PROFESSIONAL ASSISTANCE
FOR DEVELOPMENT ACTION

प्रदान Pradan

Nurturing Soil, Nurturing Lives

A Scoping Study on Regenerative Agriculture

In Jharkhand and West Bengal

Foreword

PRADAN works with rural communities to facilitate enhanced sense of agency through impacting their livelihoods. The components like inclusion of the poorest of poor, women's empowerment, nutritional security, agroecological sustainability, and significant income have been identified to constitute comprehensive livelihoods.

Since its inception, PRADAN has embraced an approach that prioritises the rejuvenation, rather than exploitation, of natural resources as a foundation for livelihoods. This approach ensures that current and future generations can continue to benefit from these resources. Consequently, Integrated Natural Resource Management has consistently underpinned PRADAN's natural resource-based initiatives.

The approach to Regenerative Agriculture is also a reflection of locating sustainability at the core of its livelihoods strategy to make it impactful and sustainable. Drawing on both traditional wisdom and scientific insights, Regenerative Agriculture leverages emergent properties—characteristics that arise from the interactions within a system but are not present in its individual parts.

This scoping study was done to capture the perspectives of the communities we work with on Regenerative Agriculture. The findings offer both reassurance and motivation to continue advancing this approach. The study reveals that, in the experiences of these communities, Regenerative Agriculture not only enhances soil health and enriches the taste of food but also provides a more reliable income and better health than conventional chemical-based practices.

We hope that these results will inspire other individuals and organisations with similar goals to explore Regenerative Agriculture further.

Saroj Kumar Mahapatra
Executive Director
PRADAN

Foreword

We are in the era of the Anthropocene, an era which poses significant challenges to the survival and well-being of humanity on Earth. Climate change, pollution (of the air, water and soil) and biodiversity collapse collectively constitute what the United Nations Environment Programme terms the triple planetary challenges confronting us today. India, as the world's most populated nation, faces especially complex challenges in meeting the country's sustainable development goals, while also ensuring the protection and restoration of the environment.

As a primarily rural country, where smallholder farming is critical for rural livelihoods, Regenerative Agriculture (RA) plays an especially important role in helping to balance issues of livelihood security, environmental health, nutritional security and human well-being. This important study by PRADAN, in two different states where they have played a major role in organisations Regenerative Agriculture education and implementation on the ground, is very important for those interested in understanding how to take such programmes forward. The results highlight the impacts of Regenerative Agriculture on environmental quality, especially in terms of improved soil health and water retention. There were clear economic impacts as well as improvement in gender empowerment – however the increased labour burden of Regenerative Agriculture falls largely on women, and this requires some thought. Perhaps most important for future expansion, this scoping study clearly highlights critical barriers to the spread of Regenerative Agriculture, which need to be addressed through policy and market interventions as well as through enhanced training and capacity building.

Given the real scarcity of detailed studies on the ground, well-designed scoping studies of this kind are very important to fill critical knowledge gaps and help to design improved policies and plans for expansion on the ground.

Harini Nagendra
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Acknowledgments:

On behalf of PRADAN, we acknowledge all those who contributed in different ways to come up with this report.

Research Team: This core group designed the study framework and tools, coordinated data collection, analysed the data, and drafted the report. The Study Group members are Amit Kumar, Dibyendu Chaudhuri, Kiran Limaye (Consultant), Parijat Ghosh, Pranav Trigunayat, and Ramneek Panesar.

Data Collection and Consolidation: Abir Ul Islam, Avinash Prajapati, Ayushmita Sarkar, Dipankar Gogoi, Navleen Kaur, Nishu Nishant, Om Prakash, Piyushkanta Barnawal, Pritom Das, Purushottam Verma, Pushkar Arya, Rohan Paliwal, Santam Mazumdar, Saurav, Sourav Maity, Sukanya Dutta, Swarup Jana, Trishagnee Borua, and Vishal Kumar.

205 enumerators and supervisors have collected the household data.

Advisory Team: Harini Nagendra (Azim Premji University), Nityananda Dhal, Pranjal Saikia, and Ritesh Pandey.

There are many more who supported us in coming up with this report. Without them, this study and report would not have been possible. We are grateful to all of them.

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Echoes From the Field

> We've immensely benefited from PRADAN's training about Regenerative Agriculture to improve our soil quality

> There isn't much awareness about Regenerative Agriculture in the village about its health and ecological benefits. The sole emphasis is on increasing the productivity

> Health is everything and Regenerative Agriculture has helped us grow healthy food with better longevity, taste and nutritional content. There's also a difference in the fodder for animals and the quality of milk

> Initially the farmers were reluctant to shift to Regenerative Agriculture. They were used to synthetic input based agriculture and there was no proper understanding of Regenerative Agriculture. Farmers were encouraged through the SHGs, panchayat melas and PRADAN to learn about the benefits of Regenerative Agriculture. Exposure visits to demonstration plots and training sessions really motivated them

> In the beginning the produce is a little lesser and the cost is a little more but then gradually as the soil quality improves the productivity increases and the cost declines

> There is a growing awareness about regenerative produce in the market now. The regenerative produce from my nursery is sold off faster than others but it fetches the same price as the synthetic input based agriculture produce. Some help in the form of certification and differential pricing will definitely help

> In the next five years there is likely to be more awareness about the benefits of Regenerative Agriculture. With the help of BRCs and FPOs a sustainable model is likely to be put in place and a change in the mental map of the farmers will also improve their belief in the capability of Regenerative Agriculture

> Regenerative Agriculture has also empowered us (women). Initially the dada (male member) was reluctant about Regenerative Agriculture but through the training we got from the SHGs we managed to convince them to take a chance with Regenerative Agriculture. After 2-3 years he also felt a difference. Now I feel heard within the family

INFOGRAPHICS

A Mixed-Method Study on Regenerative Agriculture Practices

The study employed a mixed-method approach comprising

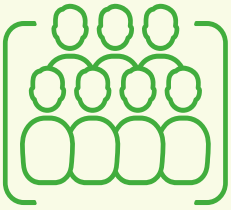
Literature Review

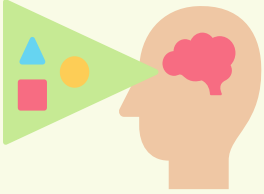
Household Survey

Focus Group Discussions (FGDs)

Personal Interviews

Sample size of 2,400 Regenerative Agriculture (RA) farmers



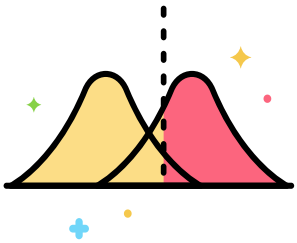


Control group: 400 non-RA farmers per state

Capturing their views on regenerative agriculture and perceptions of RA farmers

Based on

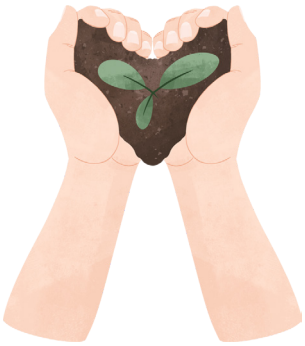
95% confidence level



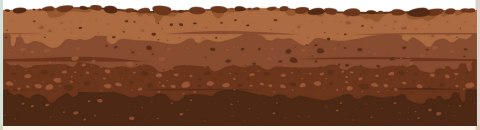
80% statistical power

5% margin of error

Changes in Soil Characters Reported by Regenerative Agriculture Farmers

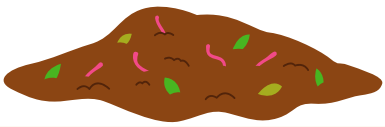


83%	Increased water retention capacity of the soil	88%
87%		88%
Female		Female
Male		Male



88%	Positive change in soil texture	89%

94%	Soil became darker	72%



89%	Increased soil organisms show improved biodiversity	88%

Regenerative Agriculture: Boosting Income in Jharkhand and West Bengal

86%

91%

90%

89%

Income from agriculture had increased after practising RA

Regenerative Agriculture: Food Production in Jharkhand and West Bengal

73%

79%

69%

70%

Food production exceeded synthetic input-based farming

% Motivating Factors for Regenerative Agriculture Reported by Farmers

Jharkhand		West Bengal
49.7	Reduced Cost	36.06
79.3	Better Soil Quality	89
78.4	Tasty Food	84.5
72.6	Healthy Food	84.91
33.8	Biodiversity	81.69
52.5	Better Shelf-life of Vegetables	54.53
41.8	Less Pest and Disease in Crop	50.69
39.2	Require Less Irrigation	44.65
0.9	Other	1.84

Gendered Preferences for Self-Prepared Bio-Inputs in Jharkhand and West Bengal

89%

87%

85%

84%

Male farmers prefer self-prepared bio-inputs slightly more than females in Jharkhand and West Bengal.

Challenges in Accessing Bio-Input Raw Materials Among Regenerative Agriculture Farmers in Jharkhand and West Bengal

15%

10%

Regenerative Agriculture farmers facing difficulty in accessing raw materials for bio-inputs.

Regenerative Agriculture Farming: Higher Labour Demands for Both Genders

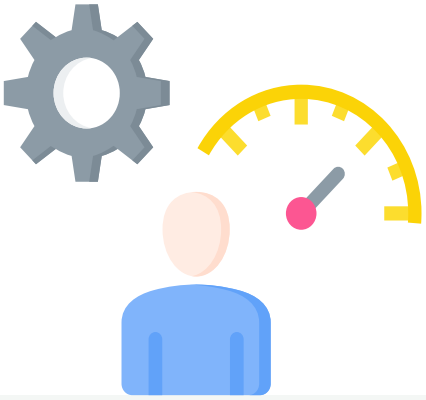
44.01

47.31

39.1

44

Increased Workload for Women Farmers with Regenerative Agriculture Adoption



62%

61%

Perceptions of Income Growth from RA Adoption Among Non-Regenerative Agriculture Farmers

45%

88%

46%

88%

Perceived Increase in Agricultural Production Among Non-Regenerative Agriculture Farmers

42%

64.4%

42%

61.4%

01 INTRODUCTION

Background and Context

The last two centuries have been marked by remarkable advances in human prowess, growth, and productivity. From leaps in technological progress to significant changes in ways of living, the transformation has been extraordinary. However, these changes have come at an increasing cost to nature. This period also witnessed explosive population growth, which brought concerns about food security, the environment, and health to the forefront—challenges often addressed through technological experimentation.

These interactions have unfolded within complex social and ecological frameworks, not leading to linear solutions but to new problems as inevitable byproducts. This reality has become particularly evident in the second half of the 20th century, a period marked by massive land conversion to cropland, the loss of 20% of coral reefs, a doubling of water withdrawals, increased reactive nitrogen and phosphorus flows into ecosystems, and a significant rise in atmospheric carbon dioxide concentration by about 32% (Millennium Assessment, 2005, p.2). Today, more than a third of the world's land surface and nearly 75% of freshwater resources are devoted to crop or livestock production (White, 2020).

This ecological degradation represents a loss of capital assets, disproportionately affecting marginalized communities, particularly in developing countries (Millennium Assessment, p.9). Oldeman et al. (1990) highlight that over half of the earth's land surface is used intensively for agriculture, grazing, plantation forestry, and aquaculture, resulting in approximately one-third of the soil being deeply transformed from its natural ecosystem state due to soil degradation (as cited in IAASTD, 2009, p.6). These trends weave sustainability concerns into the very fabric of this transformative process.

Emerging Contours of Industrial Agriculture

One of the most significant areas of transformation is agriculture, which has increasingly been shaped by the commercial interests of corporate capital. In their drive to maximise profits, large corporations have promoted the widespread use of synthetic inputs and pesticides, exacerbating the ecological imbalances discussed earlier. The shift toward synthetic input-based agriculture has been driven by a prevailing discourse that dismisses traditional methods as unproductive, unprofitable, and scientifically inferior (discussed further in Chapter 5). This shift extends not only to medium and large farmers but also to smaller ones, deepening the ecological imbalance. Consequently, smallholder farmers face a dual burden: the uneven impact of ecological degradation and the challenge of competing with big corporations. The global commercialization of agriculture has intensified the vulnerability of farmers worldwide, as they contend with growing dependence on external inputs, declining farm incomes, rising production costs, soil degradation, and susceptibility to global shocks. These factors have collectively culminated in what is described as the agrarian crisis.

This crisis is further complicated by agriculture's multifaceted role in society, providing food, feed, fiber, and fuel while organisations critical

ecological factors like water supply, carbon sequestration, and soil quality. As agriculture employs around 40% of the world's population and serves as the primary livelihood for many in developing countries, the dynamics of agricultural production—including productivity, ecological impact, income, and food security—are crucial. Small farmers, as both consumers and sellers of agricultural products, are especially vulnerable due to their dependence on synthetic inputs and the resulting decline in soil fertility.

The global agricultural system today faces numerous challenges, including climate change, loss of agro-biological diversity, soil fertility depletion, and water scarcity (IAASTD, 2009, p.2). These challenges have triggered multiple crises, as outlined by Shiva (2022):

1. The ecological crisis, involving climate change, biodiversity loss, soil erosion, and land degradation.

2. The public crisis, marked by hunger, malnutrition, and the spread of non-communicable diseases.

3. The crisis of farmers' livelihoods, characterized by displacement and declining incomes.

These interrelated crises have disproportionately burdened farmers, whose incomes, nutritional status, and quality of life have been severely affected. In India, the agrarian crisis has driven many farmers to suicide or extreme poverty over the past few decades (Basu et al., 2016; Roy, 2021; Guha and Das, 2022; Sainath, 2010).

Farmers in the Central Indian tribal region, one of the most poverty-stricken areas in India, have been particularly affected by this crisis. Adivasis, traditionally reliant on both land and forest for their livelihoods, have faced declines in forest income due to biodiversity loss, diminishing per capita landholdings caused by land dispossession and fragmentation, and the replacement of traditional practices by synthetic input-based agriculture. This transition has deskilled farmers, forcing them to abandon their deep-rooted knowledge of the farm-forest ecosystem. With increasing reliance on wage labour, migration has surged as villages struggle to provide sustainable livelihoods (SAL reports, 2021 and 2022; Purushothaman et al., 2022).

Green Revolution and its After-Effects

The debate on the agrarian crisis and its causes has persisted for many years, with a growing focus on rethinking the paradigm underlying dominant agricultural practices. This rethinking emphasizes agroecological aspects such as soil quality, nutrient content of produce, and health implications, proposing an alternative framework rooted in ecological, economic, and social sustainability. It signifies a departure from the Green Revolution strategies that prioritized synthetic input-based technological changes, leading to farmers' dependency on external inputs.

Numerous scholars have examined the impact of the Green Revolution, highlighting its underlying assumption that nature is a source of scarcity while technology is a source of abundance. This perspective overlooked the ecological destruction associated with technological interventions (Shiva, 1991, p.15). The Green Revolution, supported

by state-led institutions across developing countries, sought to address food deficits. However, it also resulted in peasants losing control over their farming systems as they became reliant on market-purchased seeds and synthetic inputs, exposing them to market volatilities (Shiva, 1991, p.64).

The indigenous farming system, which thrived on a symbiotic relationship between soil, water, farm animals, and plants, was replaced by a market-oriented model reliant on synthetic inputs and seeds. This shift disrupted traditional interactions between the farm ecosystem and the soil-water system (Shiva, 1991, p.64). Moreover, the widely celebrated productivity increases associated with the Green Revolution were heavily tied to the intensive application of synthetic fertilisers, pesticides, and other purchased inputs. While these inputs enabled higher yields, they also had ecologically destructive impacts, degrading soil by depleting essential micro-nutrients like zinc, manganese, and sulfur—a phenomenon referred to as the "robbery of soil's fertility" (Shiva, 1991, pp.112,114).

Rhodes (2017) underscores similar concerns, pointing out that synthetic input-based agriculture has exacerbated social and environmental issues such as soil erosion, contamination, desertification, depletion of water resources, and biodiversity loss (p.92). Cleaver (1972) describes this approach as merely substituting one imbalance for another. Furthermore, while the Green Revolution has been credited with averting famine in many countries by increasing productivity, the focus on quantity over quality has led to a decline in the nutritional value of crops. Many high-yield varieties produced through Green Revolution technologies were deficient in essential minerals and vitamins, contributing to widespread deficiencies in nutrients like iron and vitamin A, particularly in South and Southeast Asia, where the Green Revolution was deemed a success (Rhodes, 2017, p.86).

These issues highlight the need to move away from synthetic input-based practices originating from the Green Revolution. The Millennium Assessment Synthesis Report and the IAASTD report emphasize the urgency of transforming current agricultural practices, stating:

"The way the world grows its food will have to change radically to better serve the poor and hungry if the world is to cope with the growing population and climate change while avoiding social breakdown and environmental collapse." (as cited in Shiva, 2022)

Regenerative Agriculture as an Alternative

The proposed alternative to synthetic input-based agricultural practices emphasizes developing an ecosystem that optimally utilizes natural resources through a synergy of mutually reinforcing bio-processes. Rooted in the paradigm of agroecology, this approach shifts from monoculture-based farming reliant on fossil fuels and synthetic inputs to a biodiversity-based model that enables the ecological intensification of agricultural production (Shiva, 2022). Agroecological highlights the interrelatedness of all components within the agroecosystem and the dynamics of ecological processes, rather than focusing on isolated elements (Shiva, 2022).

This approach promotes the harvesting of energy from natural inputs, encouraging farmers to rely on organically available resources, thus fostering self-dependence. It provides a scientific basis for natural resource management while embodying farm practices that stimulate natural ecological processes. Unlike synthetic input-based agriculture, agroecology extends beyond food production to encompass the welfare of food growers, and the benefits ecosystems provide, such as carbon sequestration, climate regulation, and pest and disease control (Rhodes, 2017, pp.92–93). It avoids practices that can cause long-term soil damage, such as excessive tillage and poorly managed irrigation, thereby prioritising sustainability.

A notable example is Cuba, which adopted alternative agricultural approaches during the late 1980s and 1990s following the collapse of the Soviet Union. Deprived of access to synthetic pesticides, fertilisers, and cheap Russian oil, Cuba initiated a national experiment in organic farming. Today, it ranks among the world's most sustainably developed countries, as per the Sustainable Development Index (People's World, 2021).

The discourse on alternatives to synthetic input-based agriculture has itself been subject to historical debates. Terms such as organic agriculture, sustainable agriculture, and Regenerative Agriculture are often used interchangeably, though they reflect distinct approaches. Rhodes (2017) notes that many practices labeled as sustainable contribute only marginally to improving farming methods by slowing the degradation of natural landscapes (p.105). He cautions that "all sustainable solutions are unsustainable over the longer term if they are not also intrinsically regenerative" (p.103).

Regenerative Agriculture focuses on long-term sustainability by prioritizing the regeneration of soils, forests, water bodies, and the environment. It goes beyond merely sustaining resources to revitalising and enhancing them, ensuring sustainability in the long run (Rhodes, 2017, p.104). This approach emphasizes improving soil health while enhancing water quality, vegetation, and land productivity (Rhodes, 2017, p.82). It commits to the continual renewal of agricultural systems, from soil to people (Hes and Rose, 2019), restoring damaged landscapes, and realizing their full potential (Massy, 2017, 2013; Francis and Harwood, 1985).

Shiva (2022) underscores Regenerative Agriculture as a means to achieve Sustainable Development Goals, particularly those related to ending poverty, zero hunger, and good

health and well-being. She advocates moving beyond conventional productivity markers like yield per acre, proposing alternative measures such as health per acre and nutrition per acre. By these metrics, regenerative farming is far more productive than monoculture-based farming, offering a holistic approach to sustainability and development.

PRADAN's Vision of Regenerative Agriculture

Despite ongoing debates, scholars have described regenerative farming in various ways, and while there is some consensus on its principles, a concrete and universally accepted definition remains elusive. This reluctance to define Regenerative Agriculture stems from the belief that it should continually evolve with the ongoing learning and experiences of farmers (Newton et al., 2020). Soloviev and Landua (2016) suggest that the definition itself needs to be continuously regenerated. Additionally, rigid definitions can create boundaries that exclude minority perspectives, whereas Regenerative Agriculture aims to be inclusive of diverse ways of knowing and being (Duncan et al., 2020).

PRADAN conceptualizes Regenerative Agriculture as a process of revitalising the entire agricultural ecosystem. It moves beyond the narrow focus on crop productivity to encompass total productivity, considering all factors directly or indirectly involved or impacted by agricultural processes. Sustainability is emphasized over isolated growth factors. PRADAN identifies four key domains essential for activating and sustaining an efficient natural system:

A. Stimulating soil biology and plant health.

B. Rejuvenating the local agro-ecology.

C. Strengthening a responsive community system.

D. Establishing a local ecosystem for support services.

PRADAN's approach places sustainability at the core of its livelihoods strategy to create lasting impact. It integrates components such as inclusion of the poorest of the poor, women's empowerment, nutritional security, agroecological sustainability, and significant income generation to build comprehensive livelihoods. Its promotion of Regenerative Agriculture aligns with this vision, reflecting an effort to establish it as a viable and feasible alternative.

The following shifts are proposed to direct collective efforts toward promoting Regenerative Agriculture effectively.

S. No	Current Practices	Alternative to Adopt
1	The mindset now is to compete and exploit nature to maximise self-benefit	Appreciate the importance and need for coexistence with nature without harming but nurturing all its creations for the benefit of everyone.
2	The goal of farming is to maximise productivity and income for the current season/year from the intervened plot	The goal is to maximise return (economic and non-economic) while enriching the natural resources and product quality for now and for future generations from the whole area
3	Dependence on increased use of synthetic fertilisers for plant nutrition	The approach is to stimulate soil biology and activate all natural actors of the ecosystem to help crops get all their required nutrients from nature (soil and air).
4	Over-dependence on synthetic and toxic measures to protect the crops from disease infestation and pest attacks	Taking a system approach for making the plant healthy & immune to different disease and pest attacks and also becoming resilient to different climate extremes. Different IPM measures and the use of Biocides can be adopted in some cases
5	Focusing on a few crops mostly vegetables with high per unit area income potential	Crop diversity and round the year land coverage is the key to nurturing everyone in nature including the farmers. The focus here is to use all types of land in all possible seasons by adopting mixed cropping, and crop rotation and by producing all types of crops like cereals, pulses, oilseeds, millets, and spices etc.
6	Increased use of hybrid /GEM seeds	Avoid the use of hybrids and replace them with high-performing local seeds or O.P seeds
7	Crop planning is largely limited by a high degree of water assurance either from Kharif rainfall or from irrigation facility	In addition to irrigation, the focus here is to go for improving soil physical properties to enhance water harvesting, increase water-holding capacity, and increase water use efficiency. The focus here is to increase cropping intensity taking crops with residual moisture and going for low water requiring crops
8	An individual farmer or plot approach	A collective community approach is required focusing on the whole village area/watershed for resource rejuvenation and its optimal use
9	Input to be purchased from the market is often produced by large corporate houses	As far as possible inputs are to be arranged from within the locality and by using local resources
10	The focus on the maximisation of the use of natural resources	The focus needs to be altered to restore these natural resources and their judicious use including the commons like forests, wastelands, water bodies, etc.
11	Increased use of mechanisation and reduced dependence on livestock	Integration of animals and plants for overall rejuvenation of ecology and generating increased livelihood opportunities for all sections of the community

Purpose of This Study and Structure

The literature on Regenerative Agriculture, though growing, remains limited compared to that on synthetic input-based agriculture. The current crisis in farming systems demands more critical studies investigating the dynamics and scope of Regenerative Agriculture. This serves as the rationale for PRADAN's initiative to conduct this scoping study, which examines various aspects of Regenerative Agriculture to shed light on its adoption and existing practices in India, with a particular focus on Jharkhand. This report is presented with this intent in mind.

This report is divided into eight chapters:

- **Chapter 1** introduces the study, providing a background to establish the significance of Regenerative Agriculture in today's economic and ecological context. It contrasts conventional synthetic input-based agriculture and its destructive impacts with Regenerative Agriculture as an alternative.

- **Chapter 2** discusses the methodological aspects of the scoping study, including the statistical criteria used for household-level interviews.

- **Chapter 3** describes the nature of the respondents selected for the study, outlining preliminary household characteristics such as land ownership, livestock ownership, and history of practising Regenerative Agriculture.

- **Chapter 4** explores respondents' exposure to and awareness of various aspects of Regenerative Agriculture. It highlights their perceptions of its impact and the role of training and exposure in encouraging adoption.

- **Chapter 5** focuses on the ecological aspects of Regenerative Agriculture, including its impact on irrigation requirements, soil quality, water-holding capacity, and more, based on the study findings.

- **Chapter 6** examines the economic aspects of Regenerative Agriculture, discussing results related to productivity, food security, income generation, and changes in livelihoods.

- **Chapter 7** identifies motivating and hindering factors observed during the study. These factors provide critical insights into the ground-level dynamics of Regenerative Agriculture and help plan future interventions to encourage adoption.

- **Chapter 8** concludes the scoping study, summarizing key findings and implications.

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02 METHODOLOGY

The study employed a mixed-method approach, integrating both qualitative and quantitative techniques. The methods included a comprehensive literature review, a household survey targeting sampled households, and Focus Group Discussions (FGDs) with Community Resource Persons (CRPs), Village Organization (VO) members, and Farmer Producer Organization (FPO) board members. Additionally, personal interviews were conducted with PRADAN professionals, and Bio-Resource Center (BRC) entrepreneurs to gather in-depth insights.

