned more than five years ago identified more visible changes on their land and ecology than farmers who had recently transitioned. These farmers told me that they could observe massive differences to their farmland compared to those practising industrial agriculture. Rana (42, male, DC, small-scale, village K) said, 'With natural farming, I am able to eat healthy food and keep the environment cleaner. This is my biggest achievement' (3 April 2021). Ranjit (83, male, DC, medium-scale, village N) claimed, 'My land is so natural and pure now. It is almost like anything produced here is gold' (6 April 2021). Two other farmers (Sunil and Amar) talked about changes to their land and soil colour as the significant ecological outcomes of the transition to non-chemical farming practices. Amar claimed: 'Our land has become rich and black; we get our vermicompost naturally. Our fields have much potential to bring improvement to the land, unlike chemical farms' (52, male, DC, medium-scale, village K, 5 April 2021). According to these farmers, improvements in the soil colour and fertility, the greater availability of underground water and the

presence of naturally growing earthworms were among the visible changes to their farming land after adopting non-chemical farming. They claimed that they could easily distinguish their farms from chemically treated farmland. This also generated a feeling of achievement among these farmers, who projected themselves as superior to those who could not adopt non-chemical farming methods.

These positive implications for human health and the environment appeared to be a common perception among some of the natural farmers in my sample. Other farmers, who had diversified into alternative crops but still depended on chemical farming, told me that the transition had had a positive impact on their health and ecological surroundings, though they also mentioned a greater impact on their income and increasing employment opportunities in the villages.

Studies show that farmers producing high-value crops and vegetables often earn higher net farm incomes than farmers who are engaged in the production of cereal crops alone.[20] In India, Birthal *et al.* (2013) suggested that diversification towards other crops and vegetables could result in higher net incomes for farmers, consequently having a positive impact on poverty reduction and improving the socio-economic status of rural farming communities.

In my research, I found being a 'diversified' farmer was crucial to many interviewees. For them, diversity had multiple meanings: some distinguished their farming techniques from those practicing just chemical farming, while others emphasized their ability to employ diverse farming approaches and to produce diverse products to address customers' diverse needs (cf. Lyson and Guptill 2004). Moreover, these farmers expressed a sense of pride in their ability to diversify and earn better incomes. For instance, five polyhouse farmers told me that they were able to increase their household incomes through crop diversification. Dinesh said, 'After three years of my investment in polyhouse farming, my cost of production is £300 to £400 annually, and I make around £1 000 from one acre of land in a year. No farmer in my village was able to earn so much just by crop diversification' (5 February 2021).

Similarly, Arun said that there was a substantial increase in his income once he started growing vegetables in a polyhouse. He told me that there was a huge difference in the profits he made from growing different crops in polyhouses than he used to make from growing wheat and rice. Three other

[20] Douxchamps *et al.* (2015), Kumar and Gupta (2015), Makate *et al.* (2016), Li *et al.* (2021)

farmers (Arvind, Rahul and Kanwal) informed me that, after switching to horticulture, they found a massive increase in their incomes, as there were fewer competitors in the market. Arvind said, 'If you sell any vegetable which is not commonly produced in the vicinity, then you have fewer competitors in the market and also get a better price without much negotiation' (8 February 2021). Two farmers (Rahul and Kanwal Singh) told me that their investment in baby-corn was nothing less than a 'revolution' in the village in terms of the increase in their household's income. Rahul (41, male, DC, large-scale, village M) said, 'When we started baby-corn, there were no sellers except us, so we made a huge profit compared to other wheat- and rice-growers. Other farmers wanted to visit our farms and learn about our farming practices' (9 February 2021). These farmers talked about how their practice of crop diversification was appreciated by everyone in their neighbourhood, and the growing economic incentives provided a sense of accomplishment, as they were considered successful farmers when compared to other chemical farmers who were still involved in wheat and rice cultivation.

As mentioned earlier, agricultural diversification through polyhouse farming and processing industries had a significant impact in generating employment opportunities in villages facing the problems of low rural incomes, increasing poverty and unemployment, and youth and male outmigration. Two farmers, for example, talked about increasing employment opportunities in the villages in Rai Block. Vicky (32, male, DC, large-scale, village A2) said, 'After the growth in agro-based industries in the village, there has definitely been an increase in employment opportunities for people in and nearby' (5 February 2021). He also told me that these industries had promoted economic growth and agricultural development in the villages. Similarly, Raghu talked about how the agro-industries in the village had saved many people, especially the young, from abusive drug use and alcoholism:

> By the 1990s, wheat and rice cultivation had become stagnant and did not pay as much as it used to. This caused men to drift away from farming, especially the young, which often resulted in excessive alcohol-drinking and drug-taking among these people. However, the growth of industries in village A2 created huge employment in the village and employed mostly people from within and across the region (40, male, DC, small-scale, 9 February 2021).

Although these interviews suggest that economic benefits and employment opportunities were extended towards many small and marginalized farmers in the villages, some of these small-scale farmers offered mixed responses

to the employment opportunities created by agricultural diversification. For instance, two small-scale farmers told me why they moved from agriculture to working in a factory. One of them said, 'I choose to work in the factory rather than on my fields, as I have a small landholding and limited resources to feed a family of five people' (11 February 2021). Similarly, another farmer said, 'It is better to work in the factory, as I know I can at least make some money every month here. Agriculture has now become stagnant and non-profitable for us' (11 February 2021). However, some farmers belonging to a lower caste also pointed out the problems associated with low bargaining power when they approached large agro-business industries to sell their produce. For instance, two farmers told me about the 'strict selection process' for their product. One of them told me that his produce, vegetables like potatoes and bell peppers, was often graded and rejected by the industrial manager if it did not follow certain 'shape, size and colour requirements'. Another farmer pointed to the low negotiating power while deciding the selling price, which often made him run from markets to industries to find a suitable price for his produce. Other challenges, such as contractual working conditions in the unorganized sector, education and informational constraints, and a lack of infrastructure, financial accountability and training for workers were common among the male rural population engaged in the non-farm sector.[21]

Nonetheless, the possibility of transitioning to alternative agricultural practices was bleaker for small and lower caste farmers, who had limited farm holdings and sources of income, along with greater risks from the transition. In these circumstances, most of these farmers preferred either to continue with conventional farming practices or to switch to other income or farm diversification methods by investing their time and money in non-agricultural activities. In my sample in Rai Block, out of ten small farm-holders, six did full-time farming of wheat and rice and owned side businesses like small retail shops, selling or repairing household appliances, working as a mechanic, or running grocery stores or teashops. They claimed that, by diversifying into other sources of income, they could survive the periods of low productivity and seasonal unemployment they experienced in agriculture. Some of them were still growing wheat and rice using industrial methods and found it difficult to switch to other crops or farming practices. Monu (26, male, OBC, small-scale, village A2) said, 'I do not get enough Minimum

[21] See Rais, Acharya and Sharma (2013), Food and Agriculture Organisation (2017).

Support Price[22] on my wheat production and had to open a grocery retail store to earn an additional income' (28 November 2020). Rakesh (34, male, OBC, small-scale, village M) said, 'I saved money for ten years and sold one acre of land to set up a repair shop. Now I earn more from this store and do not have to be dependent on farm income' (28 November 2020). Only three small-scale farmers told me that they could change to alternative crops such as sweetcorn and baby-corn, but only after they had assurance of enough sales and a profit margin for their production. They were, however, dependent on large-scale farmers in the village to sell the produce in their processing industries and also had little negotiating power over their selling price:

> I started growing baby-corn five years back. I made good profits in the initial years, but now many farmers have started growing baby-corn, so I do not get the same income. I have to struggle to negotiate the price or travel long distances to sell the produce to get a better price (Shilu, 45, male, OBC, village A2, 9 February 2021).