Sampling for the Scoping Study

A sample size of 2,400 Regenerative Agriculture (RA) farmers was determined for each state, based on a 95% confidence level, 80% statistical power, and a 5% margin of error. Additionally, a control group of 400 non-RA farmers was sampled from each state to gather insights into their perspectives on regenerative agricultural practices and their perceptions of RA farmers. Since the study did not aim to directly compare the RA and non-RA groups, the sample size for non-RA farmers was intentionally limited to 400.

In both states, villages or Gram Panchayats (GPs) with fewer than 20 enrolled farmers were excluded from sampling. The exclusion affected around 3% of the total enrolled farmers in West Bengal and less than 1% in Jharkhand. The decision was made to minimize the likelihood of not finding an adequate number of respondents in the sample villages.

Jharkhand

For Jharkhand, the sample was selected from all eight districts where the program is active: Godda, Gumla, Lohardaga, Hazaribagh, Bokaro, Dumka, West Singhbhum, Khunti. In five districts—Bokaro, Hazaribagh, Khunti, Lohardaga, and West Singbhum—the sample size was fixed at 160 farmers per district. The remaining sample of 1,600 was distributed among the three districts of Dumka, Giridih, and Gumla based on the number of participant farmers. The pre-determined sample size ensured sufficient representation of these districts as the proportion of participants in these districts was small.

From the five districts with a sample size of 160 each, a single block was selected using probability proportional random sampling

without replacement. Selection probabilities were based on the number of participant farmers in the block. In the remaining three districts, two sample blocks were selected using probability proportional random sampling without replacement. This method minimizes the chance of excluding larger blocks from the sample. In all, the sample was spread across 11 blocks (Table 2.1).

The number of sample Gram Panchayats (GPs) was selected from the sample blocks using systematic probability proportional random sampling. This method, while allowing repetition, minimizes the likelihood of larger blocks being excluded from the selection. Systematic sampling was particularly necessary when the number of GPs in a block was smaller than the required sample (e.g.,

Table 2.1: Sample Blocks for Household Survey in Jharkhand

District	Block	Number of GPs	Number of Participant Farmers	Number of Sample GPs
Bokaro	Jaridih	14	1980	8
Dumka	Gopikandar	6	3750	14
Dumka	Dumka	4	1023	14
Godda	Poraiyahat	31	3865	14
Godda	Pathargama	9	3859	14
Gumla	Basia	9	3025	12
Gumla	Kamdara	10	2083	12
Hazaribagh	Tatijharia	8	2399	8
Khunti	Murhu	3	400	8
Lohardaga	Kisko	4	695	8
West Singhbhum	Sonua	5	659	8

Dumka block). It is noteworthy that even when the number of GPs were small, enrolled farmers in those GPs were sufficient to meet sampling requirements. Ultimately, the final sample was distributed across 73 GPs in 11 blocks spanning all 8 districts.

The sampled GPs were then subdivided into their villages for household surveys. Wherever possible, 20 household surveys were conducted in a single village. For example, for a GP sample of 40 households, surveys were distributed across two villages selected randomly from the list of constituent villages. If a GP did not have enough villages, the sample was evenly distributed among the available villages. For instance, if a GP sample size was 60 and only two villages had RA interventions, 30 households were surveyed per village. In cases where even distribution was not feasible, the sample was allocated proportionally to the number of enrolled farmers in each village.

The detailed distribution of samples in Jharkhand is available in Table A2.1 in Appendix 1.

West Bengal

The West Bengal sample was distributed across all nine blocks where the program was active. Villages within these blocks were categorized into two strata based on the number of enrolled farmers: Strata 1, consisting of villages with up to 100 enrolled farmers, and Strata 2, consisting of villages with more than 100 enrolled farmers. The sample size was determined at 20 households per village for Strata 1 and 40 households per village for Strata 2. This stratified approach ensured greater accuracy while minimizing the number of villages required for inclusion.

The total sample size of 2,400 farmers was divided proportionally between the two strata based on population proportions, with 1,480 farmers sampled from strata 1 across 74 villages and 920 farmers sampled from strata 2 across 23 villages. Further details of this distribution are provided in Table 2.2.

The sample villages within each stratum were further allocated among blocks based on the proportion of enrolled farmers in each block. Subsequently, the required number of sample villages for each block was selected using probability-proportional random sampling without replacement.

In addition to the household-level interviews, data collection was supplemented by Focus Group Discussions (FGDs) and Personal Interviews (PIs). FGDs were conducted at three levels: with Community Resource Persons (CRPs), Village Organization (VO) members, and Farmer Producer Organization (FPO) board members. Personal interviews were carried out with PRADAN professionals, Bio-Resource Center (BRC) entrepreneurs, and FPO board members to gather deeper insights.

The sampling framework for FGDs in Jharkhand and West Bengal is shown in Tables A2.2 and A2.3 in the Appendix.

Table 2.2: Sample Blocks for Household Interviews in West Bengal

District	Block	Strata1 Farmers	Strata2 Farmers	Strata1 Villages in Sample	Strata2 Villages in Sample
Purulia	Baghmundih	432	0	5	0
Jhargram	Binpur I	374	0	5	0
Jhargram	Binpur II	472	0	5	0
Bankura	Hirbandh	723	601	8	3
Bankura	Indpur	168	0	5	0
Purulia	Jhalda 1	216	0	5	0
Purulia	Jhalda 2	268	0	3	0
Jhargram	Nayagram	2506	2570	22	15
Bankura	Ranibandh	1414	866	16	5

03 REGENERATIVE AGRICULTURE FARMERS - WHO ARE THEY?

This chapter explores the details of the sampled households selected for the study. As the sample is designed to reflect the population of Regenerative Agriculture (RA) farmers supported by PRADAN, the characteristics of the sampled households are expected to represent the broader group of Regenerative Agriculture farmers that PRADAN promotes.

In Jharkhand, the study included a total of 2,800 households, of which 2,400 practised Regenerative Agriculture and 400 did not. At the individual level, the study surveyed 2,272 female respondents and 1,596 male respondents. In West Bengal, the total number of households sampled was 2,314, of which 2,058 practised Regenerative Agriculture and 256 did not. At the individual level, 1,903 female respondents and 1,200 male respondents were covered.

The land ownership patterns of the sample households are presented in Tables 3.2 and 3.3. The tables indicate that approximately 78% of the sampled households in Jharkhand and around 95% of those in West Bengal fall under small or marginal landholding categories. About 1% of the sampled households in Jharkhand and 2.6% in West Bengal are landless and practice Regenerative Agriculture either on leased land or as sharecroppers.

Table 3.1: Land Ownership Categories

Land Ownership Categories	Definition
Landless	No land
Marginal	Less than a hectare
Small	Between 1 to 2 hectares
Above small	2 and more than 2 hectares

The above table 3.1 shows the definitions of the different land size classes

Table 3.2: Land Ownership Structure of the Sample in Jharkhand

Land Ownership Category	Percentage
Landless	1.0
Marginal	45.3
Small	32.4
Above small	21.3

Table 3.3: Land Ownership Structure of the Sample in West Bengal

Land Ownership Category	Percentage
Landless	2.64
Marginal	88.98
Small	5.75
Above small	2.64

Figure 3.1 below shows that the land ownership structure for Regenerative Agriculture farmers and non-Regenerative Agriculture farmers is quite similar, indicating that both groups represent comparable farming classes within their respective states. This similarity allows for a valid comparison between Regenerative Agriculture and non-Regenerative Agriculture farmers.

Figure 3.1: Land Ownership Structure for Regenerative Agriculture Farmers and Non-Regenerative Agriculture Farmers in Jharkhand and West Bengal

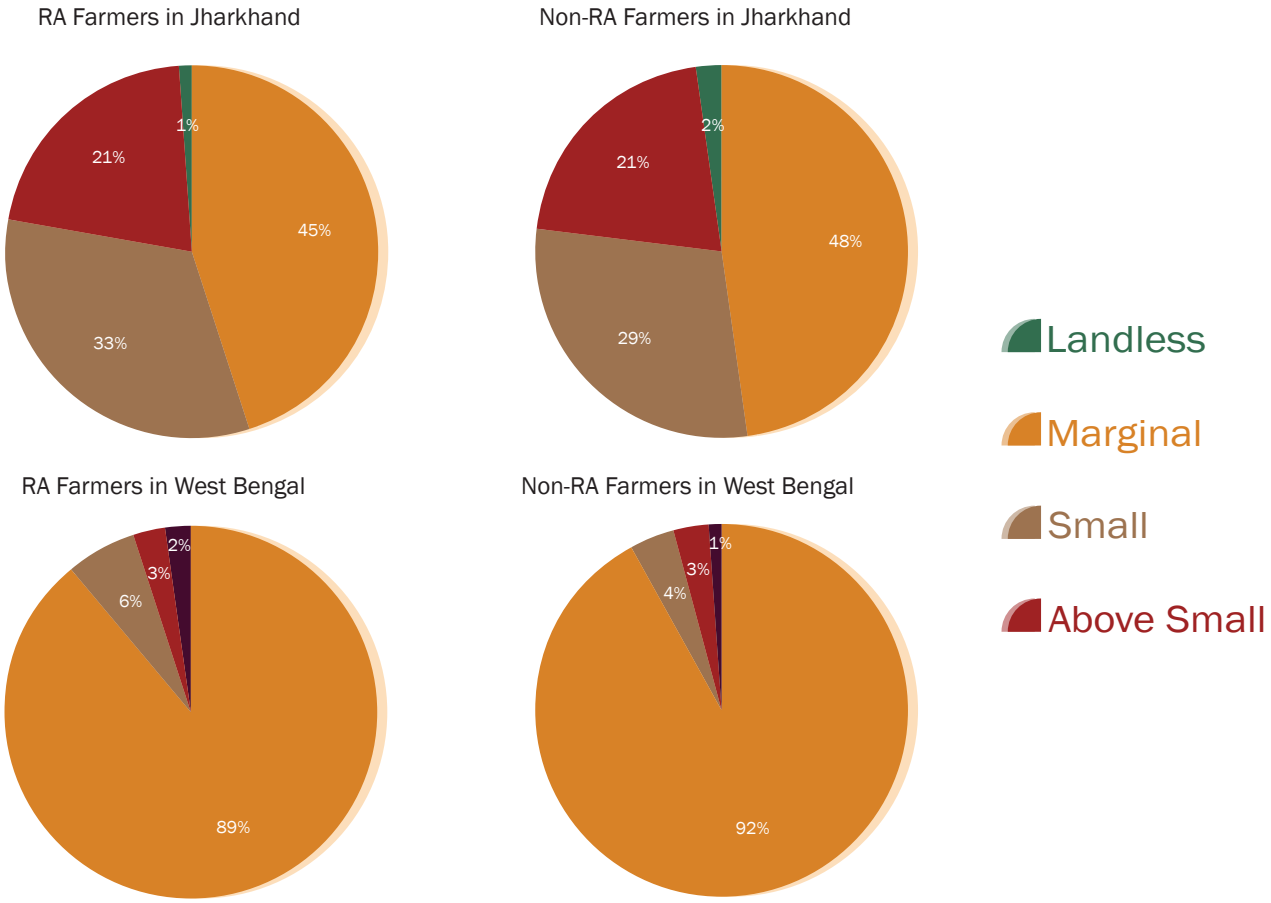


Table 3.4: Livestock Ownership by Different Categories of Land Ownership in Jharkhand

Land Ownership Category	Buffalo	Cow	Goat	Poultry	Pig
Landless	6.9	62.1	58.6	37.9	0
Marginal	6.4	72.4	70.3	55.8	6.4
Small	7.7	79.4	75.9	73.3	10.7
Above small	8.4	79.4	74.2	82.9	18.8
Overall	7.3	76	72.8	67.1	10.4

Table 3.5: Livestock Ownership by Different Categories of Land Ownership in West Bengal

Land Ownership category	Buffalo	Cow	Goat	Poultry	Pig
Landless	1.6	36.1	31.1	41	9.8
Marginal	2.3	62.9	53.6	61	9.7
Small	6.8	75.2	60.9	58.6	9
Above small	3.3	67.2	68.9	63.9	14.8
Overall	2.6	63.1	53.8	60.4	9.8

Tables 3.4 and 3.5 indicate that, in both Jharkhand and West Bengal, Regenerative Agriculture and non-RA farmers from the sampled districts are more likely to own cows, goats, or poultry.

Table 3.6: Occupational Distribution by Different Land Ownership Categories in Jharkhand (in %)

Occupation	Landless	Marginal	Small	Above Small	Total
Agricultural Enterprise	0	0.08	1	0.20	0.3
Agricultural Labour	29	29	25	23	26
Cultivation	64	65	71	75	69
Government Job	0	0.08	0	1	0.1
Housewife	0	0.20	0	0.20	0.1
Livestock	0	1	1	0.30	1
Non-agricultural Enterprise	0	0.20	0.20	0.30	0.2
Non-agricultural Labour	4	5	2	1	3
Not Working	4	0.08	0	0	0.07
Private Job (formal as well as informal)	0	0	0.30	0	0.1
Retired	0	0.08	0.20	0.30	0.2
Student	0	0.08	0.10	0	0.07
NA	1	0	0	0	1

Table 3.6 presents the occupational distribution based on the main source of income in Jharkhand across different land ownership categories. Cultivation was reported as the primary source of income by 64–75% of households across all land ownership categories, followed by agricultural labour. Table 3.7 indicates that in West Bengal, the main source of income for most households in the landless and marginal farmer categories is agricultural and non-agricultural labour, followed by cultivation. For small farmers, the order is reversed.

Table 3.7: Occupational Distribution by Different Land Ownership Categories in West Bengal (in %)

Occupation	Landless	Marginal	Small	Above Small	Total
Agricultural Labour	40.98	49.68	27.82	62.30	48.53
Non-agricultural Labour	42.62	17.14	12.03	9.84	17.33
Retired	0.00	0.05	0.00	0.00	0.04
Government Job	0.00	0.78	3.01	1.64	0.91
Private Job (formal as well as informal)	0.00	0.34	0.75	0.00	0.35
Not Working	1.64	0.10	0.75	0.00	0.17
Livestock	6.56	2.38	5.26	1.64	2.64
Agricultural Enterprise	0.00	0.15	0.00	0.00	0.13
Non-Agricultural Enterprise	0.00	0.15	0.00	0.00	0.13
Cultivation	8.20	27.34	47.37	21.31	27.83
Housewife	0.00	1.75	3.01	3.28	1.82
Student	0.00	0.05	0.00	0.00	0.04
Other Specify	0.00	0.10	0.00	0.00	0.09

04 TRAINING, EXPOSURE AND KNOWLEDGE TRANSFER

Training and exposure play a crucial role in promoting the widespread adoption of Regenerative Agriculture (RA). Farmers must understand the complex interrelationships among soil, water, plants, and the roles of microbes, worms, animals, and fungi in plant growth, from a scientific perspective. Regenerative Agriculture practices are deeply rooted in this scientific comprehension of natural processes. Therefore, training in Regenerative Agriculture is essential for imparting this perspective and transferring the necessary skills for implementation. The transfer of knowledge, encompassing both scientifically validated evidence and local traditional practices, is key to the successful dissemination and implementation of Regenerative Agriculture practices across diverse agricultural landscapes. These training initiatives also help farmers re-frame their indigenous knowledge, allowing Regenerative Agriculture practices to evolve as a blend of scientific and traditional approaches, making them more acceptable to the farming community. Additionally, exposure to successful Regenerative Agriculture farms serves as a catalyst, fostering belief in Regenerative Agriculture practices and motivating farmers to implement them on their own farms.

Training and exposure have been the primary means of creating awareness and transferring knowledge of Regenerative Agriculture to farmers in the study area. Both men and women from Regenerative Agriculture-practising households have received training and exposure.

Training and Exposure

Figure 4.1 shows that in Jharkhand, an overwhelming 96% of female respondents and 86% of male respondents from Regenerative Agriculture farming households reported receiving training in Regenerative Agriculture. Similarly, in West Bengal, as depicted in Figure 4.2, 97% of female respondents and 88% of male respondents reported receiving training on Regenerative Agriculture practices.

Figure 4.1: Regenerative Agriculture Farmers Who Received Any Training in Jharkhand

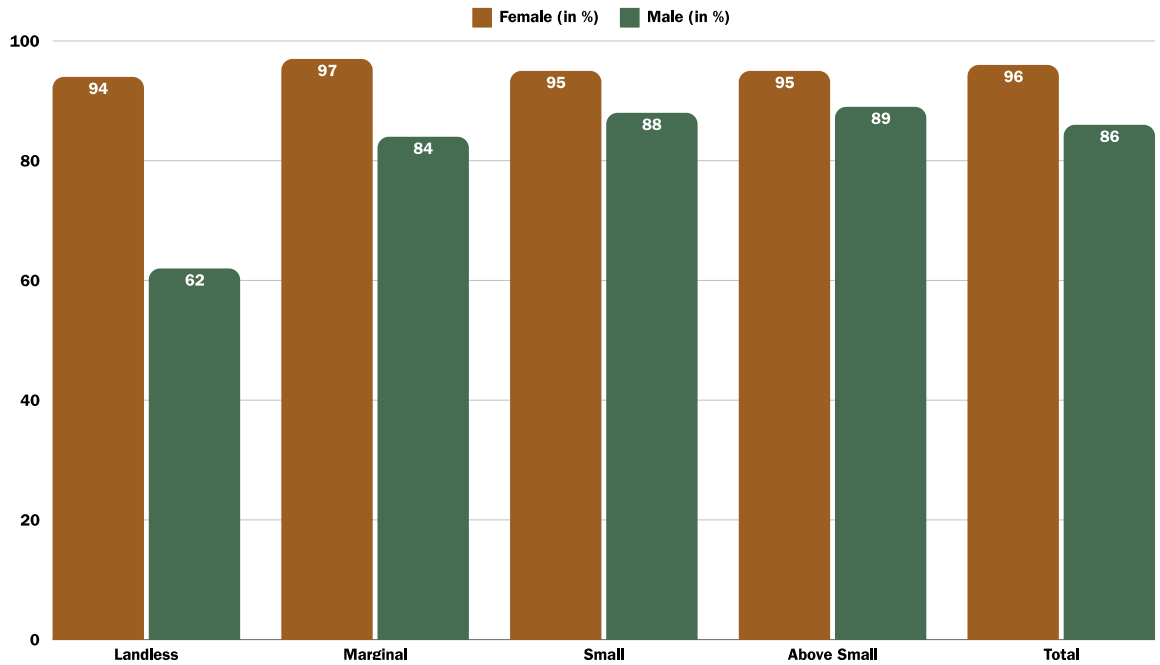
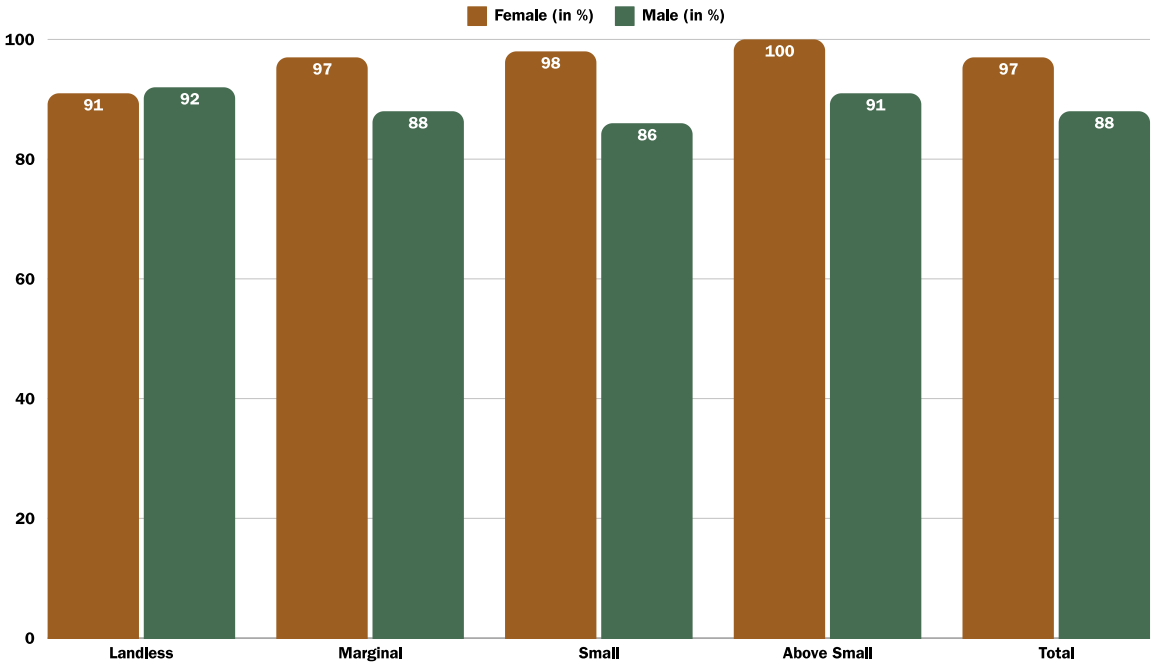


Figure 4.2: Regenerative Agriculture Farmers Who Received Any Training in West Bengal



Figures 4.3 and 4.4 show that in Jharkhand, 60% of females and 62% of males and in West Bengal, 70% of females and 61% of males had received any exposure to Regenerative Agriculture.

Figure 4.3: Regenerative Agriculture Farmers Who Received Any Exposure in Jharkhand

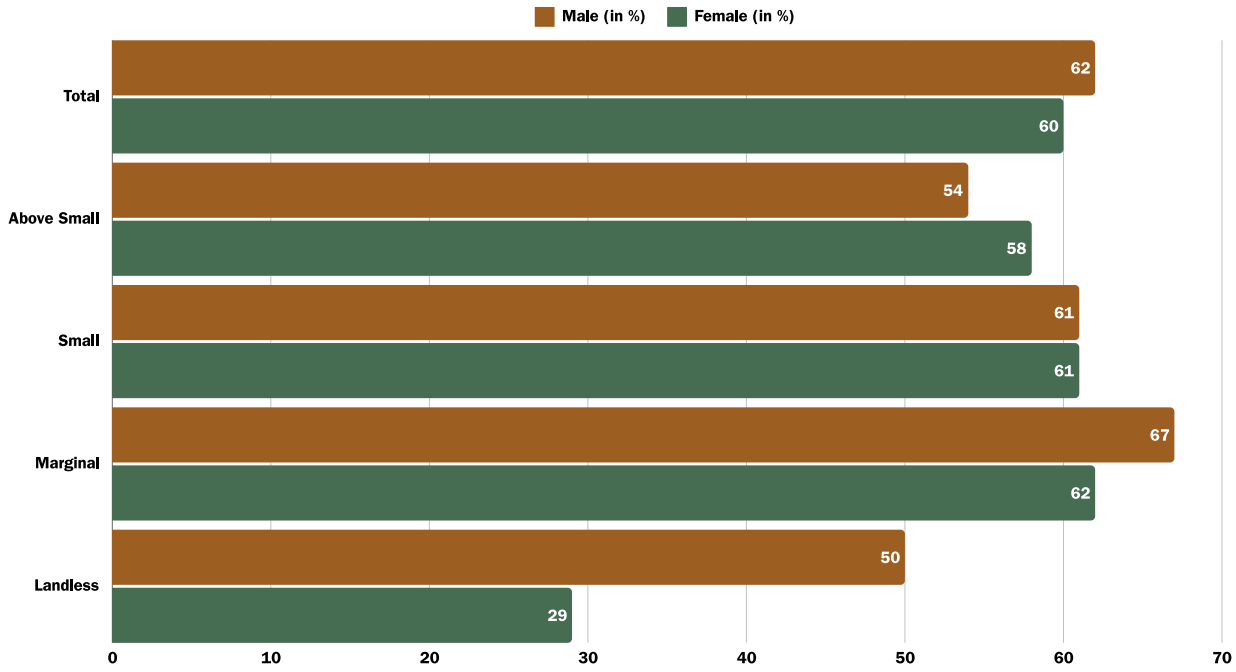


Figure 4.4: Regenerative Agriculture Farmers Who Received Any Exposure in West Bengal

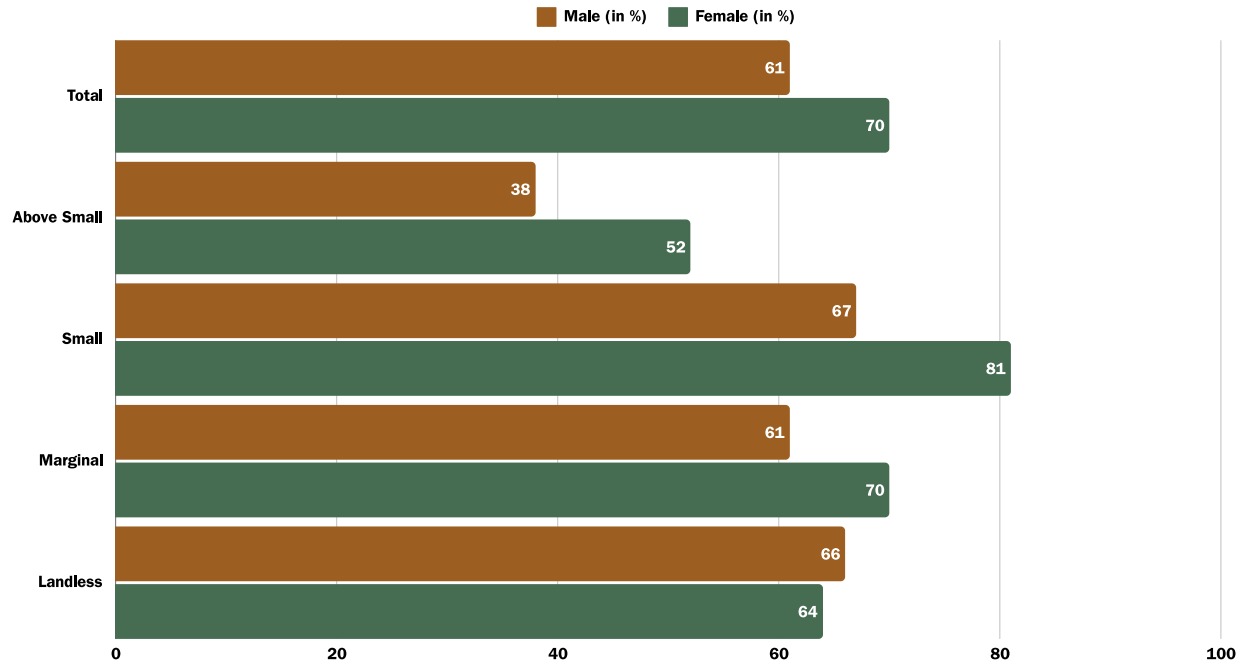


Table 4.1: Regenerative Agriculture Farmers' Place of Exposure and Whether It Helped in Adopting Regenerative Agriculture Practices in Jharkhand

Place of Exposure	Female		Male	
	Went for Exposure (%)	Reported Exposure to Be Helpful (% of Exposed)	Went for Exposure (%)	Reported Exposure to Be Helpful (% of Exposed)
Within Block	72	98	69	97
Outside Block	27	99	29	99
Other State	0.5	100	1	100
Other	0.5	100	1	100

Tables 4.1 and 4.2 illustrate that, among individuals exposed to Regenerative Agriculture farms, the majority of participants got exposure within the same block. Almost 97 to 100% of those who experienced exposure found it beneficial to adopt Regenerative Agriculture practices.