These farmers informed me that, with the limited farm-holdings and sources of income, they had to think about how to farm and viewed transitioning to alternative farming practices as a bigger risk, especially without much prior information and knowledge about it. Therefore, these farmers switched to alternative sources of income and preferred to diversify their farm activities instead of adopting alternative farming practices.

In the case of Dalit households, Jodhka (2012) mentioned local Dalit castes leaving agricultural work in Haryana villages to secure better jobs and education owing to the caste-based reservations. He argued that, even if they could not excel at school or university, these children preferred to work in small village industries, or other small businesses such as mechanics in car repairs and other appliances, tailoring, teashops, flour mills and other retail stores. In my research, I found that most of the Dalit labourers had travelled as migrants to Haryana villages from less economically developed regions of the state or country. In this situation, doing agricultural work seemed not a personal choice but a consequence of migration due to a lack of choice, a lack of land and limited work opportunities: 'When I migrated to this vil-

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22 The Minimum Support Price (MSP) is a form of market intervention by the Government of India to insure agricultural producers against any sharp fall in farm prices. The MSPs are announced by the Government of India at the beginning of the sowing season for certain crops on the basis of the recommendations of the Commission for Agricultural Costs and Prices.

lage, I knew only farming and thought of working at this farm. It was an easy option to earn an income and did not require much skill and investment' (Mohan, 48, male, Dalit, Village A2, 9 January 2021). A daily wage and a contractual job became easier for people like Mohan, who migrated from relatively less advantaged regions (in his case a rural village in Bihar) in terms of income and job opportunities. Thus, the aspirations to earn a relatively better income could be fulfilled only by working as a labourer on farmland that provided them with an income and employment throughout the season than was usually possible on conventional farming land. Furthermore, being a labourer on someone else's farm leaves one with limited decision-making power, while not having one's own land makes it impossible for these farmers to change to alternative forms of agriculture.

Overall, while some of my interviews and other studies may suggest that agricultural diversification into farming different crops and agro-based industries was helpful in generating employment opportunities and poverty alleviation in the villages, one must consider the nature of the employment conditions and their impact on the different socio-economic groups within the villages. In my study, while some farmers were able to gain economic benefits from transitioning to alternative crops and experimenting with different farming practices, this was largely limited to certain classes and castes that had the economic resources and social networks to stand the risks of changing. Some small and marginal farmers benefitted from the agricultural transition by either adopting crop diversification or working in agro-based industries. However, the choice to transition remained limited for these farmers, as these opportunities came when agriculture itself was under serious stress and farm incomes were declining. These farmers therefore preferred to diversify their household economies to non-agricultural businesses, not because other sectors were growing, but because dependence on farm incomes seemed a considerable risk.

In a World Bank report on 'gender and employment in high-value agriculture industries', Dolan and Sorby (2004) stated that women who obtained an income through their participation in agricultural practices such as horticulture or high-value crop production were less dependent on male heads of household as a source of income and obtained a stronger position in household bargaining. However, the evidence suggests that women workers do not always capture the gains from these increased export revenues and processing industries (Fleck 2001). In the case of rural India, Srivastava and Srivastava (2010) described the gendered nature of women's work and their

distinctive category as 'casual labourers'. They stated that, while men predominate in activities like ploughing and harvesting, women's workloads are much greater in weeding and transplanting, with lower wages and seasonal days of work (creating unemployment for the rest of the days). Other commentators have reported that the increasing participation of rural women in agriculture also raises questions about how such participation effects women's power and autonomy at home and in the community, and how agricultural work is managed in relation to traditional household duties.[23]

During my visits to two factories (one processing baby-corn and the other packaging peas) in these villages, I found that more women (especially OBCs and Dalits) were employed than men. According to the baby-corn factory manager, eighty percent of their industrial workforce comprised women workers. The majority of the women I interviewed in these factories agreed that agricultural diversification into industries and food-processing units had increased their employment opportunities in the villages. However, many of them also talked about the problems of delayed payment, contractual appointments and the lack of training and job security in both agriculture and the factories. Bina (30, female Dalit) told me that, although she was happy to have found a job in the baby-corn processing unit, there were delays in payment and other insecurities due to the 'contractual nature' of her job. Similarly, Anu (32, female, OBC) told me that working in the baby-corn industry was better, as she does not have to work in the 'heat and cold' all day (referring to the extreme weather conditions in Haryana), though she was paid less than her husband would earn for the same amount of work. Mona (35, female, OBC), who had completed her graduation and was working as a junior assistant in the packaging department, told me that usually the type of job was fixed for everyone there. She said, 'One person handles only one thing and is trained for their specific duties. This is how things work in the packaging industry' (20 January 2021). She also told me that women labourers were employed to do mostly 'low-skilled jobs' which do not involve any technical work. However, even Mona, who was relatively well-educated, having completed senior secondary education, and better informed than the others did not know about the 'minimum guaranteed wage' fixed by the government and was not sure if her own job was permanent or not.

Pattnaik *et al.* (2018) argue that women moving from unpaid family labour to 'visible public spaces' such as factories and packaging industries

[23] Srivastava and Srivastava (2010), Agarwal (2014), Shah and Pattnaik (2015), Pattnaik *et al.* (2018)

may be better for women's empowerment, but this might not be reflective of changing positions in the private spheres of the household and the increased dual responsibilities of work. Similarly, some women informants talked about how they managed both the domestic and outside work and how their husbands or male members of their families rarely got involved in any domestic work: 'My husband doesn't do domestic work, but I work at home, in the fields, cook food, take care of the children and look after their education' (21 January 2021). This was a general response that I heard from these women, who mentioned their added workloads in their household. While handling both domestic duties and outside work responsibilities had become a routine task for these women, my interviews also suggest that they were rarely involved in decision-making and had limited financial security at home. Seven women stated that they were occasionally consulted in a few matters of household expenses, but the main decisions were taken by the male head. For example, Kishor (52, female, Dalit) said, 'My husband does not ask me where and how to spend money, but usually most of it is used for household expenses' (21 January 2021). Likewise, Shallu (42, female, Dalit) informed me that most of her income was spent on household expenses and children's education, leaving nothing much to spend on herself. Anu told me that she is sometimes consulted over household expenses by her husband but does not decide 'when and how' to spend the money. These accounts suggest that, while the greater participation of these women outside their traditional household duties had some economic advantages at home, the questions of their 'choice of work', livelihood alternatives, financial autonomy and decision-making remained unaddressed.

However, unlike these respondents, some women farmers involved in natural farming practices talked about the positive impacts of the transitions, especially when recognizing their work in agriculture, and they claimed to have a partial financial and social standing within their households. For example, three women farmers belonging to the villages in Ganaur Block told me that their husbands recognized the importance of their work in agriculture after they had transitioned to natural farming practices:

> My husband is a part-time farmer. I do most of the agricultural and dung work. So, he knows my importance and understands my worth (Sarita, female, DC, 45, Village J, 23 June 2021).

> I make bio-spray using organic matter. My husband appreciates my work and respects it (Anita, female, 48, DC, Village J, 23 June 2021).

> I feel respected since I have started working with him in agriculture. I do more work than my husband and he recognizes my importance (Roop, female, 38, DC, Village J, 23 June 2021).

According to these women farmers, they felt more valued by their husbands when they started contributing to agricultural work, specifically working with dung, and making organic matter. They also told me that their engagement in agriculture was appreciated by married family members, since they were able to manage equal responsibilities in agriculture by producing healthy food and contributing to improving the family income. However, these narratives are not intended to imply that there was no self-worth or dignity unless these women worked with dung or in other agricultural activities and this was recognized by their husbands. Instead, what these accounts aim to show is that these women experienced a feeling of being valued through their contribution in agricultural transitions and that their work was acknowledged beyond being merely a task associated with family labour.