Table 4.2: Regenerative Agriculture Farmers' Place of Exposure and Whether It Helped in Adopting Regenerative Agriculture Practices in West Bengal

Place of Exposure	Female		Male	
	Went for Exposure (%)	Reported Exposure to Be Helpful (% of Exposed)	Went for Exposure (%)	Reported Exposure to Be Helpful (% of Exposed)
Within Block	88.13	99.49	80.79	98.48
Outside Block	10.07	99.25	14.31	98.1
Other State	0.08	100	0.14	100
Other	1.73	100	4.77	100

Table 4.3: Percentage of Regenerative Agriculture Farmers With Knowledge of Different Regenerative Agriculture Practices in Jharkhand

Area of Practice	Landless		Marginal		Small		Above Small		Total	
	F	M	F	M	F	M	F	M	F	M
Soil Moisture (in %)	94.1	100	97.7	98.7	97.4	99	98	99.7	97.6	99.1
High-Quality Manure (in %)	82.4	100	95.4	97.2	93.2	96.3	97.8	99.1	95	97.4
Local Seed Variety (in %)	94.1	100	95.5	97	93.9	96.3	96	98.9	95	97.2
Organic Seed Treatment (in %)	94.1	100	92.6	93.8	92.1	95.3	95.1	97.4	93	95.3
Plant Protection Concoctions (in %)	100	100	93.6	92.9	94.1	96.7	95.8	98.6	94.3	95.7
Plant Protection (in %)	88.2	87.5	86.2	87.8	85.9	90.3	90.3	94	87	90.3
Agronomic Practices (in %)	94.1	100	90.8	92.3	91.2	94.4	91.2	92.8	91.1	93.2
Plant Growth Enhancer (in %)	76.5	87.5	85.3	86.9	85.5	91.2	87.4	92.6	85.7	89.8

F-female, M-male

Regenerative Agriculture Farmers' Knowledge of RA Practices

Nevertheless, a significant percentage of individuals from Regenerative Agriculture-practising households, both male and female, indicated familiarity with Regenerative Agriculture practices, as shown in Tables 4.3 and 4.4.

Table 4.4: Percentage of Regenerative Agriculture Farmers With Knowledge of Different Regenerative Agriculture Practices in West Bengal

Area of Practice	Landless		Marginal		Small		Above Small		Total	
	F	M	F	M	F	M	F	M	F	M
Soil Moisture	74.42	78.79	87.58	91.74	88.79	95.65	94.92	90.62	87.58	91.58
Manure	88.37	93.94	97.08	97.22	98.28	98.55	98.31	96.88	97	97.19
Local Seed Variety (in %)	83.72	100	94.58	97.03	95.69	100	96.61	100	94.46	97.36
Organic Seed Treatment (in %)	88.37	90.91	92.71	95.92	91.38	98.55	91.53	84.38	92.5	95.63
Plant Protection Concoctions (in %)	65.12	69.7	88.75	93.14	93.1	98.55	93.22	96.88	88.62	92.9
Plant Protection (in %)	65.12	69.7	82.8	90.26	81.9	91.3	47.46	46.88	81.27	88.61
Agronomic Practices (in %)	74.42	75.76	81.87	83.86	81.03	84.06	59.32	56.25	80.96	82.92
Plant Growth Enhancer (in %)	48.84	51.52	67.58	73.47	67.24	69.57	42.37	46.88	66.37	71.95

F-female, M-male

In both Jharkhand and West Bengal, as evident from Figures 4.1–4.4 and Tables 4.1–4.4, although the percentage of males trained in Regenerative Agriculture is lower than that of females, the percentage of males reported to possess knowledge of Regenerative Agriculture practices is higher across all areas. Further exploration is required to understand the reasons behind this disparity.

Table 4. 5: Regenerative Agriculture Knowledge Sources in Jharkhand

Source of Knowledge	Landless		Marginal		Small		Above Small		Total	
	F	M	F	M	F	M	F	M	F	M
PRADAN (in %)	100	87.5	96.3	94	96.2	96.7	94.7	93.4	96	94.8
Other NGO (in %)	11.8	25	7.5	7.7	11.7	13.2	14.6	18.3	10.4	12.4
Friend (in %)	0	0	2.9	1.5	5	3.3	6	6.3	4.2	3.3
Government Extension Department (in %)	0	0	1.4	2.6	3.8	6	6.8	8.6	3.3	5.3
Neighbours (in %)	0	0	6	6.4	11.9	9.7	20.8	23.5	11	11.8
Observing Others in the Village (in %)	0	0	4.8	5.1	14.5	15.6	24.1	24.6	12	13.7
Intergenerational Knowledge (in %)	11.8	12.5	5.5	5.8	12.8	14.8	19.4	19.8	10.9	12.6
Other (in %)	0	0	0.1	0.2	0.6	0.4	1.5	1.4	0.6	0.6

F-female, M-male

Tables 4.5 and 4.6 show that in Jharkhand over 96% of females and 94% of males and in West Bengal around 85% of females and males reported that they gained knowledge about Regenerative Agriculture from PRADAN. Additionally, in Jharkhand, approximately 11% of females and 13% of males stated that they acquired Regenerative Agriculture knowledge through intergenerational exchange of information.

Table 4.6: Regenerative Agriculture Knowledge Sources in West Bengal

Source of Knowledge	Landless		Marginal		Small		Above Small		Total	
	F	M	F	M	F	M	F	M	F	M
PRADAN (in %)	90.7	87.88	95.1	93.78	96.55	91.3	88.14	87.5	94.88	93.32
Other NGO (in %)	9.3	12.12	6.12	7.7	9.48	10.14	5.08	9.38	6.36	8
Friend (in %)	0	0	3.85	4.64	8.62	8.7	3.39	6.25	4.04	4.79
Government Extension department (in %)	4.65	0	12.77	13.73	23.28	24.64	8.47	12.5	13.09	13.94
Neighbours (in %)	2.33	3.03	7.64	7.33	12.93	17.39	3.39	6.25	7.71	7.76
Observing Others in the Village (in %)	9.3	6.06	13.94	17.63	12.93	15.94	40.68	46.88	14.59	17.99
Intergenerational Knowledge (in %)	0	0	0.41	0.83	0.86	2.9	0	0	0.41	0.91
Other (in %)	0	0	0.87	1.39	2.59	5.8	0	3.12	0.93	1.65

F-female, M-male

Non-RA Farmers' Perception of Regenerative Agriculture

Non-RA farmers from a neighboring village were asked about their perceptions of the income, production, and food security of Regenerative Agriculture farmers following the adoption of Regenerative Agriculture practices. Figure 4.5 below illustrates the perspectives of non-RA farmers in Jharkhand regarding the agricultural income of Regenerative Agriculture farmers after adopting Regenerative Agriculture practices. Among respondents from non-RA households, 46% of males and 45% of females believe that farmers' income increased after adopting Regenerative Agriculture. In contrast, 35% of females and 37% of males think there was no change in income, while 20% of females and 17% of males perceive a decrease in income following Regenerative Agriculture adoption.

Figure 4.6, on the other hand, shows that in West Bengal, more than 88% of non-RA farmers, both female and male, perceived an increase in the farmers' income from agriculture due to Regenerative Agriculture.

Regarding production, Figure 4.7 indicates that over 42% of both males and females from non-RA households in Jharkhand believe that the agricultural production of Regenerative Agriculture farmers has increased following the adoption of Regenerative Agriculture. Conversely, only about 14% of females and 13% of males expressed the view that food production had declined.

Figure 4.5: Non-RA Farmers' Perception of Regenerative Agriculture Farmers' Income From Agriculture After Adopting Regenerative Agriculture in Jharkhand

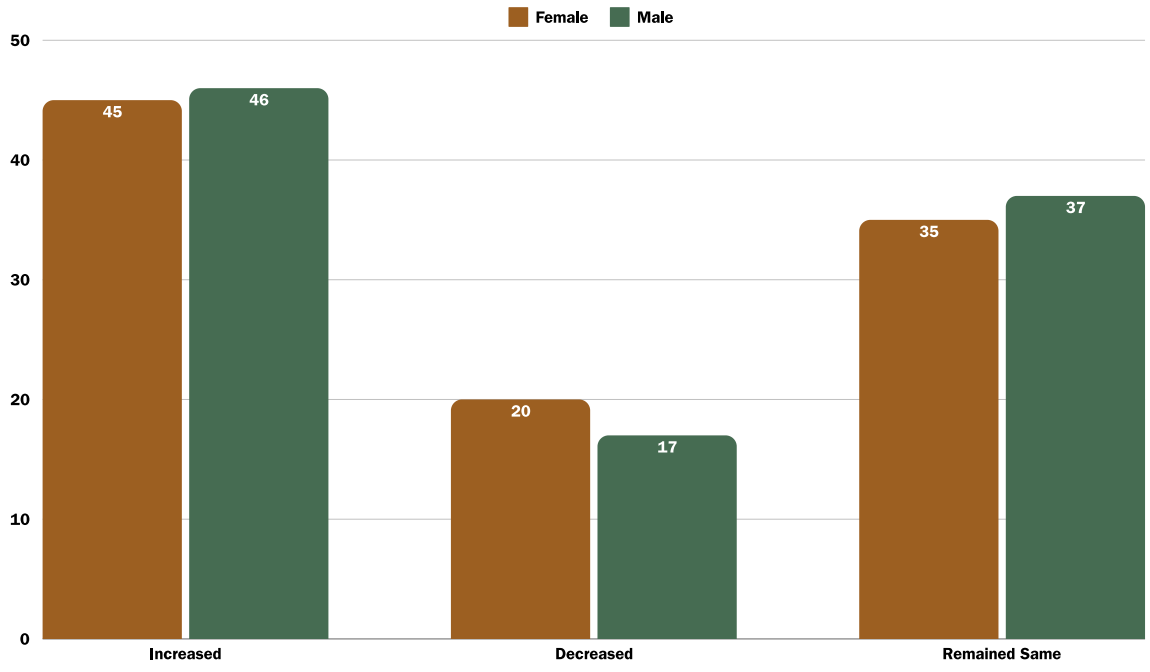


Figure 4.6: Non-RA Farmers' Perception of Regenerative Agriculture Farmers' Income From Agriculture After Adopting Regenerative Agriculture in West Bengal

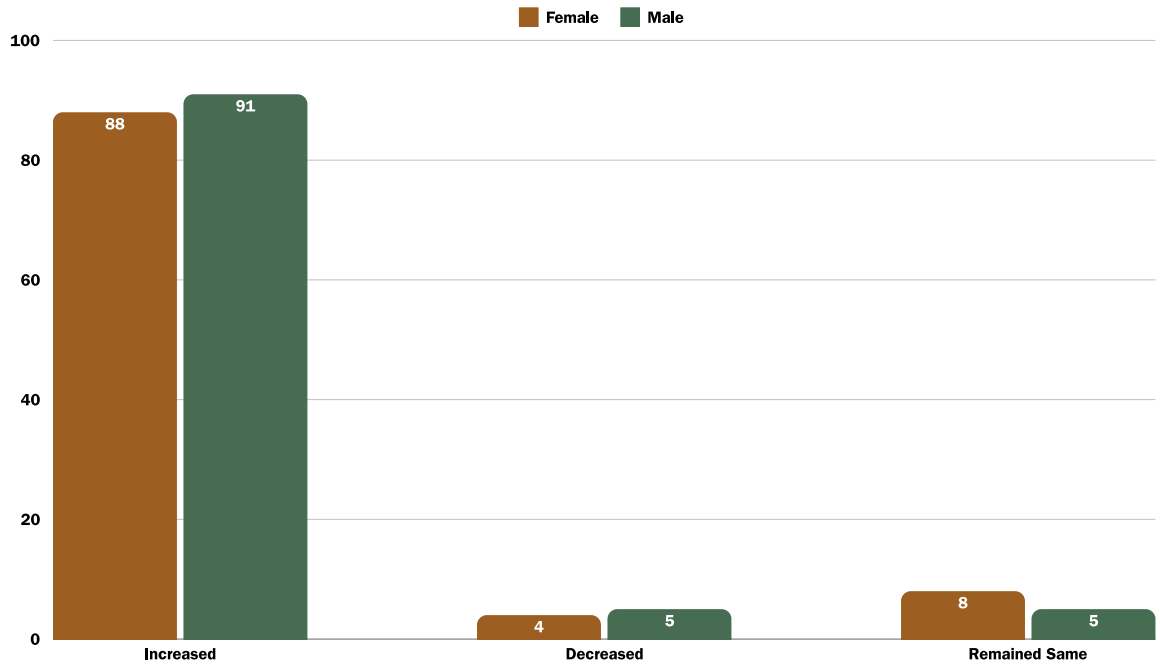


Figure 4.7: Non-RA Farmers' Perception of Regenerative Agriculture Farmers' Production From Agriculture After Adopting Regenerative Agriculture in Jharkhand

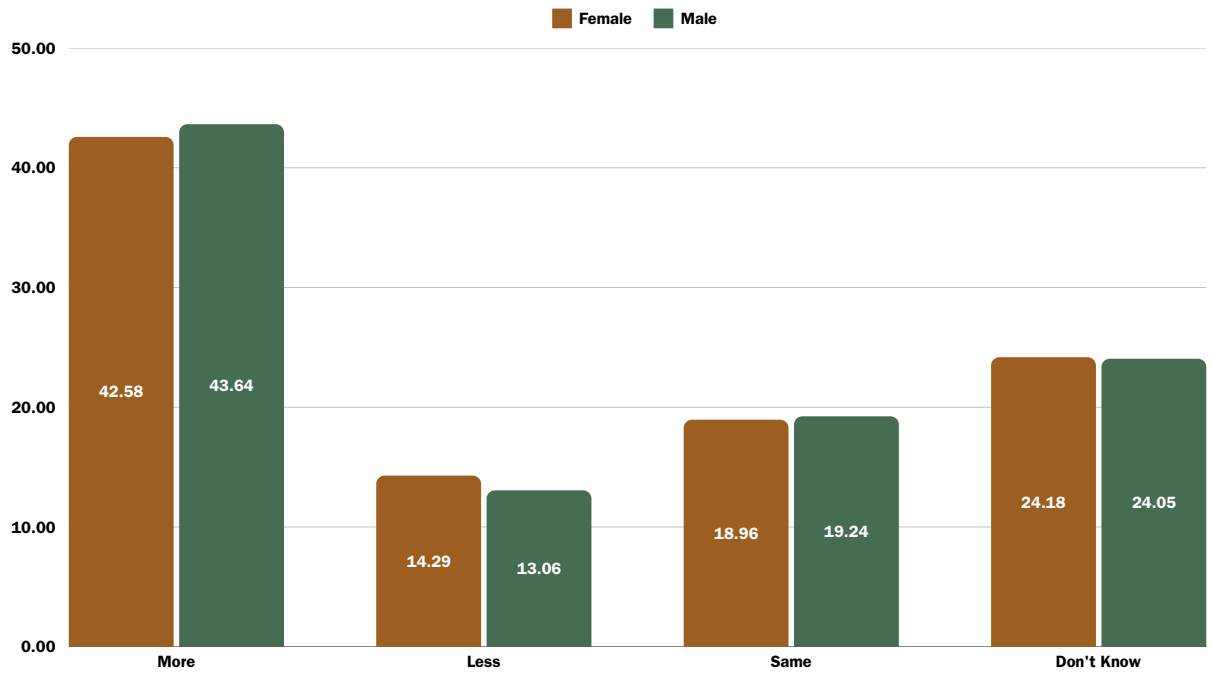
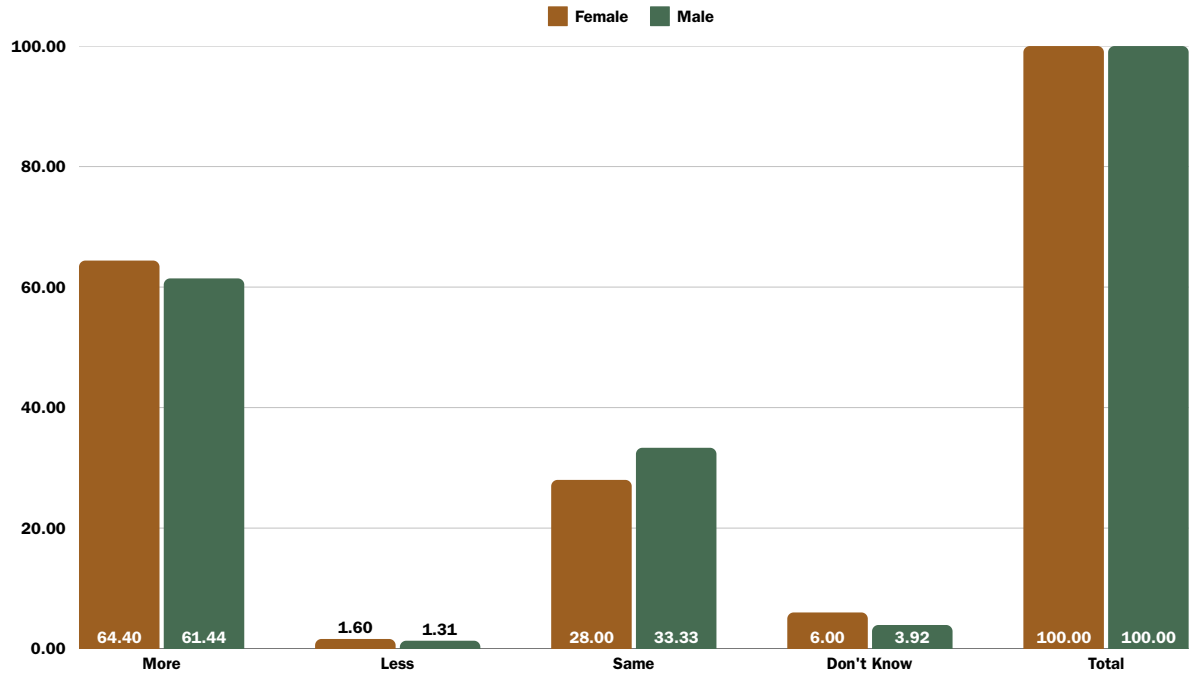


Figure 4.8: Non-RA Farmers' Perception of Regenerative Agriculture Farmers' Production From Agriculture After Adopting Regenerative Agriculture in West Bengal



Similarly, Figure 4.8 shows that 64.4% of female respondents and 61.44% of male respondents in West Bengal who did not practice Regenerative Agriculture believed that Regenerative Agriculture led to an increase in food production for these farmers. The proportion of those who believed it led to a decline in food production was minimal, at 1.6% and 1.31%, respectively.

Figure 4.9: Non-RA Farmers' Perception of Regenerative Agriculture Farmers' Food Security From Agriculture After Adopting Regenerative Agriculture in Jharkhand

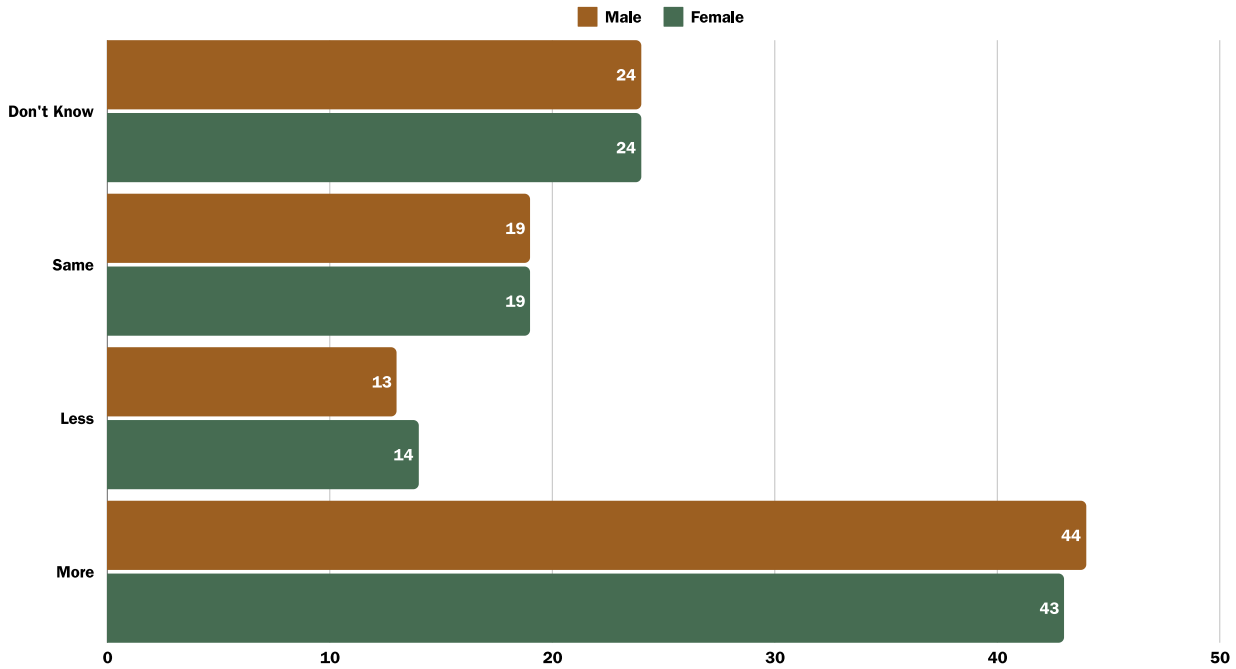
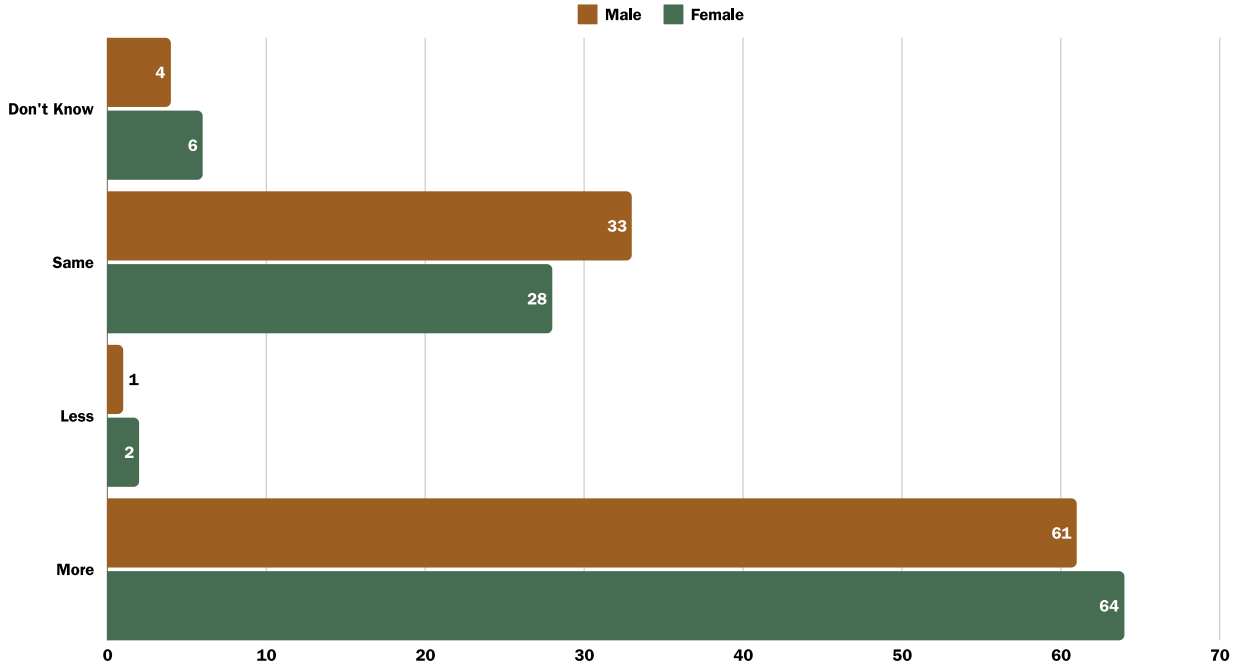


Figure 4.9 reveals that approximately 44% of males and 42% of females in Jharkhand from non-RA households believe that the food security of Regenerative Agriculture farmers has improved following the adoption of Regenerative Agriculture. About 13% of both males and females expressed the belief that food security has declined. Additionally, 24% of respondents, comprising both males and females, stated that they do not have a clear understanding of the impact on food security.

Similarly, Figure 4.10 highlights that a higher proportion of non-RA female and male respondents in West Bengal, at 64% and 61% respectively, believe that food security has improved after practising Regenerative Agriculture compared to Jharkhand.

Figure 4.10: Non-RA Farmers' Perception of Regenerative Agriculture Farmers' Food Security From Agriculture After Adopting Regenerative Agriculture in West Bengal



The data presented in this section highlight the critical roles of training and exposure in raising awareness and disseminating knowledge of Regenerative Agriculture practices among farmers. Both men and women have actively participated in training programs and exposure visits, with substantial percentages reporting the effectiveness of these initiatives in adopting Regenerative Agriculture practices. Most participants, particularly women, received exposure within their respective blocks. Notably, a small percentage of men reported exposure to Regenerative Agriculture farms in other states, underscoring a gender disparity in this aspect.

Furthermore, the significant percentage of both male and female participants who reported that exposure helped them adopt Regenerative Agriculture practices demonstrates the positive impact of these initiatives on farming practices. Despite a slightly higher percentage of women undergoing training, men exhibited a greater understanding of Regenerative Agriculture practices across various areas. PRADAN has played a significant role as the primary source of Regenerative Agriculture knowledge for both genders. However, many farmers, regardless of gender, have reported acquiring knowledge from multiple sources, indicating the involvement of various actors in spreading Regenerative Agriculture awareness and knowledge.

Finally, the perceptions of non-RA farmers provide valuable insights into the broader community's awareness of the outcomes of Regenerative Agriculture practices. The majority believe that Regenerative Agriculture has positively impacted farmers' income, production, and food security, emphasising the potential benefits associated with the adoption of Regenerative Agriculture practices.

05 ECOLOGICAL IMPACT OF REGENERATIVE AGRICULTURE

Regenerative Agriculture is characterized by an outcomes-focused approach, particularly in terms of ecological impacts. It holds the potential to transform farming practices not only to meet food demands but also to restore and sustain the planet's health. Rooted in the philosophy of healing the land, Regenerative Agriculture is a holistic framework that goes beyond mere cultivation techniques, emphasising the interconnectedness of soil health, biodiversity, watershed protection, and economic resilience (Grelet et al., 2021; White, 2020).

The transition to Regenerative Agriculture follows a phased approach, beginning with the cessation of synthetic inputs. By diversifying crops and eliminating artificial fertilisers, farmers adopt a more sustainable and regenerative system. This step-by-step process is crucial for revitalising the soil, enabling the restoration of natural fertility and overall soil health (White, 2020). It represents not just a change in practice but a paradigm shift towards working in harmony with nature.

Unlike traditional agriculture, which often focuses on harm reduction, Regenerative Agriculture views farming as an opportunity to actively enhance ecosystem health (Siegfried, 2020). This perspective highlights agriculture's potential not only to sustain but to improve ecosystem well-being. By adopting practices that regenerate rather than deplete, Regenerative Agriculture marks a significant shift toward sustainable and long-term ecological resilience.

Practitioners of Regenerative Agriculture believe in the self-organising potential of healthy ecological systems. Such systems naturally tend toward greater complexity, interdependence, and diversity, contributing to enhanced resilience (Gordon, Davila, & Riedy, 2022). This perspective aligns with ecological principles, recognizing that diverse ecosystems are often more resilient to external pressures and disturbances.

Regenerative Agriculture Farmers' Experience of Ecological Restoration

A significant global concern is land degradation resulting from conventional agricultural practices, which has impacted nearly 25% of the Earth's land surface (White, 2020). Conventional farming methods, characterized by synthetic inputs and monoculture, contribute to this degradation, reducing the land's productivity and overall ecological vitality.

Regenerative Agriculture seeks to address the critical issue of water scarcity by focusing on increasing organic matter in the soil. The soil's capacity to retain water is a crucial ecological benefit. Research indicates that a mere 1% increase in organic matter can enhance water storage by up to 16,000 gallons per acre (Sullivan, 2002). This underscores the potential of Regenerative Agriculture not only to improve agricultural productivity but also to aid water conservation—a pressing issue in many parts of the world.

Figure 5.1 demonstrates that over 83% of female and 87% of male Regenerative Agriculture farmers in Jharkhand reported improved water retention capacity in the soil.

Figure 5.1: Percentage of Regenerative Agriculture Farmers Reporting a Change in Water Holding Capacity of the Soil After Practising Regenerative Agriculture in Jharkhand

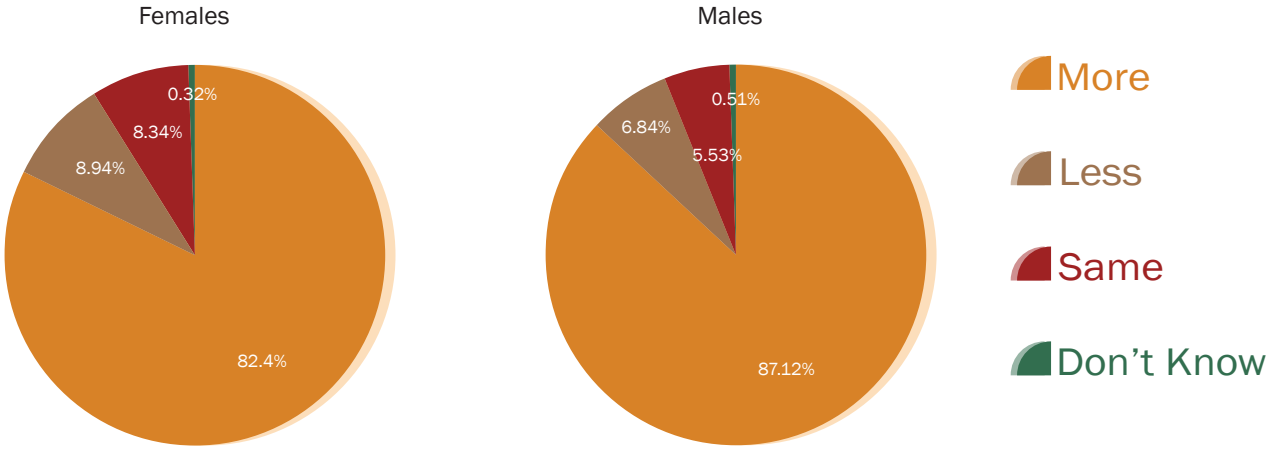
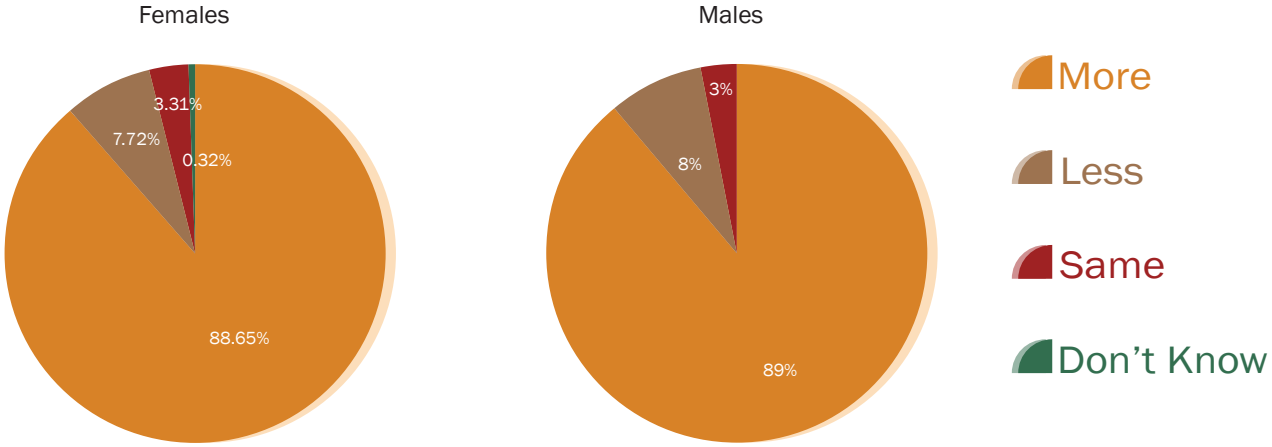


Figure 5.2 indicates that over 88% of female and male respondents in West Bengal reported an increase in the water-holding capacity of the soil after practising Regenerative Agriculture. Compared to Jharkhand, this proportion was higher. Consequently, the percentage of respondents stating that the water-holding capacity had remained the same or decline was lower.

Figure 5.2: Percentage of Regenerative Agriculture Farmers Reporting a Change in Water Holding Capacity of the Soil After Practising Regenerative Agriculture in West Bengal



Further, changes in soil towards a finer texture highlight the potential of Regenerative Agriculture to alter soil composition, thereby enhancing fertility and structure. Figure 5.3 illustrates that in Jharkhand, approximately 88% of female and 87% of male Regenerative Agriculture farmers observed a positive change in soil texture. Similarly, Figure 5.4 from West Bengal indicates that about 86% of female and 89% of male respondents reported that the soil texture had become finer after practising Regenerative Agriculture.

Figure 5.3: Percentage of Regenerative Agriculture Farmers in Jharkhand Reporting Change in Soil Texture After Practising Regenerative Agriculture

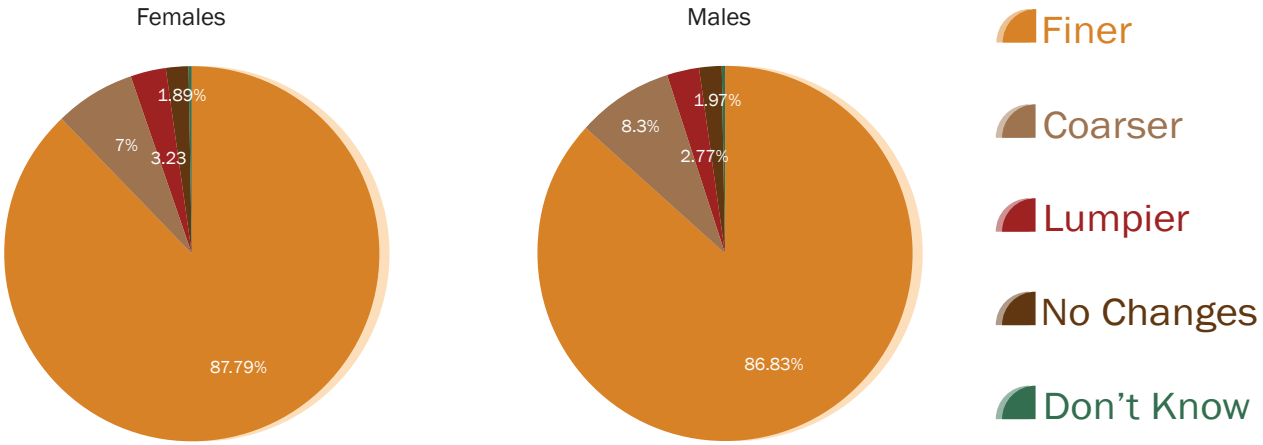
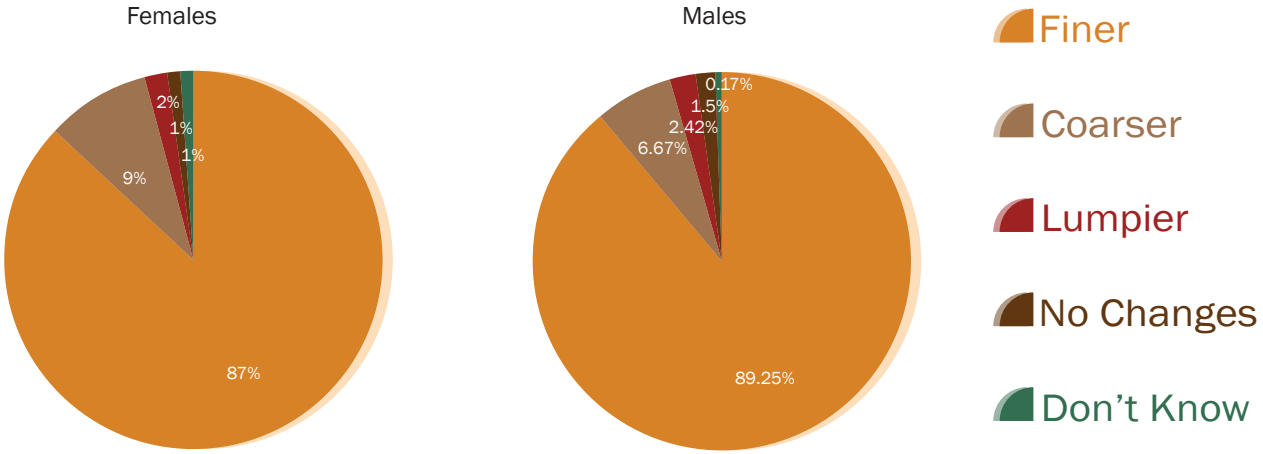


Figure 5.4: Percentage of Regenerative Agriculture Farmers in West Bengal Reporting a Change in Soil Texture After Practising Regenerative Agriculture



The darkening of soil colour signifies an improvement in organic matter content, further validating the regenerative process. Table 5.1 shows that over 94% of Regenerative Agriculture farmers in Jharkhand, both female and male, reported that their soil became darker after adopting Regenerative Agriculture.

In comparison, Table 5.2 indicates that in West Bengal, 72% of female and male respondents observed a darkening of soil colour after practising Regenerative Agriculture.

Table 5.1: Percentage of Regenerative Agriculture Farmers in Jharkhand Reporting a Change in Soil Colour After Practising Regenerative Agriculture

Soil Colour	Female	Male
Darker	94.33	94.61
Lighter	2.9	3.06
No Change	2.63	2.11
Don't Know	0.14	0.22

Table 5.2: Percentage of Regenerative Agriculture Farmers in West Bengal Reporting Change in Soil Colour After Practising Regenerative Agriculture

Soil Colour	Female	Male
Darker	72.52	72.92
Lighter	20.91	21.17
No Change	6.04	5.83
Don't Know	0.53	0.08

Regenerative Agriculture holds the promise of restoring damaged landscapes and realising their innate potential (Gordon, Davila, & Riedy, 2022). In addition to improving soil health, it promotes biodiversity—a key factor in ecological resilience. The focus on diverse crops, cover cropping, and polyculture in regenerative systems fosters a more balanced and resilient ecosystem, mitigating risks associated with monoculture and pesticide use. Figure 5.5 shows that 88% of female and 89% of male Regenerative Agriculture farmers in Jharkhand observed an increase in soil organisms, indicating enhanced soil biodiversity. The corresponding figures for West Bengal were 87% and 88%, as shown in Figure 5.6.

This finding was echoed during a focus group discussion (FGD) with a group of Community Resource Persons (CRPs) in Poraiyahat, who unanimously reported an increase in dost keeda (friendly organisms) and a decline in dushman keeda (harmful organisms), resulting in improved soil quality since

adopting Regenerative Agriculture. Exposure visits conducted by a PRADAN professional to Saraiyahat in Jharkhand also confirmed significant changes in soil structure as friendly organisms returned to the soil. Similar observations were reiterated by several PRADAN professionals in West Bengal during their interviews.

Figure 5.5: Percentage of Regenerative Agriculture Farmers in Jharkhand Reporting Change in Soil Organisms After Practising Regenerative Agriculture

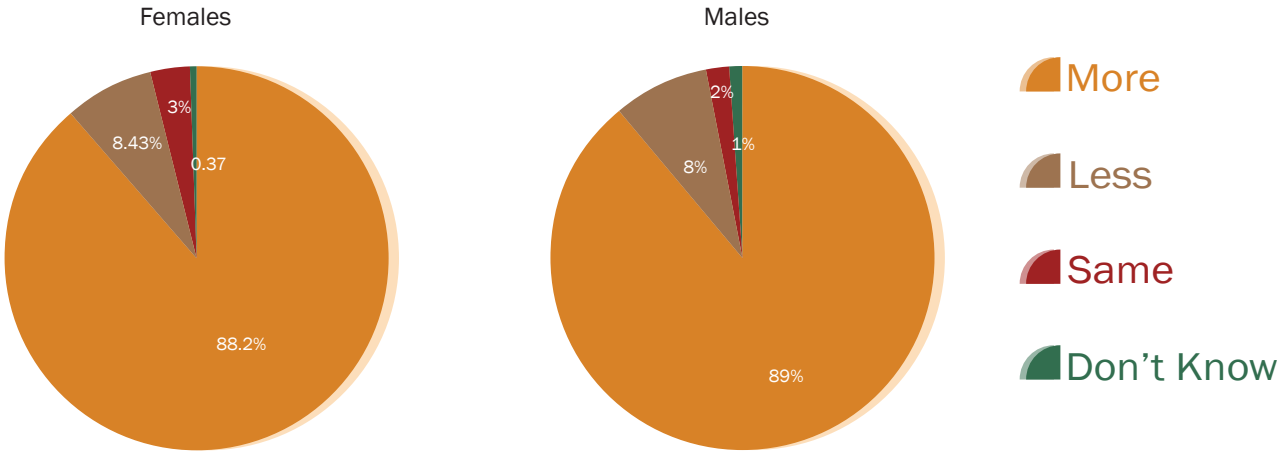
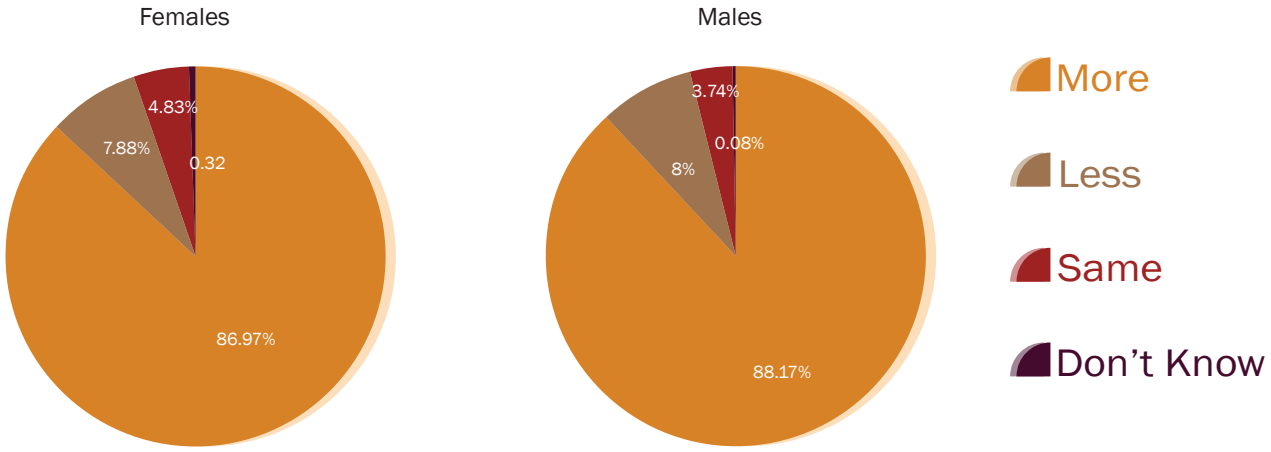


Figure 5.6: Percentage of Regenerative Agriculture Farmers in West Bengal Reporting Change in Soil Organisms After Practising Regenerative Agriculture



Regenerative Agriculture emerges as a beacon of hope for sustainable farming practices that address the needs of the present while ensuring the health and resilience of ecosystems for future generations. Reports from practitioners offer tangible evidence of the positive ecological impacts of Regenerative Agriculture, underscoring the urgency of its broader adoption in the global agricultural landscape.

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06 ECONOMIC ASPECTS OF REGENERATIVE AGRICULTURE

The economic aspects of Regenerative Agriculture (RA) have been a subject of considerable debate, particularly given its positioning as a complete alternative to synthetic input-based agriculture. Discussions often emphasize the role of agricultural systems in socio-economic production, focusing on Regenerative Agriculture's potential to feed the global population while providing an economically viable alternative for farmers who adopt it. These debates are closely linked to the productivity of Regenerative Agriculture compared to synthetic input-based agriculture.

While productivity remains central to evaluating the feasibility of Regenerative Agriculture, its ecological benefits have also faced scrutiny, albeit to a lesser extent. Since productivity is fundamental to maximising output from a given amount of land, it raises a critical question: Can Regenerative Agriculture, with its current yields, feed the world? This question forms the crux of the arguments made by both critics and proponents of Regenerative Agriculture. Although yields are only one component of the ecological, social, and economic benefits of any farming system, they are undeniably pivotal to a sustainable food security policy (Seufert et al., 2012, p.229).

The issue becomes more pronounced considering population growth projections, which estimate that the global population will reach 9 billion by the middle of this century. This growth is expected to increase the demand for food, feed, and biofuel by 50%, further straining the food supply system (Godfray et al., 2010, p.812; FAO, 2017). Rising wealth and purchasing power will compound this pressure, driving higher consumption levels. Additionally, the limited availability of cropland poses a significant challenge, as expanding it would likely create new ecological problems.

As a result, productivity takes center stage in the discourse on positioning Regenerative Agriculture as an alternative to synthetic input-based agriculture. Its economic competitiveness with conventional farming methods will be a decisive factor in determining its broader adoption.

Input Side Story

Highlighting the challenges on the input side is essential to understanding the complete supply chain of Regenerative Agriculture (RA) produce. It is equally crucial to address input-side issues to develop a scalable model of Regenerative Agriculture. Without a reliable and manageable input supply process, efforts to scale up and promote Regenerative Agriculture are likely to face significant obstacles.

Since Regenerative Agriculture relies on naturally available inputs from the farm, it not only reduces farmers' dependence on external inputs but also lowers their production costs. As part of this study, respondents practising Regenerative Agriculture were asked about various aspects related to input availability, preferences, and awareness. Details regarding awareness of different processes for input preparation have already been discussed in the previous chapter.

Figure 6.1: Preference for Own Unit-Preparation of Bio-Units Over Purchasing From External Sources in Jharkhand

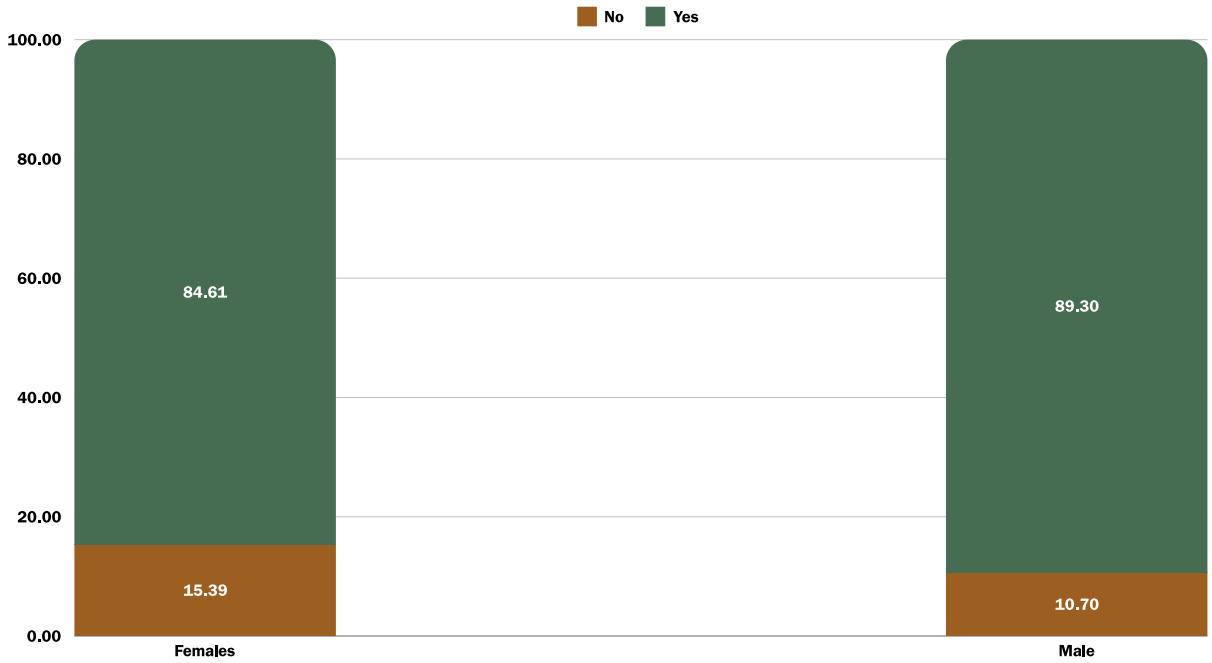


Figure 6.2: Preference for Own Unit-Preparation of Bio-Units Over Purchasing From External Sources in West Bengal

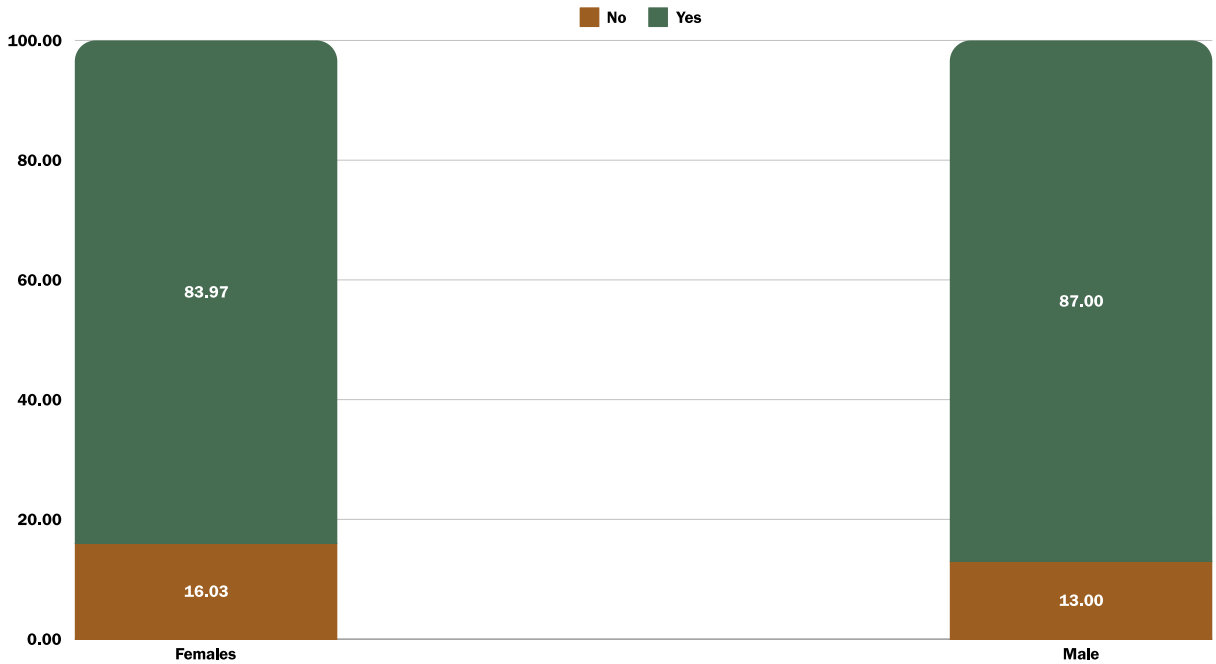


Figure 6.1 shows that in Jharkhand, 84.61% of female and 89.3% of male farmers reported preferring to prepare their own bio-inputs rather than purchasing them from external sources. Similarly, Figure 6.2 indicates that in West Bengal, 84% of female and 87% of male farmers expressed a preference for preparing bio-inputs at their own individual units instead of buying them externally. An analysis of Tables A6.1 and A6.2 in the Appendix suggests that this preference for self-preparation over purchasing remains consistent across different land ownership categories in both Jharkhand and West Bengal.