Two women (Savita and Anita) handled both agricultural work and marketing responsibilities, as their husbands were only part-time farmers. Savita claimed to be recognized as an active contributor to natural farming practices and remarked, 'I do most of the work in making organic manure; without me my husband wouldn't be able to do sustainable farming at all' (70, female, DC, village B, 19 January 2021). Anita shared similar thoughts: 'Making organic manure is usually my work. If I don't do it farming would not be organic' (48, female, DC, village J, 23 June 2021). Two other women farmers talked about being consulted in decision-making processes related to the time and choice of crop production. They said that they decided together with their husbands which crops should be grown in a particular season based on their importance to health, preference in terms of self-consumption within in the family and best value in the market. They shared their interests and knowledge of crop production and market value:

> In the early phase of the transition, the growth of millets was 7 to 8 kg per acres, but then it increased to 15 to 20 kg per acre. Our organic millet has a better value as compared to the chemical one (Sarita, 23 June 2021).

> We produce mustard and then process it into oil and sell only in the nearby market. We can earn a better income without travelling to far-off places (Neeta, 38, female, DC, Village J, 23 June 2021).

Throughout the interviews, these women shared extensive knowledge of agricultural practices, their contribution to sustainable farming and how they managed both agricultural work and marketing responsibilities. Although most of them were involved in working with animals and dung, these women often travelled to the fields, made and used bio-spray on the fields during pest attacks and were sometimes consulted in respect of marketing activities by other family members. In their conversations, these women used phrases like 'our production' and 'our income', emphasizing their contribution to the farm's production and their involvement in production processes. The women participated in both agricultural and marketing work and claimed that their efforts were equally acknowledged and respected by their husbands and other family members. However, these narratives cannot be read to imply that no self-worth or dignity exists unless these women did dung work or other agricultural activities and were validated by their husbands. Instead, what these accounts aim to show is that these women experienced a feeling of being valued through their contribution to agricultural transitions and their work was acknowledged beyond the mere task of family labour. Yet, it is important to see if this transition led to any difference in their financial stability and social standing, leading to a possible transformation in the gendered power structures at home.

A few women respondents claimed to have some financial security and social standing at home, especially after transitioning to sustainable farming practices. Two women respondents told me that they were consulted about the distribution of finance and responsibilities by their husbands, but ultimately it was their husbands who took the responsibility for their cash incomes and decided where to spend it. Having bank accounts for every adult member of a family was still uncommon in these villages, and therefore most of the income was deposited in their husband's account or that of another male head of the family. Three other women farmers told me that, since they switched to sustainable farming, the household income had increased, and they were able to spend well on their family's needs, ranging from children's education to developing healthy eating habits. Although social barriers, such as a lack of access to land-ownership and awareness of general rights, did not allow these women to claim their economic share of the household income, they did not mention financial difficulties in deciding where and how to spend the income. They also told me that, with the transition to sustainable agriculture, their contribution to family income and stability had increased, which provided some space to consult them in other matters of

the household as well. Sarita said, 'My husband gives the priority to me and the family, so there is no disagreement' (23 June 2021). Anita (48, female, DC, village J) said, 'Children's education and family's health is a priority for us, so we spend most of our income on that alone' (23 June 2021). These women asserted that they would continue to do sustainable farming, as it was a healthier alternative in agriculture, and that they were happy and satisfied with their contribution and acknowledgement. These perceptions therefore suggest a possible transformation in existing gendered power relations with an increasingly critical awareness of existing gender roles by both men and women, which allowed women to imagine new possibilities and their roles in agriculture (cf. Leder *et al.* 2019).

Overall, these narratives show how the gender implications of agricultural transitions need to be studied differently at both the household and community levels. Being recognized as active contributors to agricultural work and other managerial responsibilities distinguished women in natural farming households from those working in the agro-based industries, which also had implications for their financial security and social standing at home. This also generated a sense of self-worth among these women, who considered themselves different from other women who were either doing conventional farming practices or working in the factories. However, more research is required on this topic to analyse how sustainable transitions might challenge the gendered structure at play and study how far women's roles in agriculture may be perceived as more than that of mere contributors, namely as equal participants and achievers of sustainable transitions.