Table 6.1: Farmers' Preference and the Actual Source of Different Bio-Inputs in Jharkhand

	Actual Source (%)			Preference by Female Farmers (%)			Preference by Male Farmers (%)		
	Self-prepared	Purchased	Collected	Self-prepared	Purchased	Other	Self-prepared	Purchased	Other
Seed	50.55	48.28	1.17	52.72	47.24	0.05	56.77	43.16	0.07
Vermi-compost	59.1	40.26	0.64	45.85	47.14	7	46.14	46.65	7.21
Shivansh Khaad	72.45	27.24	0.31	56.41	38.66	4.93	55.9	37.92	6.18
Super-compost	38.25	61.18	0.57	32.03	62.86	5.12	35.15	61.35	3.5
Multi-seed	59.9	39.12	0.98	40	54.19	5.81	41.19	55.02	3.79
Beejamrit	60.48	39.16	0.36	53.04	45.44	1.52	54.8	43.74	1.46
Jeevamrit	75.48	23.96	0.56	53.46	40.88	5.67	53.42	39.52	7.06
Farm Yard Manure	70.87	24.61	4.52	81.89	17.65	0.46	78.6	21.25	0.15
Plant Protection	56.41	43.47	0.12	45.58	51.52	2.9	45.56	52.84	1.6
Mulching	68.63	28.2	3.17	51.66	36.77	11.57	52.33	36.32	11.35

Table 6.2: Farmers' Preference and the Actual Source of Different Bio-Inputs in West Bengal

	Actual Source (%)			Preference by Female Farmers (%)			Preference by Male Farmers (%)		
	Self-prepared	Purchased	Collected	Self-prepared	Purchased	Other	Self-prepared	Purchased	Other
Seed	49.49	49.88	0.62	55.75	42.93	1.31	62.08	36.92	1
Vermi-compost	48.83	50.86	0.31	46.3	46.72	6.99	51.08	42.75	6.17
Shivansh Khaad	78.77	20.46	0.77	37.78	45.09	17.13	42.75	38.83	18.42
Super-compost	62.43	37.57	0	39.04	49.5	11.46	42.83	46.58	10.58
Multi-Seed	71.08	28.38	0.54	40.51	47.56	11.93	45.25	41.58	13.17
Beejamrit	58.07	40.9	1.03	57.65	41.25	1.1	59.92	39.42	0.67
Jeevamrit	71.51	28.07	0.42	63.11	35.84	1.05	64.17	34.92	0.92
Farm Yard Manure	75.36	19.21	5.43	80.98	18.65	0.37	84.33	15.25	0.42
Plant Protection	65.49	34.23	0.28	54.28	43.35	2.36	58.75	39.75	1.5
Mulching	89.37	10.63	0	38.2	45.87	15.92	42.67	41.08	16.25

The data in Tables 6.1 and 6.2 highlight a clear preference in Jharkhand and West Bengal for preparing bio-inputs at home rather than purchasing them externally. This trend is particularly pronounced among male respondents, who reported a higher inclination towards self-preparation of inputs. Since bio-input preparation is predominantly undertaken by women, this preference underscores a notable gender dimension in the adoption and production of bio-inputs.

However, the tables also reveal a gap between the preference for and the actual preparation

of bio-inputs. For inputs like seeds and farmyard manure, a higher proportion of farmers preferred self-preparation compared to those who actually prepared them. Similarly, for most inputs, the preference to purchase exceeded actual purchases, likely due to the complexity and labour-intensive nature of self-preparation. Personal interviews revealed that the preparation of many bio-inputs is a challenging task, requiring significant labour and facing obstacles such as the unavailability of certain materials like cow urine. Furthermore, assembling ingredients often involves unpleasant aspects, such as dealing with foul smells, while the availability of raw materials for these inputs is also limited (discussed later in the report).

Additionally, Table 6.3 shows that in Jharkhand, over 15% of respondents reported that the availability of raw materials for preparing bio-inputs was either moderate or tough for most inputs. Similarly, in West Bengal (see Table 6.4), more than 10% of respondents stated that raw material availability was moderate or tough.

Table 6.3: Percentage of Regenerative Agriculture Farmers Reporting Availability of Raw Materials for Different Bio-Inputs in Jharkhand

Availability	Seed	Vermi-compost	Shivansh Khaad	Super-compost	Multi-seed	Beejamrit	Jeevamrit	FYM	Plant Protection	Mulching
Easy	79.03	82.98	80.79	82.41	83.31	83.36	83.23	84.63	84.55	80.77
Moderate	10.48	9.24	11.81	10.45	11.78	9.28	9.98	9.59	8.95	12.57
Tough	6.76	6.22	6.87	5.19	3.93	6.37	6.07	4.80	5.33	4.59
Not Available Locally	3.66	1.46	0.54	1.70	0.25	0.99	0.72	0.79	1.10	0.55
Other	0.07	0.09		0.24	0.74			0.20	0.06	1.53

Table 6.4: Percentage of Regenerative Agriculture Farmers Reporting Availability of Raw Materials for Different Bio-Inputs in West Bengal

Availability	Seed	Vermi-compost	Shivansh Khaad	Super-compost	Multi-seed	Beejamrit	Jeevamrit	FYM	Plant Protection	Mulching
Easy	76.81	76.4	81.33	85.42	84.86	82.83	86.88	85.44	85.34	90.37
Moderate	21.01	20.24	13.04	12.71	14.05	15.67	12.61	13.81	13.82	8.97
Tough	1.09	0.2	5.12	0.56	1.08	0.84	0.25	0.75	0.46	0.66
Not available locally	1.09	3.05	0.51	1.31		0.66	0.25		0.37	
Other		0.1								

Tables 6.3 and 6.4 underscore the critical role of bio-resource centers (BRCs) in two key ways: first, in situations where self-preparation of bio-inputs is difficult, farmers rely on BRCs; and second, when purchasing bio-inputs is challenging, a higher proportion of farmers resort to self-preparation despite preferring external purchases. This highlights the importance of BRCs not only in supplying bio-inputs to farmers unable to prepare them but also in meeting the needs of farmers who wish to buy them but face obstacles in doing so.

BRCs are locally operated units engaged in the large-scale production of bio-inputs used in Regenerative Agriculture (RA). By producing all inputs in one location, BRC entrepreneurs achieve economies of scale that are otherwise unattainable for individual farmers. The supply chain of these products involves collecting information about farmers' needs and passing it to BRC entrepreneurs. This information gap is bridged by FPO (Farmer Producer Organization) area managers and AKMs (Ajeevika Krishi Mitra), who gather data from farmers across villages and relay it to the BRCs. This system not only aids BRC entrepreneurs in procuring raw materials but also minimizes the turnover rate of products with a short shelf life.

The BRC model, which has started developing and expanding in recent years, is still in its early stages but serves as a vital component in the Regenerative Agriculture production network. The ready availability of bio-inputs through BRCs facilitates farming without synthetic inputs, which are otherwise more easily accessible. However, compared to the synthetic inputs market, BRCs face significant challenges, including infrastructure, transportation, and logistics, as they scale up.

PRADAN has played a pivotal role in supporting BRC entrepreneurs by providing essential assets such as preparation drums, weighing machines, crates, packaging bottles, jars, and other resources. Additionally, PRADAN has provided training to equip BRC entrepreneurs

with the necessary skills to manage these units effectively. The evolving collaboration between BRCs and FPOs has enabled entrepreneurs to scale up by centralizing sales and improving information flow.

The significance of BRCs is further highlighted by the high percentage of farmers who cited the unavailability of raw materials as a barrier to practising Regenerative Agriculture across all their lands. In this context, government support to strengthen and expand the BRC model would be instrumental in making it sustainable, scalable, and economically viable.

Labour Requirement

In addition to this, the labour required also acts as an important factor in deciding farmers' inclination towards Regenerative Agriculture.

Tables 6.5 and 6.6 indicate that a majority of male (47%) and female (44%) respondents reported that the labour required for Regenerative Agriculture (RA) was higher compared to synthetic input-based agriculture. This observation was also corroborated during focus group discussions (FGDs) with Community Resource Persons (CRPs), where increased labour requirements in Regenerative Agriculture emerged as a key topic. Further analysis of the gendered aspects of labour requirements revealed an interesting dynamic: the burden of this increased labour disproportionately fell on women.

Table 6.5: Labour Requirement Under Regenerative Agriculture According to Male and Female Respondents in Jharkhand

Labour Requirement	Female (%)	Male (%)
More	44.01	47.31
Less	26.91	25.98
Same	28.34	25.69
Don't Know	0.74	1.02

Table 6.6: Labour Requirement Under Regenerative Agriculture According to Male and Female Respondents in West Bengal

Labour Requirement	Female (%)	Male (%)
More	39.1	44
Less	38.99	35
Same	21.65	20.92
Don't Know	0.26	0.08

Figure 6.3 shows that in Jharkhand, approximately 62% of female respondents reported an increased workload after adopting Regenerative Agriculture (RA). In contrast, in West Bengal, 60.59% of female respondents believed that the workload on women did not increase following Regenerative Agriculture adoption. In Jharkhand, the activities contributing most to the increased workload included field preparation, nursery bed preparation, and manure preparation. This perspective, that Regenerative Agriculture increased women's workload, was consistent across all land ownership categories in Jharkhand. However, the percentage of female respondents reporting this declined as land ownership increased (see Tables A6.3 and A6.4 in the Appendix).

Figure 6.3: Distribution of Female Respondents by Their Perspective on Increased Workload on Women in Jharkhand and West Bengal

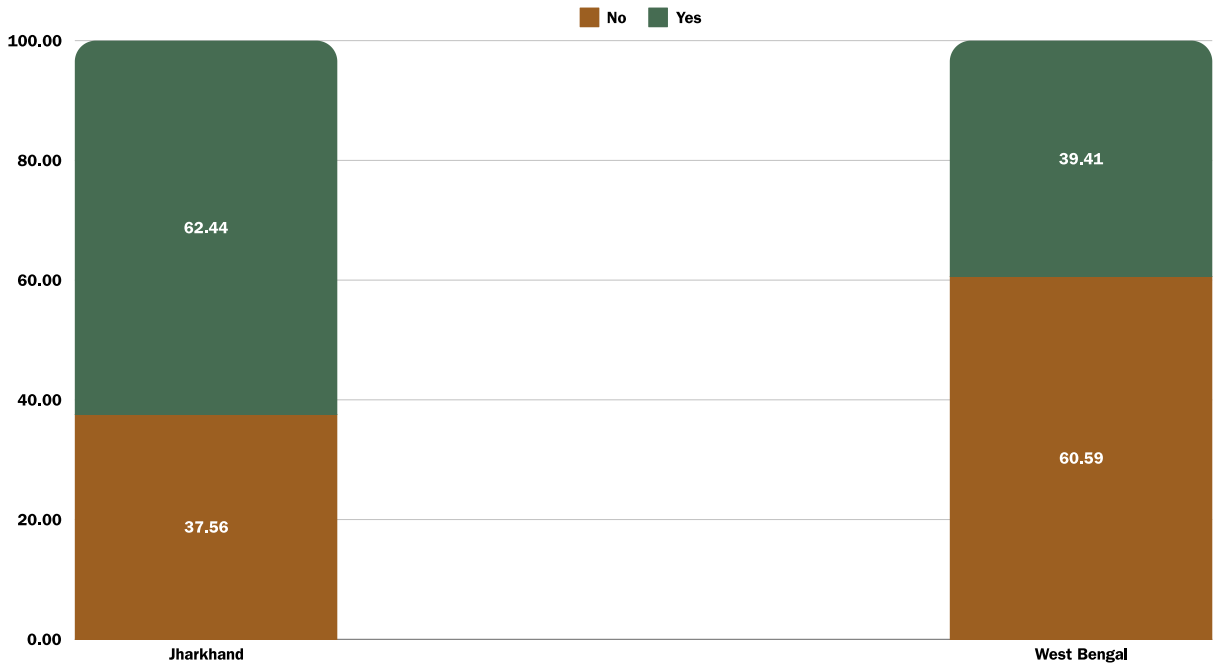


Figure 6.4: Distribution of Female Respondents in Jharkhand by Their Perspective on Returns on Labour in Regenerative Agriculture

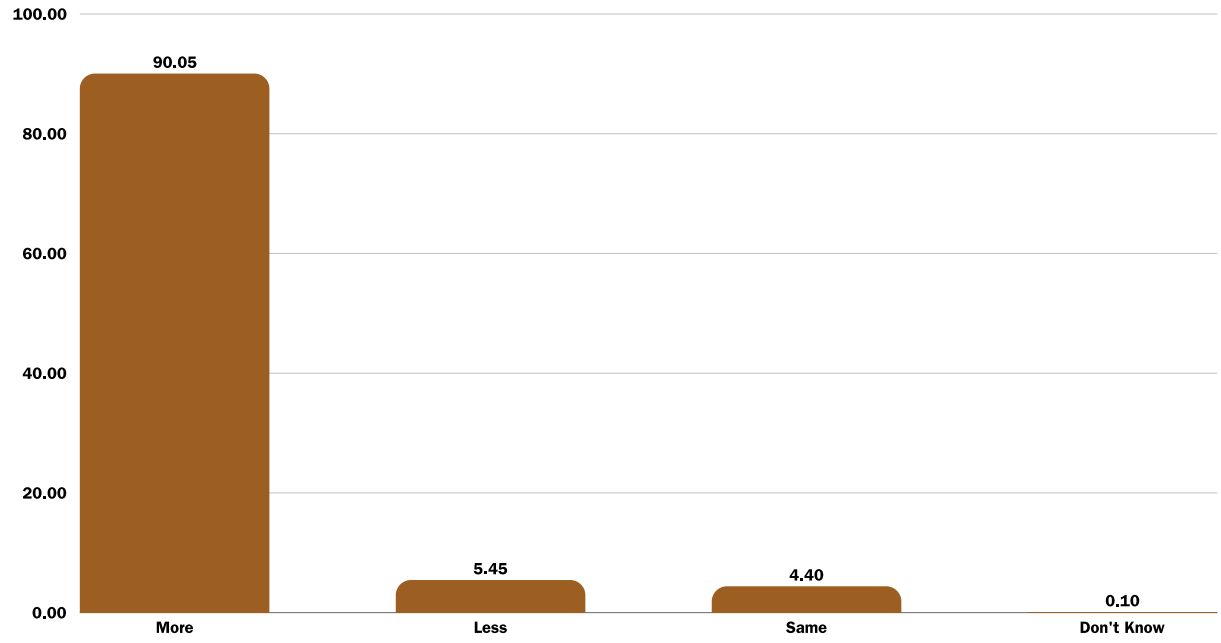
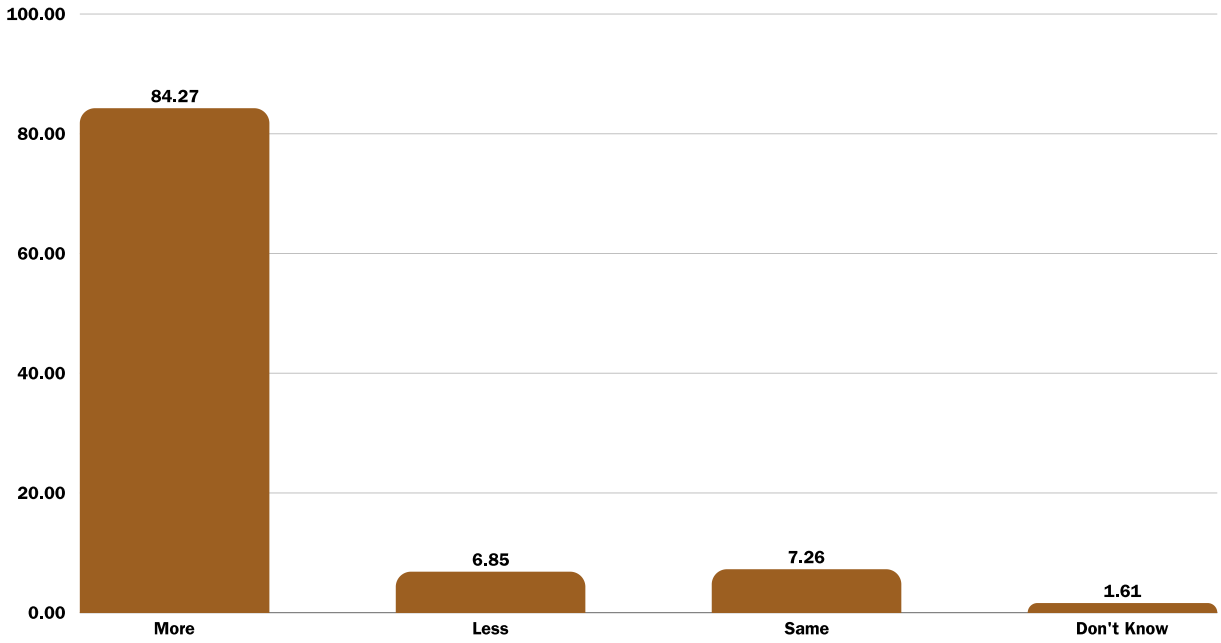


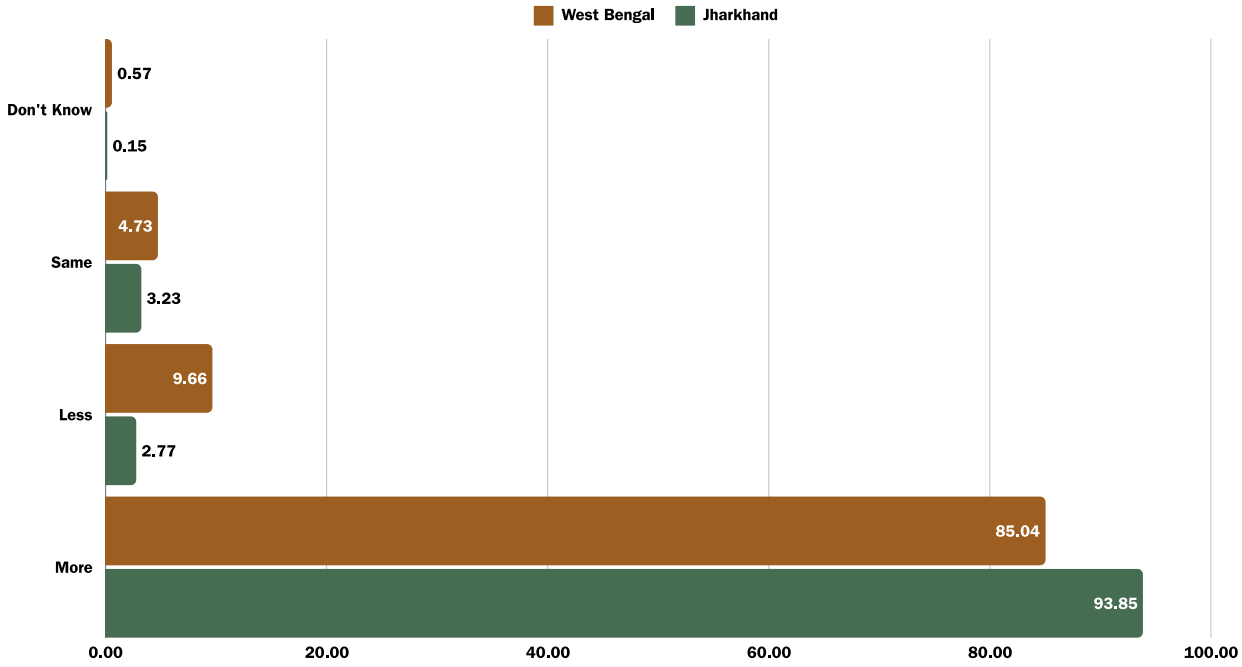
Figure 6.5: Distribution of Female Respondents in West Bengal by Their Perspective on Returns on Labour in Regenerative Agriculture



Figures 6.4 and 6.5 illustrate that 90% of female respondents in Jharkhand and 84% in West Bengal reported higher returns on labour from Regenerative Agriculture (RA) plots. Notably, the proportion of female respondents reporting higher returns on labour increased with land ownership (see Tables A6.5 and A6.6 in the Appendix).

A similar perspective was shared by male respondents. According to Figure 6.6, 93.85% of male respondents in Jharkhand and 85% in West Bengal stated that returns from Regenerative Agriculture were higher compared to synthetic input-based agriculture.

Figure 6.6: Distribution of Male Respondents by Their Perspective on Returns on Labour in Regenerative Agriculture



The data reveals an increase in the agency of women compared to male respondents. As shown in Table 6.7, female respondents in both Jharkhand and West Bengal reported that most household decisions were made jointly by men and women. However, for decisions made individually, women reported having a higher share of decision-making authority compared to men. A greater proportion of female respondents believed they made individual decisions more often than their male counterparts.

This shift was also highlighted during a VO-level focus group discussion (FGD) in Satbandha, Jharkhand. A female participant shared that initially, men in the household were skeptical about adopting Regenerative Agriculture practices. However, increased awareness through participation in Self-Help Group (SHG) activities enabled women to assert themselves within their households and take on greater roles in farming activities. As the benefits of Regenerative Agriculture became evident to the men, women gained greater influence in decision-making, both in farm-related and

non-farm matters. One female respondent summarized this transformation succinctly, saying, “Ab toh hamari chalti hai” (“Now our say prevails”).

This increased agency and decision-making by women, resulting from their active participation in SHG activities, demonstrates how institutionally driven policies designed to empower women can lead to significant social outcomes.

A similar transformation was noted during a VO-level FGD in Baghmundi, West Bengal, where participants shared that women in the village had undergone significant changes. In the past, societal norms restricted women’s mobility due to fear and apprehension. However, with support from elders and encouragement to participate in meetings, women made substantial progress. This collective effort enabled women to secure access to water, support year-round farming, and contribute to higher family incomes. These achievements earned women greater acceptance and recognition from villagers, reflecting a broader shift in attitudes toward their role in community development.

Table 6.7: Distribution of Female Respondents by Decision-Making About Different Activities in Regenerative Agriculture

	Jharkhand				West Bengal			
	Male	Female	Both	Other	Male	Female	Both	Other
Selection of Plot	12.0	14.5	73.4	0.1	5.53	11.12	83.3	0.05
Selection of Crop	7.9	15.1	77.0	0.1	5.32	10.33	84.3	0.05
Selection of Seed	6.6	15.6	77.7	0.1	5.11	10.91	83.98	0
Deciding Plant Protection Process	7.2	14.1	78.7	0.1	4.74	9.54	85.19	0.53
Deciding Interculture Process	8.6	12.6	78.5	0.3	4.32	9.06	85.72	0.9
Deciding Harvesting Time	4.6	12.6	82.7	0.1	3.74	11.49	84.67	0.11
Where to Sell	10.3	10.6	78.8	0.3	6.43	10.48	82.93	0.16
Fixing Price	10.4	11.7	77.6	0.3	8.59	10.38	80.77	0.26

Livelihood

Figure 6.7 indicates that 93.55% of respondents in Jharkhand reported changes in their livelihood activities following the adoption of Regenerative Agriculture (RA). In West Bengal, the corresponding figure was 89.77%.

Figure 6.7: Changes in Livelihood

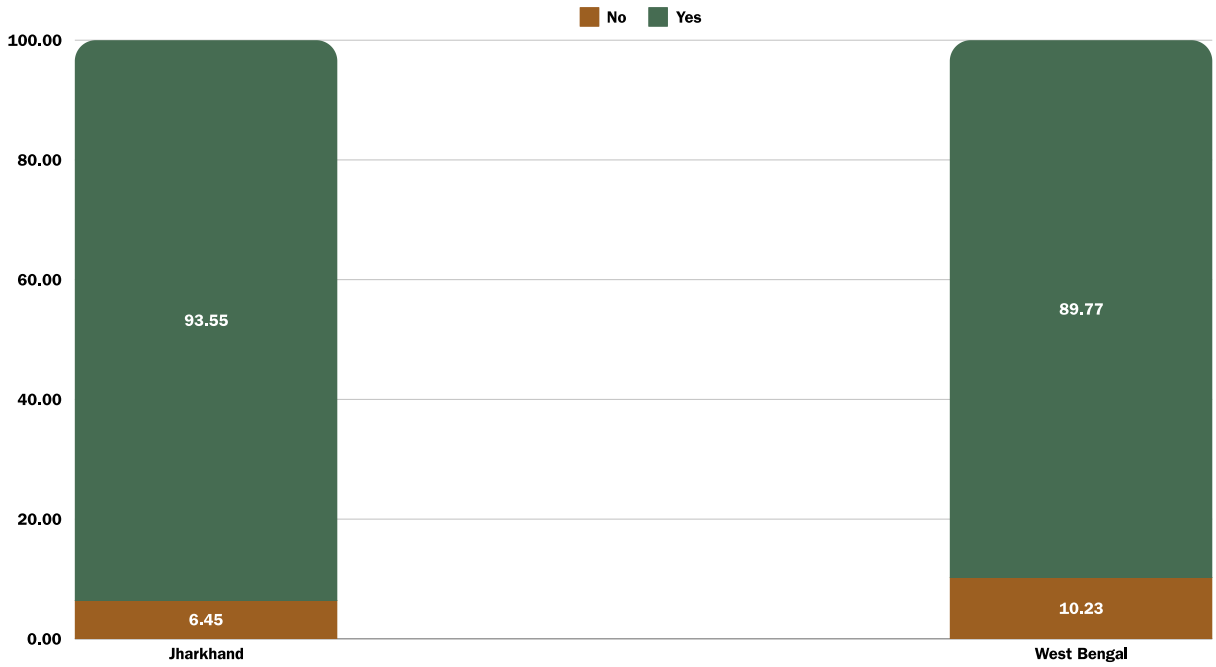


Table 6.8: Percentage of Households Reporting Changes in Different Livelihood Activities in Jharkhand After They Started Regenerative Agriculture

	Gross Cultivated Area	Migration (Time & Number of Persons)	Forest Produce	Livestock (Herd/Flock Size)	Wage Days
More	79.63	40.64	45.93	52.74	37.43
Less	5.93	36.00	22.94	18.39	37.24
Same	13.89	22.62	25.93	25.15	24.87
Don't Know	0.55	0.74	5.20	3.72	0.46

A more detailed analysis is provided in Tables 6.8 and 6.9, which illustrate the specific livelihood activities that were affected.

The tables indicate that a significant percentage of respondents in both states reported that the adoption of Regenerative Agriculture (RA) substantially influenced their livelihood activities. Approximately 80% of respondents in Jharkhand and 68% in West Bengal stated that the gross area under agriculture increased after adopting Regenerative Agriculture. However, contrasting trends emerged regarding forest produce and livestock herd or flock size. While a significant proportion of respondents in Jharkhand reported increases in these areas, many in West Bengal noted declines.

A similar divergence was observed in migration patterns and wage days. In Jharkhand, many respondents reported increases in wage days and migration, whereas in West Bengal, respondents indicated reductions in both. These findings underscore the need for further in-depth investigation to determine the extent to which these changes can be attributed to Regenerative Agriculture practices and to assess the potential influence of broader macroeconomic factors.

Table 6.9: Percentage of Households Reporting Changes in Livelihood Activities in West Bengal

	Gross Cultivated Area	Migration (Time & Number of Persons)	Forest Produce	Livestock (Herd/Flock Size)	Wage Days
More	67.92	9.69	13.9	19.89	29.46
Less	14.19	72.76	60.63	51.62	44.16
Same	17.38	15.67	21.48	26.5	23.19
Don't Know	0.51	1.88	3.99	1.99	3.19

Impact of Regenerative Agriculture on Income and Food Security

The impact of Regenerative Agriculture (RA) on income from agriculture and other sources has been one of its most notable features. Empirical evidence, as discussed earlier in this chapter, supports this observation. Tables 6.17 and 6.18 illustrate the impact of Regenerative Agriculture on income from agriculture and other sources.

The data reveals that income from agriculture and other sources increased for both Jharkhand and West Bengal respondents after adopting Regenerative Agriculture. In Jharkhand, approximately 86% of females and 90.9% of males reported an increase in income from agriculture. Similarly, 80.18% of females and 83.92% of males noted an increase in income from other sources. In West Bengal, 90% of females and 89% of males stated that their income from agriculture had increased following Regenerative Agriculture adoption. Likewise, 82.4% of females and 79.5% of males observed an increase in income from other sources.

The positive impact of Regenerative Agriculture on income serves as a significant motivation for designing and promoting interventions around its adoption.

Figure 6.8: Impact of Regenerative Agriculture on Income From Agriculture

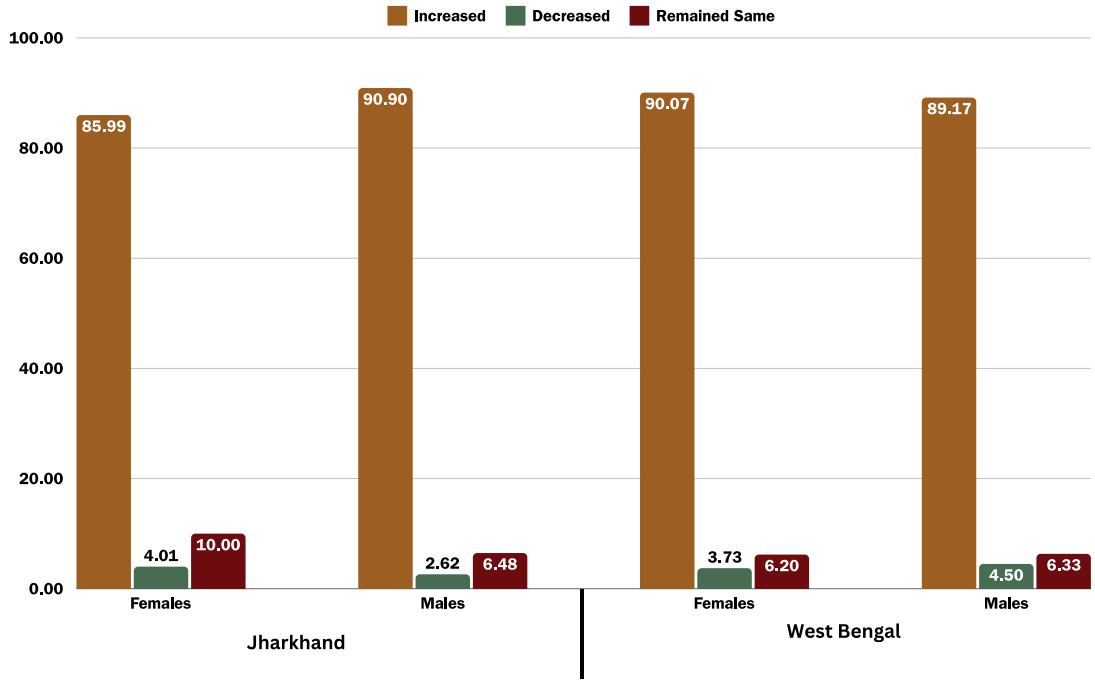
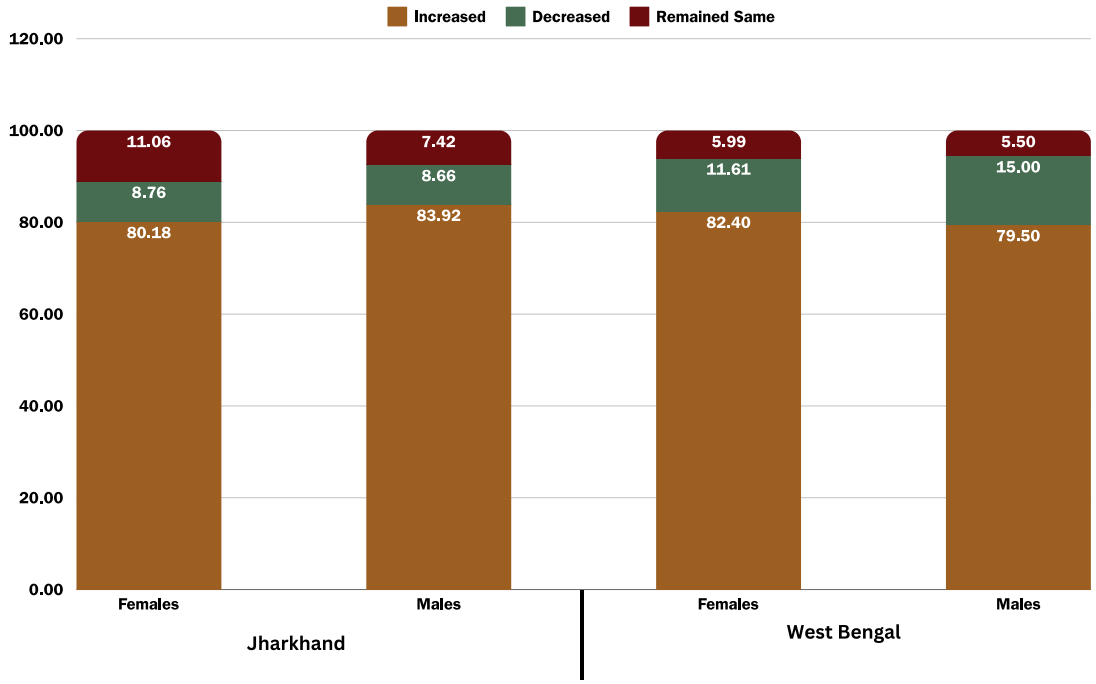


Figure 6.9: Impact of Regenerative Agriculture on Income From Other Sources



Even when the impact of Regenerative Agriculture (RA) on income from agriculture and other sources is examined by years of practice, it is evident that farmers with varying durations of Regenerative Agriculture experience reported an increase in their income. In Jharkhand, over 85% of female respondents and more than 84% of male respondents who had been practising Regenerative Agriculture for more than a year stated that their income from agriculture had increased (see Tables A6.7 and A6.8 in the Appendix). Similarly, 81% of females and 84% of males reported an increase in income from other sources. Notably, more than 90% of females and males practising Regenerative Agriculture for over five years reported that their income from all other sources had increased (see Table A6.9 in the Appendix).

In West Bengal, over 80% of female and male respondents practising Regenerative Agriculture for a year indicated an increase in income. Additionally, more than 85% of female and male respondents practising Regenerative Agriculture for 1–7 years reported an increase in income. Interestingly, 100% of female and male respondents who traditionally practised Regenerative Agriculture reported an increase in income after adopting Regenerative Agriculture (see Table A6.10 in the Appendix).

This observation is further supported by the perceptions of non-RA farmers regarding the impact of Regenerative Agriculture on income. Tables A6.11 to A6.14 in the Appendix show that in Jharkhand, approximately 79% of females and 82% of males not practising Regenerative Agriculture believed that the income of Regenerative Agriculture farmers from agriculture either increased or remained the same. Of these, 44.51% of females and 45.7% of males believed that income from agriculture increased after practising Regenerative Agriculture. Regarding income from other sources, around 81% of females and 83% of males believed that it either increased or remained the same, with 46.43% of females and 46.74% of males stating that it increased after practising Regenerative Agriculture.

In West Bengal, 88.45% of females and 90.85% of males not practising Regenerative Agriculture believed that the income from agriculture increased after Regenerative Agriculture adoption. For income from other sources, 70.4% of females and 89.54% of males expressed a similar belief.

Figure 6.10 demonstrates the positive impact of Regenerative Agriculture (RA) on food production in Jharkhand and West Bengal. Approximately 73% of female respondents and 79.4% of male respondents in Jharkhand reported that their food production was relatively higher with Regenerative Agriculture compared to synthetic input-based agriculture. The corresponding figures for West Bengal were 69.47% for females and 70% for males. This perspective aligns with the respondents' belief in Regenerative Agriculture's ability to provide sufficient food, as illustrated in Figure 6.11.

The global debate on Regenerative Agriculture's ability to feed the world, discussed earlier in this chapter, underscores varying opinions. However, this study reveals

Figure 6.10: Impact of Regenerative Agriculture on Food Production in Jharkhand and West Bengal

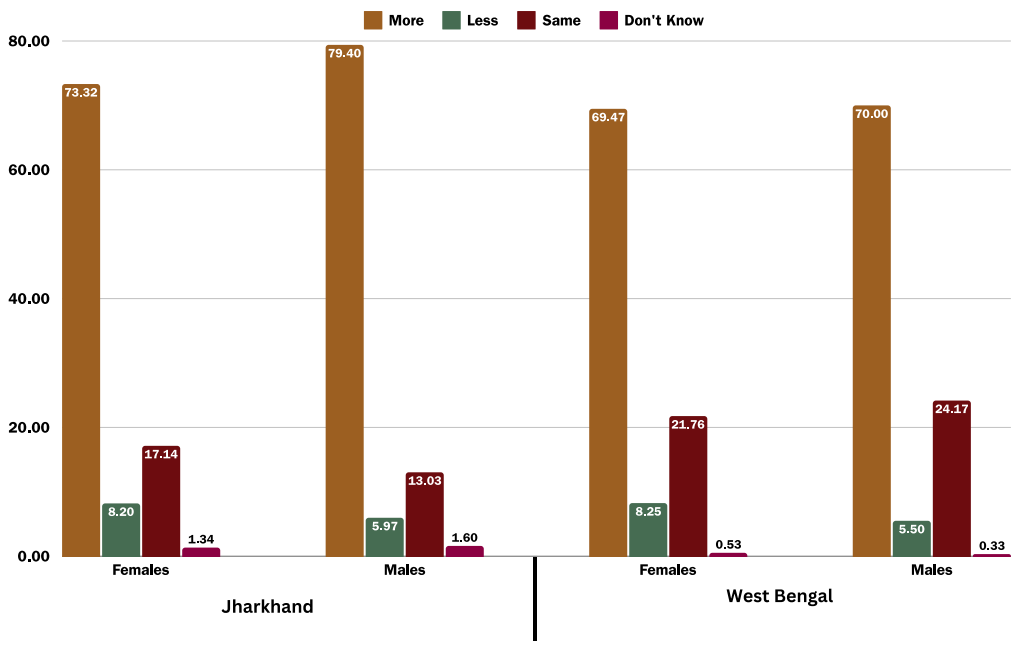
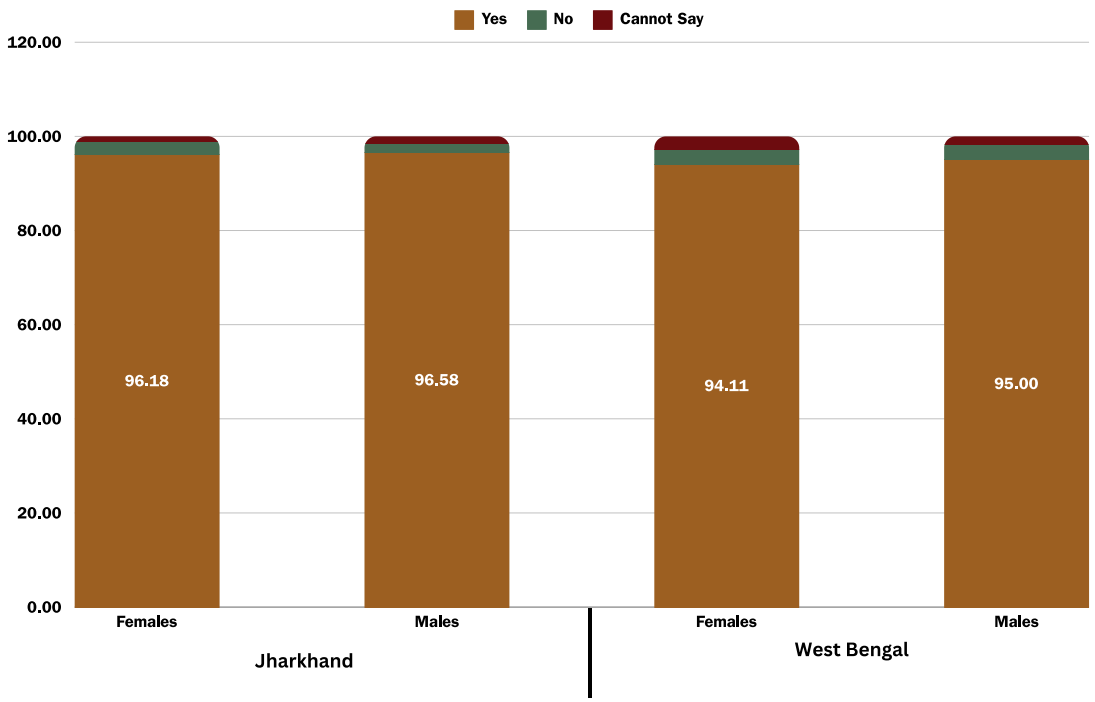


Figure 6.11: Regenerative Agriculture Farmers on the Ability of Regenerative Agriculture to Provide Sufficient Food in Jharkhand and West Bengal



that a significant proportion of Regenerative Agriculture farmers are confident in its ability to provide sufficient food. In Jharkhand, 96.18% of female respondents and 96.58% of male respondents stated that Regenerative Agriculture ensured their food security. Similarly, in West Bengal, 94.11% of females and 95% of males expressed confidence in Regenerative Agriculture's capacity to provide adequate food. This confidence is closely linked to Regenerative Agriculture's impact on productivity and its ability to produce enough food.

Interestingly, many non-RA farmers also share this perception. In Jharkhand, 61.26% of non-RA female farmers and 61.51% of non-RA male farmers believed that Regenerative Agriculture could provide sufficient food. In West Bengal, 94.4% of female and 93.46% of male non-RA farmers held the same belief. This reinforces the perception of Regenerative Agriculture's ability to ensure food security (see Tables A6.15 and A6.16 in the Appendix).

Data from FGDs and interviews echoed these findings. Respondents from CRP groups shared that while there may be a decline in production during the initial one or two cycles after transitioning from non-RA to Regenerative Agriculture, production becomes comparable or even surpasses previous levels by the third or fourth cycle. Additionally, they noted that local markets favor RA-grown vegetables and fruits due to their better taste, shelf life, and health benefits. As one respondent put it: "Bazar me agar Regenerative Agriculture wala baigan/tamatar rahega or chemical wala rahega, to Regenerative Agriculture wala pahle khatam hoga" ("In the market, if Regenerative Agriculture-grown brinjal/tomatoes are available alongside chemically grown ones, the Regenerative Agriculture produce sells out first").

Willingness and Ability to Invest

As shown in Figures 6.12 and 6.13, more than 95% of farmers in both Jharkhand and West Bengal reported their willingness and ability to invest in cereals, vegetables, oilseeds, and pulses through Regenerative Agriculture (RA). In both states, the ability to invest closely aligns with the willingness to invest, reflecting the scope and growing acceptability of Regenerative Agriculture.

Figure 6.12: Willingness and Ability to Invest in Jharkhand

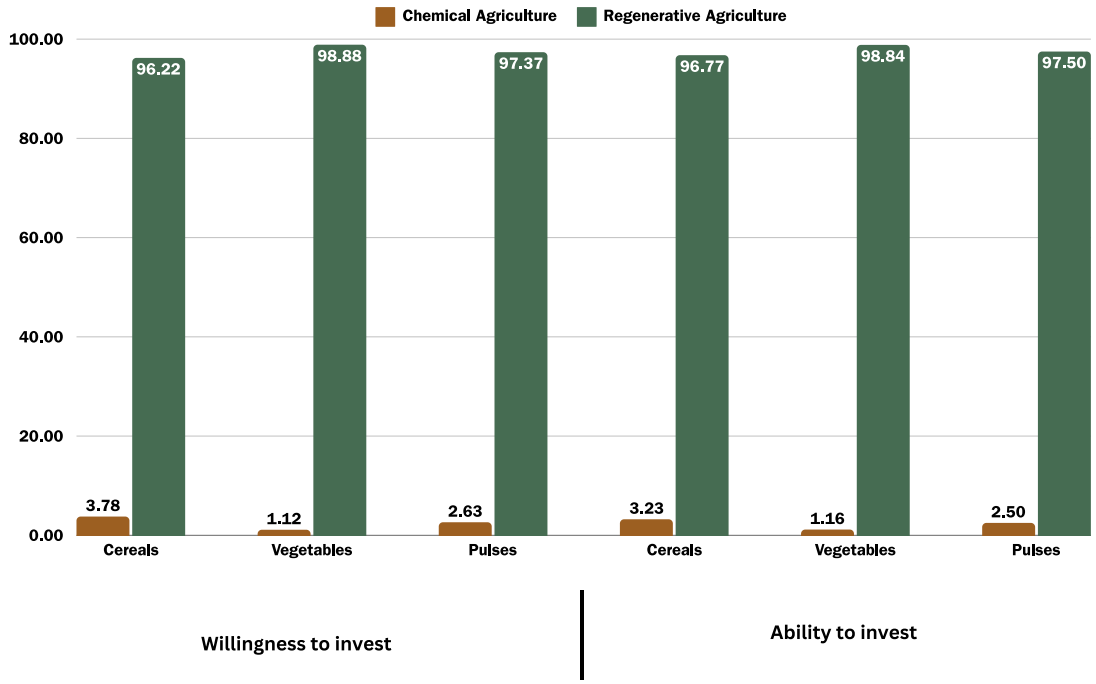
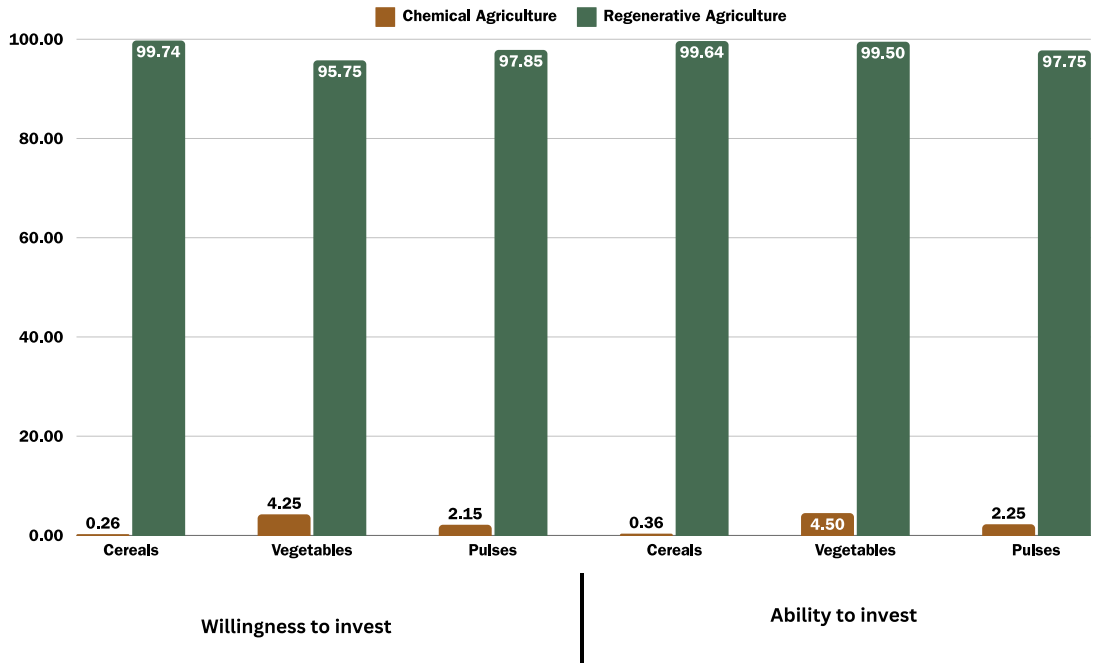


Figure 6.13: Willingness and Ability to Invest in West Bengal



07 FACTORS AFFECTING REGENERATIVE AGRICULTURE

This chapter summarizes the facilitating (motivating) and hindering (constraining) factors organisations farmers' adoption of Regenerative Agriculture (RA).

Facilitating Factors

The table below presents the percentage of households where respondents identified various factors that motivated them to adopt Regenerative Agriculture.