4. Conclusion

This article has examined farmers' perspectives on why some farmers were motivated to leave traditional cereal-crop production and adopt alternative methods of agricultural practices in rural Haryana. I showed how different farmers talked about the way they managed transitions from the conventional farming of wheat and rice to other crops or diverse farming practices. These farmers described their alternatives in the form of crop diversification, the polyhouse method of farming, and natural or agro-ecological farming methods. They explained their individual journeys to transitioning through a range of farming practices, marketing strategies and how they learned new forms of techniques and approaches to transition. All farmers in my research

claimed health and environmental factors as the main motivations for them to transition to alternative agricultural practices.

However, many other factors, such as existing economic resources, social networks and their social and gender positions within a rural community had an impact on who was able to transition more smoothly than others, yet these transitions were not limited to any particular class, caste, gender or age group. Moreover, health and environmental awareness not only motivated some farmers to pursue sustainable agriculture, it also redefined their duty as farmers to produce and sell non-chemical foods that promote a healthy lifestyle. Conducting a microscopic analysis of these transitions at the farm and household levels was helpful in understanding these differences across diverse caste, class and gender groups of farmers.

While the existing literature on the agricultural transition takes into account the ecological aspects of the outcomes of the transition (Chebrolu and Sen 2017, Khadse and Rosset 2019), limited attention has been paid to addressing the social implications of transitions. My article has addressed this research gap by empirically investigating the outcomes of the agricultural transitions, especially their social impacts at the household and community levels. What these farmers were able to achieve with agricultural transitions reflects why they chose to transition in the first place and what social impact their transitions generated. Specifically, I discussed accounts wherein these farmers talked about their experiences of improving human health and the ecological conditions of the villages, the increase in their income and economic conditions, and the impact on gendered relationships and social inequalities in the household and among rural farming communities.

More importantly, my research reveals how these farmers not only moved from one farming practice to another but, in the process, also claimed themselves to be different from those who followed earlier practices of conventional farming. The article shows that these farmers identified themselves as 'organic', 'natural', 'sustainable' or 'diversified', which, according to them, represented the identity of a 'good' farmer who was fulfilling his duty to produce healthy and sustainable food while at the same time contributing to the betterment of village agriculture and rural sustainability. This newfound identity that they gained after transitioning to alternative practices developed a sense of achievement in what they were doing as farmers, which kept them motivated to pursue agriculture and encouraged others to adopt similar practices. For some women farmers, the agricultural transition had some positive implications on their role in agriculture, specifically in reshaping

their social positions within both the household and the community. Their interviews indicate that transitions helped some women in rebuilding individual self-worth based on a sense of their contribution in agricultural practices and family income. Being recognized as active contributors to agricultural work and other managerial responsibilities, these women claimed some financial security and social standing at home. However, more research is required on this topic to analyse how sustainable transitions could challenge the gendered structure at play and study how far women's role in agriculture may be perceived as more than mere contributors to equal participants and achievers of sustainable transitions.

Overall, the article argued that although diverse farming practices were adopted with the aim of transitioning to alternative agriculture, their pathways to the transition differed in terms of the strategies they adopted and the socio-ecological outcomes that were generated for different groups of farmers. Studying these agricultural methods by recognizing different pathways to the transition is important in developing an alternative framework for understanding sustainable transitions that acknowledge the place-based differences and knowledge of farming practices that are crucial at a given time and that may be suitable in the current socio-economic context in India. Although this article indicates a change in farmers' identities accompanying the shifts in agricultural forms and practices, how agricultural transitions may or may not involve a change in the identities of different farmers in diverse socio-economic contexts is open to further research. More specifically, more research is needed to address the socio-demographic differences in the villages, as gender, caste, class and age are all undoubtedly important facets of the social and working lives of farmers in India.

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