Table 7.1: Motivating Factors for Regenerative Agriculture Across Different Land-Ownership Categories in Jharkhand

Motivation	Landless	Marginal	Small	Above Small	Total
Reduced Cost	31.6	53.1	47.5	46.5	49.7
Better Soil Quality	57.9	74.1	81.5	87.4	79.3
Tasty Food	68.4	70.4	81	91.4	78.4
Healthy Food	73.7	66.7	73.3	83.6	72.6
Biodiversity	26.3	26.8	37.8	42.3	33.8
Better Shelf-life of Vegetables	52.6	47.4	56	57.7	52.5
Less Pest and Disease in Crops	36.8	34.9	47.7	47.3	41.8
Require Less Irrigation	15.8	31.4	47	44.3	39.2
Other	0	0.1	0.6	3	0.9

Table 7.2: Motivating Factors for Regenerative Agriculture Across Different Land-Ownership Categories in West Bengal

Motivation	Landless	Marginal	Small	Above Small	Total
Reduced Cost	53.49	34.5	48.72	44.07	36.06
Better Soil Quality	90.7	88.77	88.89	94.92	89
Tasty Food	90.7	84.04	86.32	89.83	84.5
Healthy Food	86.05	84.5	87.18	91.53	84.91
Biodiversity	79.07	81.28	84.62	89.83	81.69
Better Shelf-life of Vegetables	67.44	52.53	69.23	74.58	54.53
Less Pest and Disease in Crops	72.09	49.08	57.26	69.49	50.69
Require Less Irrigation	58.14	42.68	54.7	72.88	44.65
Other	6.98	1.9	0	0	1.84

Similar factors emerged during FGDs and PIs with CRPs, BRC entrepreneurs, VO members, and PRADAN professionals who are actively involved in facilitating Regenerative Agriculture (RA) in their respective areas. Below is a summary:

Intergenerational Knowledge of the Farmers

One of the most prominent facilitating factors identified during FGDs and interviews was the extensive intergenerational knowledge of farmers. Small and marginal farmers in the Central Indian Plateau (CIP) possessed deep knowledge of their surrounding ecosystems, which shaped their farming practices and life skills. This knowledge offered an integrated understanding of various components of nature, including biodiversity, climate-resilient cropping systems, ethnomedicine, and the interconnectedness of natural systems.

Over the past 40–50 years, however, this knowledge has gradually diminished due to the influence of extension workers and other actors implementing development interventions. One of the most significant interventions was the

introduction of "modern" agriculture to boost production. Seed, fertilizer, and pesticide companies promoted new technologies and products, promising higher yields. As farmers adopted these prescribed practices, they gradually lost the intricate knowledge and skills essential for living harmoniously within their ecosystems.

Increased dependency on markets and mainstream media further alienated the younger generation from this rich intergenerational knowledge, leaving them ignorant and less interested in the biodiversity that once supported climate-resilient agricultural practices and ethno-medicinal usage. According to village elders, local biodiversity previously met most of their daily needs. Ignorance and disinterest among the younger generation led to the replacement of useful trees with timber species by the forest department and illegal logging activities.

When PRADAN and CRPs introduced Regenerative Agriculture principles to farmers, older generations could easily relate to them. In many cases, they shared their knowledge and conviction during village-level discussions and meetings, acting as a key facilitating factor for implementing Regenerative Agriculture interventions in the area.

Building a Connection Between Health and Agriculture

Farmers recognized the connection between increasing health issues and their food habits. Most small and marginal farmers consume what they produce, and many observed that changes in their food habits made them feel less energetic. They associated the rise in diseases such as diabetes, anemia, and cancer with consuming food grown using inorganic inputs.

Farmers also drew parallels between human health and deteriorating soil health caused by conventional agricultural practices. They noted that the use of inorganic inputs hardened the soil, reduced its porosity, and killed living organisms like earthworms, small fish, and molasses, leaving the soil "dead." This realization led them to believe that the chemicals harming soil biodiversity also posed risks to human health, contributing to diseases like cancer.

The "cancer train" from Punjab's Malwa region was frequently mentioned in discussions as an example of the negative health impacts of synthetic inputs. Such discussions acted as critical motivating factors for farmers to adopt Regenerative Agriculture practices. This concern was a recurring theme in interviews and FGDs in both Jharkhand and West Bengal, serving as a strong impetus for the realization that Regenerative Agriculture could be a solution to various health and ecological problems.

Exposure and Trainings

Exposure to places where farmers had already adopted Regenerative Agriculture (RA) practices helped build acceptance and conviction among prospective adopters. Once farmers expressed readiness to adopt Regenerative Agriculture, they were trained on the principles and steps involved. Separate training sessions were organized to cover all critical components of Regenerative Agriculture.

In this regard, visits to model fields across

several blocks were conducted. These visual observations of Regenerative Agriculture fields significantly influenced farmers' decision to adopt Regenerative Agriculture practices.

Hand Holding Support and Demonstration at the Village Level

Community Resource Persons (CRPs) and some farmers cultivated crops using Regenerative Agriculture (RA) principles, creating demonstration plots that served as exposure sites for farmers in nearby areas. These sites encouraged more farmers to experiment with Regenerative Agriculture on portions of their land.

CRPs also visited individual plots, assisting farmers with tasks such as soil preparation, seed treatment, and bio-input preparation. This hands-on support played a crucial role in helping farmers initiate Regenerative Agriculture practices.

Outcome

Improved soil health emerged as one of the most significant facilitating factors shared by farmers and Community Resource Persons (CRPs). After 2–3 cycles of adopting Regenerative Agriculture (RA) practices, noticeable improvements were reported in soil colour, porosity, water-holding capacity, and the return of worms and other small organisms.

In both Jharkhand and West Bengal, farmers also highlighted that crops grown using Regenerative Agriculture practices had a longer shelf life, better taste, and, in some cases, received higher attention in local markets. Some farmers experienced equal or better yields after 2–3 cycles. Additionally, indigenous crops cultivated through Regenerative Agriculture practices often outperformed high-yielding varieties grown using conventional methods, especially under irregular rainfall and extended dry spells caused by climate change.

The ability to preserve seeds for subsequent seasons, eliminating the need to purchase them from the market, was another key factor motivating Regenerative Agriculture adoption. Similarly, the cost of preparing or purchasing bio-inputs was lower compared to buying synthetic inputs, further encouraging farmers to adopt Regenerative Agriculture practices.

BRCs

Bio-Resource Centers (BRCs) played a crucial role by supplying bio-inputs directly to farmers based on their demand. Since preparing inputs was often a tedious and complicated task, BRCs served as a vital link in the input supply chain for farmers who lacked the capacity to produce bio-inputs independently.

The bulk production of bio-inputs by BRCs not only facilitated easier access for farmers but also created livelihood opportunities for BRC entrepreneurs. This made BRCs a pivotal element in ensuring the smooth adoption of Regenerative Agriculture (RA).

Facilitative Policies and Support from Government Departments

As part of the Sustainable Development Goals (SDGs), Regenerative Agriculture (RA) is supported by the government through various projects and schemes at state and local levels. Block offices have recognized the efforts of CRPs and Regenerative Agriculture farmers, assisting them by providing seeds and bio-inputs whenever available. In some

areas, CRPs were also invited to participate in training programs organized by block and other government departments, both as trainees and trainers.

Identity and Recognition

The women Community Resource Persons (CRPs) shared that their involvement in Regenerative Agriculture (RA) has helped them establish their own identity as progressive farmers who assist others in learning and practising Regenerative Agriculture. They noted that this experience has boosted their confidence and filled them with pride when recognized not only by villagers but also by outsiders, including block officials and CSO personnel.

After initial struggles, most of the women CRPs shared that farmers now approach them to learn more about RA and seek assistance whenever needed.

Hindering Factors

Tables 7.3 and 7.4 shows the percentages of women respondents in Jharkhand and West Bengal respectively at the HH level shared the following factors as constraining:

Table 7.3: Factors Hindering the Application of Regenerative Agriculture on All Land According to Female Respondents in Jharkhand

	Landless	Marginal	Small	Above Small	Total
Complicated Process	100	57.2	65.3	83.2	67.3
Raw Material Not Available as Per Requirement	0	63.3	56.9	61.1	60.2
High Cost	0	30	22.8	19.1	24.4
Labour Intensive	0	17.8	18.6	8.4	15.4
Less Yield	0	6.1	10.8	2.3	6.7
Less Income	0	0.6	2.4	1.5	1.5
Pest Attack	0	2.2	1.2	1.5	1.7
Other	0	0.6	1.2	1.5	1

Table 7.4: Factors Hindering the Application of Regenerative Agriculture on All Land According to Female Respondents in West Bengal

	Landless	Marginal	Small	Above Small	Total
Complicated Process	25	23.61	29.41	76.47	27.56
Raw Material Not Available as Per Requirement	0	59.72	52.94	64.71	58.66
High Cost	0	10.65	5.88	0	9.45
Labour Intensive	25	40.74	23.53	0	36.61
Less Yield	25	27.78	41.18	0	26.77
Less Income	50	14.81	23.53	0	14.96
Pest Attack	25	14.81	17.65	5.88	14.57
Other	0	0.93	0	0	0.79

Table 7.5: Factors Hindering the Application of Regenerative Agriculture on All Land According to Male Respondents in Jharkhand

	Landless	Marginal	Small	Above Small	Total
Complicated Process	100	64.6	71.6	84.7	74.9
Raw Material Not Available as Per Requirement	0	53.8	55.8	63.3	57.9
High Cost	0	29.2	18.9	9.2	17.8
Labour Intensive	0	13.8	12.6	5.1	10
Less Yield	0	3.1	5.3	0	2.7
Less Income	0	0	0	1	0.4
Pest Attack	0	0	0	0	0
Other	0	0	0	1	0.4

Tables 7.5 and 7.6 show the percentages of men respondents at the household level shared the following factors as constraining in Jharkhand and West Bengal:

Table 7.6: Factors hindering the application of Regenerative Agriculture on all land according to male respondents in West Bengal

	Landless	Marginal	Small	Above Small	Total
Complicated Process	50	22.55	12.5	88.89	27.64
Raw Material Not Available as Per Requirement	50	56.86	75	33.33	56.1
High Cost	25	1.96	0	0	2.44
Labour Intensive	25	54.9	12.5	11.11	47.97
Less Yield	50	17.65	12.5	0	17.07
Less Income	50	12.75	0	0	12.2
Pest Attack	50	14.71	0	0	13.82
Other	0	0	0	0	0

Below is a summary of what was shared in different FGDs and PIs as hindering factors for adopting Regenerative Agriculture by more farmers and in a larger share of lands.

Summary of FGDs

Lack of Conviction and Fear About Reduced Production and Less Income

Farmers' apprehension about reduced production leading to decreased income is a significant hindrance to the large-scale adoption of Regenerative Agriculture (RA). Although some farmers have experienced good results on small patches of land, they remain fearful of adopting Regenerative Agriculture for the rest of their land. A common practice is to use Regenerative Agriculture for land where they grow food for their own consumption while continuing conventional methods for market-oriented crops.

Some farmers expressed concern that they had previously been forced to abandon traditional agricultural practices—many of which were similar to Regenerative Agriculture principles—due to insufficient production. They worry that adopting Regenerative Agriculture on a larger scale might return them to the same situation of inadequate yields. The lack of extensive data demonstrating comparable or better large-scale production further reinforces these fears.

According to a PRADAN professional in West Bengal, this lack of conviction is particularly evident among larger farmers who find synthetic inputs more convenient. These fears and doubts also arise from a mindset accustomed to synthetic input-based agriculture. A shift to Regenerative Agriculture, if it is to happen, will require gradual change supported by coordinated efforts to address these concerns.

Not following all the Steps

There are six major steps involved in Regenerative Agriculture (RA): soil preparation, seed selection, seed treatment, adhering to a schedule for applying bio-inputs as preventive measures, mixed cropping, and multilayer farming. While many farmers have adopted practices such as soil preparation, seed selection, and seed treatment, they often fail to follow the preventive schedule for bio-input applications.

Preparing bio-pesticides and other bio-inputs requires time and advance preparation, making them less readily available. In contrast, synthetic pesticides are easily accessible in shops. As a result, when faced with pest or disease attacks, farmers often panic and resort to store-bought synthetic pesticides.

Lack of Human Resources for Village-Level Demonstration and Hand Holding Support

Less number of CRPs make it difficult to reach out to more villages and farmers to facilitate discussions, on-field demonstrations and handholding support.

Lack of Readily Available Input Within Reach

While synthetic fertilisers, pesticides, and other inputs are readily available in the market, bio-inputs require farmers to either prepare them at home or procure them from Bio-Resource Centers (BRCs). In many areas with the potential for expanding Regenerative

Agriculture (RA), the limited number of BRCs is a significant hindering factor.

For preparing bio-inputs at home, most ingredients are locally available in villages. However, items like cow urine (gomutra) and cow dung (gobar) are often scarce due to a declining inclination among households to raise cows. Additionally, preparing these concoctions and composts demands more time and effort compared to synthetic inputs, which are easily, readily, and conveniently available. These challenges hinder farmers from fully relying on bio-inputs.

Lack of Systematic Data Collection to Create Evidence Related to Production and Income

Although farmers who adopted Regenerative Agriculture (RA) on specific plots for 2–3 consecutive seasons experienced similar or better production, there is a lack of systematic recording of production data. If such data had been collected, it could serve as concrete evidence rather than relying on perceptions and anecdotes. This would have encouraged more farmers to adopt Regenerative Agriculture on a larger share of their land.

Labour Intensive Production

In many cases, the intensity of labour required for Regenerative Agriculture (RA) has proven to be a significant barrier to its adoption. In most focus group discussions and interviews, participants stated that the high labour demands for both the application and preparation of bio-inputs were a deterrent. This challenge was particularly pronounced for larger farmers with high land-to-labour ratios, as it led to increased costs. In contrast, synthetic inputs were relatively easier to access and use.

08 CONCLUSION

The scoping study on Regenerative Agriculture (RA) in Jharkhand and West Bengal has provided critical insights into the adoption, practices, and challenges associated with Regenerative Agriculture. These findings help outline major trends in ecological sustainability, economic benefits, and social dynamics that influence the adoption of Regenerative Agriculture. They also serve as a foundation for proposing steps for future research and interventions to further promote and support Regenerative Agriculture adoption.

Ecological Impact of Regenerative Agriculture

One of the most promising outcomes of adopting Regenerative Agriculture (RA) has been the improvement in soil health. Farmers in both Jharkhand and West Bengal reported visible changes in soil texture, colour, and biodiversity. The reappearance of soil organisms like earthworms was frequently mentioned as a key indicator of this improvement. Additionally, enhanced soil porosity and water retention have increased resilience to extreme weather conditions such as drought and excessive rainfall, contributing to food security and sustainability.

The study also highlighted a significant reduction in the use of synthetic inputs like fertilisers and pesticides. Farmers increasingly relied on bio-inputs such as compost, Jeevamrit, and other botanical extracts, which not only improved soil health but also enhanced crop quality. This transition toward organic farming reduced the harmful environmental impacts commonly associated with conventional agricultural methods.

Economic Impact

The economic implications of adopting Regenerative Agriculture (RA) were generally positive but varied across different landholding categories. Smallholder farmers benefited the most, as Regenerative Agriculture practices reduced their reliance on costly synthetic inputs. In Jharkhand, 64–75% of farmers reported cultivation as their primary source of income, and those practising Regenerative Agriculture experienced a noticeable increase in productivity after an initial adjustment period of 2–3 seasons.

However, the study also highlighted certain challenges. Many farmers, especially those with larger landholdings, found Regenerative Agriculture to be labour-intensive, particularly for tasks like preparing bio-inputs and managing mixed-cropping systems. Consequently, some farmers reverted to synthetic pesticides during pest attacks due to the time required for bio-pesticide preparation.

Regional disparities in Regenerative Agriculture adoption also revealed economic challenges across different regions. Farmers in Jharkhand reported an increase in forest produce and livestock, while those in West Bengal experienced a decline. These variations likely stem from regional differences in ecosystem services and market access, emphasising the need for localized interventions to address these challenges effectively.

Social Dynamics and Gender Roles

Regenerative Agriculture (RA) has had a significant social impact, particularly in empowering women farmers. Women have played a crucial role in initiating Regenerative

Agriculture adoption in many households, often through training received from Self-Help Groups (SHGs). Over 96% of female respondents in Jharkhand and 97% in West Bengal reported receiving Regenerative Agriculture training. Their active participation not only helped convince male household members but also contributed to the wider community adoption of Regenerative Agriculture.

However, the study highlighted an increased workload associated with Regenerative Agriculture practices, which disproportionately falls on women. About 62% of respondents in Jharkhand and 40% in West Bengal reported that this additional workload primarily affects women. Overall, 44% of respondents acknowledged an increased workload when transitioning to Regenerative Agriculture. While Regenerative Agriculture offers long-term benefits, the immediate rise in labour requirements may deter further adoption unless adequate mechanization and labour support are introduced.

On a positive note, the study found that returns on labour are high. This was reported by 94% of respondents in Jharkhand and 85% in West Bengal, suggesting that despite increased labour, the economic returns from Regenerative Agriculture are a motivating factor for adoption.

Barriers to Adoption

Despite its numerous benefits, several barriers hinder the widespread adoption of Regenerative Agriculture (RA). The most significant challenges include the labour-intensive nature of Regenerative Agriculture, the lack of immediate financial returns, and the time required to prepare bio-inputs. Additionally, the unavailability of local resources such as cow dung for composting has made it difficult for some farmers to fully implement Regenerative Agriculture practices.

Another critical challenge is the inconsistent data collection on Regenerative Agriculture practices. While many farmers reported positive outcomes, the absence of systematic data on yield, income, and soil health has limited their ability to advocate for Regenerative Agriculture or expand it to a larger share of land.

Next Steps

1. Enhancing Training and Support for Farmers

The study highlighted the importance of continuous training and exposure to successful Regenerative Agriculture (RA) models. While many farmers have received some level of training, additional efforts are necessary to enhance their technical capacity. Extension services should prioritize providing on-the-ground hand holding support, particularly in areas where farmers face challenges in preparing bio-inputs or managing the labour-intensive aspects of Regenerative Agriculture.

Community Resource Persons (CRPs) play a vital role in facilitating knowledge transfer and conducting practical demonstrations. Expanding the number of CRPs and extending their outreach can address knowledge gaps and offer more personalized support to farmers adopting Regenerative Agriculture practices.

2. Strengthening Bio-Resource Centers (BRCs)

Bio-Resource Centers (BRCs) have proven pivotal in supplying bio-inputs and facilitating knowledge dissemination. However, the insufficient number of BRCs in some regions poses a significant challenge to scaling up Regenerative Agriculture (RA) adoption. Future interventions should prioritize establishing more BRCs, particularly in remote areas, and ensuring that these centers are well-equipped to meet the demand for quality bio-inputs in a timely manner.

3. Addressing Labour and Mechanization Challenges

Given that the labour-intensive nature of Regenerative Agriculture (RA) is a significant barrier to adoption, particularly for larger farmers, introducing appropriate mechanization can help alleviate this burden. Mechanizing specific processes, such as soil preparation, and bio-input preparation and application, would make Regenerative Agriculture more accessible and sustainable for farmers.

4. Encouraging Data Collection and Research

The absence of concrete, long-term data on the benefits of Regenerative Agriculture (RA) has been a persistent issue. Systematic data collection on yield, soil health, and income is crucial for building a strong evidence base for Regenerative Agriculture. This data can help demonstrate the long-term benefits of Regenerative Agriculture to skeptical farmers and policymakers, encouraging wider adoption.

Collaboration between research institutions, government agencies, and farmer cooperatives can establish frameworks for tracking these metrics over time. Such initiatives could also explore Regenerative Agriculture's potential to mitigate the effects of climate change, an increasingly pressing concern.

5. Promoting Market Linkages and Value Addition

Farmers practising Regenerative Agriculture (RA) have expressed concerns about the lack of differentiated market pricing for their produce. Despite the longer shelf life and better nutritional content of Regenerative Agriculture crops, they often fetch the same prices as conventionally grown produce. Establishing certification systems for Regenerative Agriculture produce and raising consumer awareness about its health and environmental benefits could help farmers secure better prices.

Additionally, developing value chains that connect Regenerative Agriculture farmers with local markets, cooperatives, and export opportunities will be crucial for ensuring the economic sustainability of Regenerative Agriculture practices.

6. Gender-Sensitive Approaches

The empowerment of women through Regenerative Agriculture (RA) training and leadership roles in Self-Help Groups (SHGs) is among the most promising social outcomes of the study. However, as noted earlier, the increased labour burden on women must be addressed. Future interventions should focus on reducing this burden by improving access to labour-saving technologies and resources. Additionally, program approaches should be designed to ensure women's active participation in decision-making processes.

The scoping study on Regenerative Agriculture in Jharkhand and West Bengal highlights the significant ecological and economic benefits of Regenerative Agriculture. While challenges persist—particularly concerning labour intensity, market linkages, and systematic data collection—the positive outcomes observed suggest that Regenerative Agriculture can play a vital role in advancing sustainable livelihoods and food security in India.

APPENDIX

Appendix - 1

Table A2.1: Distribution of Sample in Jharkhand

District	Block Name	Name of the GP	Name of all the RF/NF Villages in the GP	GP Wise Number of Farmers Enrolled for RF/NF	Households Part of the Sample
Godda	Poraiyahat	Akasi	Barmasia, Khorishisa, Majhdiha, Pindari	210	20
Godda	Poraiyahat	Amwar Santhali	Gauripur, Ghunghasa	140	20
Bokaro	Jaridih	Araju	Araju, Arasadam, Kamlapur,	325	20
Gumla	Basia	Areya	Sakia, Kurdega, Uchdih, Areya	470	40
Dumka	Dumka	Asansol	Asansol, Dhadkia	23	20
West Singhbhum	Sonua	Baljori	Bikrampur, Chamakpur, Belposh, Jhargaon	160	40
Godda	Poraiyahat	Banjhi	Korisiris, Sarbindha, Dhobarni, Banjhi	205	20

District	Block Name	Name of the GP	Name of all the RF/NF Villages in the GP	GP Wise Number of Farmers Enrolled for RF/NF	Households Part of the Sample
Bokaro	Jaridih	Baradih	Baradih	120	20
Godda	Poraiyahat	Bargacha Haryari	Siktiya, Bodachappar, Bargacha Haryari	115	20
Hazaribagh	Tatijharia	Bedam	Partanga, Chocha,	180	20
Bokaro	Jaridih	Beldih	Beldih, Hardih, Saraibindha	165	20
Lohardaga	Kisko	Bethat	Anandpur, Pata chala, Lawagain, Bhusar	208	60
West Singhbhum	Sonua	Bhalurungi	Binka, Bhalurungi, Rengadbeda, Sasikela	184	60
Bokaro	Jaridih	Bhaski	Tondra, Bhaski, Tengikudar, Lipu, Roria,	550	40
Godda	Pathargama	Bisaha	Charkaghat,Neemavaran, Masudanpur,Bhagwanchak, Bisaha, Bariattha	435	20

District	Block Name	Name of the GP	Name of all the RF/NF Villages in the GP	GP Wise Number of Farmers Enrolled for RF/NF	Households Part of the Sample
Godda	Pathargama	Boha	Kariyani, Barhara, Boha, Manoharpur, Teloliya	377	20
Godda	Poraiyahat	Chatra	Satpahadi, Kamrabandh, Dulidih, Amduma, Chatra	220	20
Godda	Pathargama	Chilra	Chilra, Chainpur, Patharkani, Rupuchak, Chunakothi	358	20
Hazaribagh	Tatijharia	Daherbhanga	Dahherbhanga, Boudha, Kesra	211	20
Dumka	Dumka	Darbarpur	Chirudih, Darbarpur, Dhawadangal, Jhajhapara, Jitpur, Kendpahari, Kuldiha, Kulungu, Neruapahari, Suripalan	265	60
Godda	Poraiyahat	Deodanr	Jitpur, Govindpur, Garhbana	155	20
West Singhbhum	Sonua	Dewabir	Konkuwa, Sarjomhatu, Dewabir	130	20
Hazaribagh	Tatijharia	Dharampur	Dharampur, Dudhmania,Panimako	342	20

District	Block Name	Name of the GP	Name of all the RF/NF Villages in the GP	GP Wise Number of Farmers Enrolled for RF/NF	Households Part of the Sample
Godda	Poraiyahat	Drupad	Bhaga, Garhi, Padampur, Harlatikar	135	20
Hazaribagh	Tatijharia	Dumar	Dumar, Churchu, Banhe	280	20
Bokaro	Jaridih	Gangjori	Tilaiya, Birsadam	110	20
Godda	Pathargama	Gangtakala	Gangtakala, Sighaidih Maal, Jogiya, Khera, Jamjori	174	20
West Singhbhum	Sonua	Golmunda	Segoisai, Nischintpur,Kunusai, Golmunda	95	20
Dumka	Gopikandar	Gopikandar	Jhutichapar, Gopikandar, Baratali, Dubrajpur, Gariyapani, Jadopani, Bakijor, Baghabandh, Koyada, Jolo, Balia, Kurumba, Chandarmali, Jhariyapani, Bhuskidangal, Sarwapani	506	40
Khunti	Murhu	Hethgowa	Hethgoa, Chichigada, Gutigara, Kudasud	150	60
Khunti	Murhu	Indipiri	Indipidi, Etre, Sandigaon, Chatradih, Burima, Kota, Kulipidi, Kota, Urikel	180	80

District	Block Name	Name of the GP	Name of all the RF/NF Villages in the GP	GP Wise Number of Farmers Enrolled for RF/NF	Households Part of the Sample
Gumla	Basia	Itam	Amdega, Kurum, Itam, Kochdega	201	20
Hazaribagh	Tatijharia	Jharpo	Jharpo,Lodhi	512	40
Gumla	Kamdara	Kamdara	Turbul, Raiba, Jariya, Kamdara	180	20
Godda	Pathargama	Kasturiya	Kasturiya, Shampur, Kendua, Barmasiya, Bargama	519	40
Khunti	Murhu	Kewra	Kewra, Janumpiri	70	20
Dumka	Gopikandar	Kharauni Bazaar	Karmatanr, Tarni, Karudih, Ahrichuah, Amladahi, Namodih, kasaipahar, Kalyanpur	642	40
Godda	Poraiyahat	Kharkachiya	Kharkachiya,	80	20
Lohardaga	Kisko	Kharki	Datma, ChhechhraNawadih, Banpur, Semardih	253	60

District	Block Name	Name of the GP	Name of all the RF/NF Villages in the GP	GP Wise Number of Farmers Enrolled for RF/NF	Households Part of the Sample
Gumla	Kamdara	Konsa	Arhara, Konsa, Latra, Murumkela	277	20
Gumla	Kamdara	Kulburu	Kulburu, Betarkera, Gurjumdih, Ichagutu, Khijri, Kurkura	310	40
Dumka	Gopikandar	Kuschira	Manjirabari, Babuikhora, Durgapur, Majdiha, Ranga Mission, Gummapahari, Dhundhapahari	488	40
Godda	Poraiyahat	Lata Dikwani	Beldang, Satbandha, Balathar, Amjore, Latadikwani	310	20
Godda	Pathargama	Latauna	Boharna, Dighi, Gangarampur, Ghutiya, Latauna, Rajaun Kalan, Rajaun Khurd	525	40
Godda	Poraiyahat	Liladah	Liladah, Jalgo	70	20
West Singhbhum	Sonua	Lonjo	Udaypur, Lonjo, Nilaigot	90	20
Gumla	Basia	Lungtu	Jolo, Lungtu, Ninai	401	40

District	Block Name	Name of the GP	Name of all the RF/NF Villages in the GP	GP Wise Number of Farmers Enrolled for RF/NF	Households Part of the Sample
Godda	Pathargama	Maheshlitti	Maheshlitti, Terdiha, Gandharpur	444	40
Gumla	Basia	Mamarla	Lalpur, Chintamankura, Narekala	205	20
Gumla	Basia	Moreng	Moreng, Patura, Raikera, Kinderkela	205	20
Dumka	Gopikandar	Musna	Jamchuah, Dharampur, Amjhari, Musna, Puranakhoda, Budichapar, Ramgarh, Jitpur, Amarpur, Janumdih, Palasbani, Kajikendra, Gamariya	493	40
Gumla	Basia	Okba	Kedli, Tengra	303	20
Godda	Pathargama	Padua	Kerwar,Dhopdiha, Padua, Beltikri, Sonbarsha	331	40
Lohardaga	Kisko	Pakhar	Pakhar, Hutap, Tisiya, Salaiya	167	40
Gumla	Basia	Pantha	Pantha, Sonmer, Lotwa, Lawakera	491	40

District	Block Name	Name of the GP	Name of all the RF/NF Villages in the GP	GP Wise Number of Farmers Enrolled for RF/NF	Households Part of the Sample
Godda	Pathargama	Paraspani	Paraspani, Latauna, Daharlangi, Kherwar	696	40
Dumka	Dumka	Parsimla	Bagnal, Basmata, Damri, Goalsimla, Jagudi, Karmtanr, Parsimla, Rampur, Saltala, Titadih	517	140
Godda	Poraiyahat	Pindrahat	Boha, Khardaha, Pindrahat, Piparjoria	105	20
Gumla	Basia	Pokta	Pokta, Ramjadi, Lohri, Barai	414	20
Dumka	Dumka	Rampur	Andipur, Dasoraydih, Karmatanr, Kathijoria, Khayerbani	218	80
Gumla	Kamdara	Ramtolia	Ramtolya, Pakut, Sonmer, Kenaloya, Kuli	302	40
Gumla	Kamdara	Rerwa	Rerwa, Haphu, Sursang	135	20
Godda	Poraiyahat	Salaiya	Danidih, Dakshinbaihar, Salaiya, Sijhua	170	20

District	Block Name	Name of the GP	Name of all the RF/NF Villages in the GP	GP Wise Number of Farmers Enrolled for RF/NF	Households Part of the Sample
Gumla	Kamdara	Salegutu	Salegutu, Barkoili, Garai, Kamta, Porhotoli, Surua	344	40
Godda	Poraiyahat	Sondiha	Jajalpur, Amrakanauli, Sondiha	125	20
Gumla	Kamdara	Surhu	Gara, Karichua, Loyenga	270	40
Dumka	Gopikandar	Surjudih	Badapathar, Surjudih, Paharpur, Kormo, Bhalki, Bengdobha, Parwatpur, Karipahadi, Piparjoriya, Birajpur, Chhota Bathan, Pindargariya, Kherbani, Gogajor, Bara Bathan	717	60
Bokaro	Jaridih	Tand Mohanpur	Tand Mohanpur	65	20
Bokaro	Jaridih	Tantri North	Tantri, Kenduwadih	55	20
Godda	Poraiyahat	Tarkhutta	Tarkhutta, Dhobai, Baghakhol, Gohrarajpur	155	20
Hazaribagh	Tatijharia	Tatijharia	Holong, Murumato, Berho	428	40

District	Block Name	Name of the GP	Name of all the RF/NF Villages in the GP	GP Wise Number of Farmers Enrolled for RF/NF	Households Part of the Sample
Dumka	Gopikandar	Tengjor	Duwariya, Siddhpahari, Dumaria, Roldih, Talbariya, Amarpani, Muhalo, Kochapani, Bhilaighati, Mudhasol, Dhawadangal, Sugapahadi, Tengjor, Dumartalla	904	60
Gumla	Basia	Tetra	Tetra, Sonlangbira, Siribira,	335	20

Table A2.2: Distribution of Sample in West Bengal

District	Block	Strata	Villages	GP	HH sample
Purulia	Baghmundih	1	Nowadih	Tunturi-Suisa	20
Purulia	Baghmundih	1	Kundtanr	Sindri	20
Purulia	Baghmundih	1	Saridih	Tunturi-Suisa	20
Purulia	Baghmundih	1	Chaunia	Matha	20
Purulia	Baghmundih	1	Baredih	Sindri	20
Jhargram	Binpur I	1	Domuhani	Dharampur	20
Jhargram	Binpur I	1	Kargonala	Dharampur	20
Jhargram	Binpur I	1	Bagghara	Dharampur	20
Jhargram	Binpur I	1	Gopalpur	Balatikri	20
Jhargram	Binpur I	1	Dharmmapur	Dharampur	20
Jhargram	Binpur II	1	Amlasol	Banspahari	20
Jhargram	Binpur II	1	Dangardiha	Belpahari	20
Jhargram	Binpur II	1	Jambani	Belpahari	20

District	Block	Strata	Villages	GP	HH sample
Jhargram	Binpur II	1	Amjharna	Banspahari	20
Jhargram	Binpur II	1	Banspahari	Simulpal	20
Bankura	Hirbandh	1	Hirbandh	Hirbandh	20
Bankura	Hirbandh	1	Jhatipukuriya	Hirbandh	20
Bankura	Hirbandh	1	Amjhuri	Moshiara	20
Bankura	Hirbandh	1	Jadurbonkanta	Baharamuri	20
Bankura	Hirbandh	1	Jhariyakocha	Gopalpur	20
Bankura	Hirbandh	1	Harirampur	Gopalpur	20
Bankura	Hirbandh	1	Nipaniya	Malian	20
Bankura	Hirbandh	1	Bagaldhara	Baharamuri	20
Bankura	Indpur	1	Rajudi	Raghunathpur	20
Bankura	Indpur	1	Kalipahari	Hatagram	20
Bankura	Indpur	1	Niyasa	Hatagram	20
Bankura	Indpur	1	Uttar Kendbona	Hatagram	20

District	Block	Strata	Villages	GP	HH sample
Bankura	Indpur	1	Dakshin Kendbona	Hatagram	20
Purulia	Jhalda 1	1	Gopalpur	Jhalda Darda	20
Purulia	Jhalda 1	1	Patmadih	Jhalda Darda	20
Purulia	Jhalda 1	1	Choto Fura (Chora Tungri)	Mathari Khamar	20
Purulia	Jhalda 1	1	Nowagarh	Jhalda Darda	20
Purulia	Jhalda 1	1	Khamar(Dantia)	Mathari Khamar	20
Purulia	Jhalda 2	1	Tahadri	Rigid	20
Purulia	Jhalda 2	1	Kanriyor	Rigid	20
Purulia	Jhalda 2	1	Khatanga	Chitmu	20
Jhargram	Nayagram	1	Tilia	Chandabila	20
Jhargram	Nayagram	1	Hati Top	Chandrarekha	20
Jhargram	Nayagram	1	Bara Jharia	Barakhakri	20
Jhargram	Nayagram	1	Baksa	Arrah	20
Jhargram	Nayagram	1	Bhaluk Chua	Arrah	20

District	Block	Strata	Villages	GP	HH sample
Jhargram	Nayagram	1	Panchami	Arrah	20
Jhargram	Nayagram	1	Chandabila	Chandabila	20
Jhargram	Nayagram	1	Bamanda	Chandrarekha	20
Jhargram	Nayagram	1	Biriberia	Barakhakri	20
Jhargram	Nayagram	1	Bhola	Chandrarekha	20
Jhargram	Nayagram	1	Atal Diha	Chandabila	20
Jhargram	Nayagram	1	Dulki	Chandabila	20
Jhargram	Nayagram	1	Bara Mara	Arrah	20
Jhargram	Nayagram	1	Ram Chandra Pur	Barakhakri	20
Jhargram	Nayagram	1	Tulsi Bani	Chandrarekha	20
Jhargram	Nayagram	1	Mohanpur	Chandrarekha	20
Jhargram	Nayagram	1	Rai Pal	Chandrarekha	20
Jhargram	Nayagram	1	Telia	Chandrarekha	20
Jhargram	Nayagram	1	Norri	Chandrarekha	20

District	Block	Strata	Villages	GP	HH sample
Jhargram	Nayagram	1	Kuldiha	Arrah	20
Jhargram	Nayagram	1	Bali Muri	Arrah	20
Jhargram	Nayagram	1	Bihankuria	Patina	20
Bankura	Ranibandh	1	Sutan	Rautora	20
Bankura	Ranibandh	1	Hakim Sinan	Haludkanali	20
Bankura	Ranibandh	1	Madan Kata	Barikul	20
Bankura	Ranibandh	1	Lipidiri	Ambikanagar	20
Bankura	Ranibandh	1	Malcharar	Haludkanali	20
Bankura	Ranibandh	1	Rajakata	Rajakata	20
Bankura	Ranibandh	1	Ramgar	Rautora	20
Bankura	Ranibandh	1	Khata-Am	Rautora	20
Bankura	Ranibandh	1	Muchikata	Rautora	20
Bankura	Ranibandh	1	Satnala	Barikul	20
Bankura	Ranibandh	1	Haramgara	Rautora	20

District	Block	Strata	Villages	GP	HH sample
Bankura	Ranibandh	1	Panijia	Rudra	20
Bankura	Ranibandh	1	Chhola Gara	Haludkanali	20
Bankura	Ranibandh	1	Kamardanga	Haludkanali	20
Bankura	Ranibandh	1	Maisamura	Rautora	20
Bankura	Ranibandh	1	Madandihi	Haludkanali	20
Bankura	Hirbandh	2	Dhanarangi	Gopalpur	40
Bankura	Hirbandh	2	Guniada	Gopalpur	40
Bankura	Hirbandh	2	Shyamnagar	Malian	40
Jhargram	Nayagram	2	Bachhur Khoyar	Barakhakri	40
Jhargram	Nayagram	2	Kadam Diha	Barakhakri	40
Jhargram	Nayagram	2	Ramkrishnapur	Arrah	40
Jhargram	Nayagram	2	Pathra Sol	Chandrarekha	40
Jhargram	Nayagram	2	Nagri Pada	Arrah	40
Jhargram	Nayagram	2	Mura Kati	Barakhakri	40

District	Block	Strata	Villages	GP	HH sample
Jhargram	Nayagram	2	Pukhuria	Chandabila	40
Jhargram	Nayagram	2	Bhaluk Ghara	Barakhakri	40
Jhargram	Nayagram	2	Bara Khankri	Barakhakri	40
Jhargram	Nayagram	2	Kuili Suta	Chandrarekha	40
Jhargram	Nayagram	2	Rukhni Mara	Barakhakri	40
Jhargram	Nayagram	2	Bhalia Ghati	Barakhakri	40
Jhargram	Nayagram	2	Jari Ghati	Arrah	40
Jhargram	Nayagram	2	Khas Jangal	Patina	40
Jhargram	Nayagram	2	Narda	Chandabila	40
Bankura	Ranibandh	2	Kama	Rudra	40
Bankura	Ranibandh	2	Baragram	Haludkanali	40
Bankura	Ranibandh	2	Jamda	Haludkanali	40
Bankura	Ranibandh	2	Gosainidihi	Haludkanali	40
Bankura	Ranibandh	2	Bikramdihi	Rajakata	40

Table A2.3: Sample Blocks for FGDs in Jharkhand and West Bengal

S.No	State	District	Block Name	CRP (Regenera-tive Agriculture) – FGD: 8 Per State	VO- FGD: 8 Per State	FPO Board Members +Staff – FGD
1	Jharkhand	Bokaro	Jaridih	One block is to be sampled from each sampled district, with one CRP group per sampled block	1 VO per sampled block of FGD	8 for Jharkhand
2	Jharkhand	Dumka	Gopikandar			
3	Jharkhand	Godda	Poraiyahat			
4	Jharkhand	Gumla	Kamdara			
5	Jharkhand	Hazaribagh	Tatijharia			
6	Jharkhand	Khunti	Murhu			
7	Jharkhand	Lohardaga	Kisko			
8	Jharkhand	West Singhbhum	Sonua			
9	West Bengal	Bankura	Hirbandh	Eight blocks are to be sampled from three sampled districts, one CRP group per sampled block	1 VO per sampled block of FGD	3 for WB
10	West Bengal	Bankura	Ranibandh			
11	West Bengal	Bankura	Indpur			
12	West Bengal	Jhargram	Nayagram			
13	West Bengal	Jhargram	Binpur-II			
14	West Bengal	Jhargram	Binpur I			
15	West Bengal	Purulia	Baghmundih			
16	West Bengal	Purulia	Jhalda 1			
				16	16	11

Table A2.4: Sample Blocks for Personal Interviews in Jharkhand and West Bengal

S.No	State	District	Block Name	BRC Entrepreneurs	PRADAN Professional 8 per state	PI of Progressive Farmers at the District level
1	Jharkhand	Bokaro	Jaridih	1	1	1
2	Jharkhand	Dumka	Gopikandar	1	1	1
3	Jharkhand	Godda	Poraiyahat	1	1	1
4	Jharkhand	Gumla	Kamdara	1	1	1
5	Jharkhand	Hazaribagh	Tatijharia	1	1	1
6	Jharkhand	Khunti	Murhu	1	1	1
7	Jharkhand	Lohardaga	Kisko	1	1	1
8	Jharkhand	West Singhbhum	Sonua	1	1	1
9	West Bengal	Bankura	Hirbandh	1	1	
10	West Bengal	Bankura	Ranibandh	1	1	1
11	West Bengal	Bankura	Indpur	1	1	
12	West Bengal	Jhargram	Nayagram	1	1	
13	West Bengal	Jhargram	Binpur-II	1	1	1
14	West Bengal	Jhargram	Binpur I	1	1	
15	West Bengal	Purulia	Baghmundih	1	1	
16	West Bengal	Purulia	Jhalda 1	1	1	1
				16	16	11

1 BRC entrepreneur per Sampled block

1 per sampled district

8 for Jharkhand (1 per sampled district)

1 BRC entrepreneur per Sampled block

one per sampled block

3 for WB (1 per sampled district)

Appendix - 2

Table A6.1: Preference for Own Unit-Preparation of Bio-Units Over Purchasing From External Sources for Females Across Land Ownership Categories

Land Category	Female			Male		
	No	Yes	Total	No	Yes	Total
Landless	5	12	17	0	8	8
	29.41	70.59	100.00	0.00	100.00	100.00
	1.50	0.65	0.78	0.00	0.65	0.58
Marginal	179	807	986	69	462	531
	18.15	81.85	100.00	12.99	87.01	100.00
	53.59	43.95	45.44	46.94	37.65	38.65
Small	104	611	715	47	439	486
	14.55	85.45	100.00	9.67	90.33	100.00
	31.14	33.28	32.95	31.97	35.78	35.37
Above Small	46	406	452	31	318	349
	10.18	89.82	100.00	8.88	91.12	100.00
	13.77	22.11	20.83	21.09	25.92	25.40
Total	334	1836	2170	147	1227	1374
	15.39	84.61	100.00	10.70	89.30	100.00
	100.00	100.00	100.00	100.00	100.00	100.00

First row has frequencies; second row has row percentages and third row has column percentages

Table A6.2: Preference for Own Unit-Preparation of Bio-Units Over Purchasing From External Sources Across Land Ownership Categories in West Bengal

Land Category	Female			Male		
	No	Yes	Total	No	Yes	Total
Landless	8	31	39	6	26	32
	20.51	79.49	100.00	18.75	81.25	100.00
	2.62	1.94	2.05	3.85	2.49	2.67
Marginal	286	1407	1693	145	922	1067
	16.89	83.11	100.00	13.59	86.41	100.00
	93.77	88.05	88.96	92.95	88.31	88.92
Small	8	105	113	4	65	69
	7.08	92.92	100.00	5.80	94.20	100.00
	2.62	6.57	5.94	2.56	6.23	5.75
Above Small	3	55	58	1	31	32
	5.17	94.83	100.00	3.12	96.88	100.00
	0.98	3.44	3.05	0.64	2.97	2.67
Total	305	1598	1903	156	1044	1200
	16.03	83.97	100.00	13.00	87.00	100.00
	100.00	100.00	100.00	100.00	100.00	100.00

The first row has frequencies; the second row has row percentages and the third row has column percentages

Table A6.3: Distribution of Female Respondents Across Land Ownership Categories by Their Perspective on Increased Workload on Women in Jharkhand

	No	Yes	Total
Landless	1	16	17
	5.88	94.12	100.00
	0.12	1.18	0.78
Marginal	283	703	986
	28.70	71.30	100.00
	34.72	51.88	45.44
Small	321	394	715
	44.90	55.10	100.00
	39.39	29.08	32.95
Above Small	210	242	452
	46.46	53.54	100.00
	25.77	17.86	20.83
Total	815	1355	2170
	37.56	62.44	100.00
	100.00	100.00	100.00

Note: First row has frequencies, second row has row percentages, third row has column percentages

Table A6.4: Distribution of Female Respondents Across Land Ownership Categories by Their Perspective on Increased Workload on Women in West Bengal

	No	Yes	Total
Landless	31	8	39
	79.49	20.51	100.00
	2.69	1.07	2.05
Marginal	1008	685	1693
	59.54	40.46	100.00
	87.42	91.33	88.96
Small	88	25	113
	77.88	22.12	100.00
	7.63	3.33	5.94
Above Small	26	32	58
	44.83	55.17	100.00
	2.25	4.27	3.05
Total	1153	750	1903
	60.59	39.41	100.00
	100.00	100.00	100.00

Note: First row has frequencies, second row has row percentages, third row has column percentages

Table A6.5: Distribution of Female Respondents Across Land Ownership Categories by Their Perspective on Returns on Labour in Regenerative Agriculture in Jharkhand

	More	Less	Same	Don't Know	Total
Landless	10	2	0	0	12
	83.33	16.67	0.00	0.00	100.00
	1.16	3.85	0.00	0.00	1.26
Marginal	447	27	30	0	504
	88.69	5.36	5.95	0.00	100.00
	51.98	51.92	71.43	0.00	52.77
Small	245	18	8	1	272
	90.07	6.62	2.94	0.37	100.00
	28.49	34.62	19.05	100.00	28.48
Above Small	158	5	4	0	167
	94.61	2.99	2.40	0.00	100.00
	18.37	9.62	9.52	0.00	17.49
Total	860	52	42	1	955
	90.05	5.45	4.40	0.10	100.00
	100.00	100.00	100.00	100.00	100.00

Note: First row has frequencies, second row has row percentages, third row has column percentages

Table A6.6: Distribution of Female Respondents Across Land Ownership Categories by Their Perspective on Returns on Labour in Regenerative Agriculture in West Bengal

	More	Less	Same	Don't Know	Total
Landless	6	0	0	0	6
	100.00	0.00	0.00	0.00	100.00
	0.96	0.00	0.00	0.00	0.81
Marginal	567	50	50	12	679
	83.51	7.36	7.36	1.77	100.00
	90.43	98.04	92.59	100.00	91.26
Small	26	1	2	0	29
	89.66	3.45	6.90	0.00	100.00
	4.15	1.96	3.70	0.00	3.90
Above Small	28	0	2	0	30
	93.33	0.00	6.67	0.00	100.00
	4.47	0.00	3.70	0.00	4.03
Total	627	51	54	12	744
	84.27	6.85	7.26	1.61	100.00
	100.00	100.00	100.00	100.00	100.00

Note: First row has frequencies; second row has row percentages and third row has column percentages

Table A6.7: Impact of Regenerative Agriculture on Income From Agriculture by Years of Practising Regenerative Agriculture in Jharkhand (for Regenerative Agriculture Farmers)

	Females				Males			
	Increased	Decreased	Remained	Total	Increased	Decreased	Remained	Total
Last Year	741	35	103	879	535	23	W35	593
	84.30	3.98	11.72	100.00	90.22	3.88	5.90	100.00
1-3 Years	918	39	90	1047	588	10	39	637
	87.68	3.72	8.60	100.00	92.31	1.57	6.12	100.00
4-5 Years	93	7	5	105	47	1	4	52
	88.57	6.67	4.76	100.00	90.38	1.92	7.69	100.00
6-7 Years	24	1	3	28	22	1	0	23
	85.71	3.57	10.71	100.00	95.65	4.35	0.00	100.00
8-10 Years	35	5	1	41	25	0	1	26
	85.37	12.20	2.44	100.00	96.15	0.00	3.85	100.00
Traditionally	55	0	15	70	32	1	10	43
	78.57	0.00	21.43	100.00	74.42	2.33	23.26	100.00
Total	1866	87	217	2170	1249	36	89	1374
	85.99	4.01	10.00	100.00	90.90	2.62	6.48	100.00

Note: First row has frequencies, second row has row percentages

Table A6.8: Impact of Regenerative Agriculture on Income From Agriculture by Years of Practising Regenerative Agriculture in West Bengal (for Regenerative Agriculture Farmers)

	Females				Males			
	Increased	Decreased	Remained	Total	Increased	Decreased	Remained	Total
Last Year	356	20	44	420	208	16	25	249
	84.76	4.76	10.48	100.00	83.53	6.43	10.04	100.00
1-3 Years	915	40	73	1028	535	25	51	611
	89.01	3.89	7.10	100.00	87.56	4.09	8.35	100.00
4-5 Years	203	0	1	204	153	0	0	153
	99.51	0.00	0.49	100.00	100.00	0.00	0.00	100.00
6-7 Years	122	6	0	128	91	8	0	99
	95.31	4.69	0.00	100.00	91.92	8.08	0.00	100.00
8-10 Years	32	5	0	37	26	5	0	31
	86.49	13.51	0.00	100.00	83.87	16.13	0.00	100.00
Traditionally	86	0	0	86	57	0	0	57
	100.00	0.00	0.00	100.00	100.00	0.00	0.00	100.00
Total	1714	71	118	1903	1070	54	76	1200
	90.07	3.73	6.20	100.00	89.17	4.50	6.33	100.00

Note: First row has frequencies, second row has row percentages

Table A6.9: Impact of Regenerative Agriculture on Income From Other Sources by Years of Practising Regenerative Agriculture in Jharkhand (for Regenerative Agriculture Farmers)

	Females				Males			
	Increased	Decreased	Remained	Total	Increased	Decreased	Remained	Total
Last Year	681	86	112	879	488	59	46	593
	77.47	9.78	12.74	100.00	82.29	9.95	7.76	100.00
1-3 Years	853	98	96	1047	538	58	41	637
	81.47	9.36	9.17	100.00	84.46	9.11	6.44	100.00
4-5 Years	95	5	5	105	49	1	2	52
	90.48	4.76	4.76	100.00	94.23	1.92	3.85	100.00
6-7 Years	24	1	3	28	21	1	1	23
	85.71	3.57	10.71	100.00	91.30	4.35	4.35	100.00
8-10 Years	39	0	2	41	24	0	2	26
	95.12	0.00	4.88	100.00	92.31	0.00	7.69	100.00
Traditionally	48	0	22	70	33	0	10	43
	68.57	0.00	31.43	100.00	76.74	0.00	23.26	100.00
Total	1740	190	240	2170	1153	119	102	1374
	80.18	8.76	11.06	100.00	83.92	8.66	7.42	100.00

Note: First row has frequencies, second row has row percentages

Table A6.10: Impact of Regenerative Agriculture on Income From Other Sources by Years of Practising Regenerative Agriculture in West Bengal (for Regenerative Agriculture Farmers)

	Females				Males			
	Increased	Decreased	Remained	Total	Increased	Decreased	Remained	Total
Last Year	317	62	41	420	176	51	22	249
	75.48	14.76	9.76	100.00	70.68	20.48	8.84	100.00
1-3 Years	862	97	69	1028	493	75	43	611
	83.85	9.44	6.71	100.00	80.69	12.27	7.04	100.00
4-5 Years	195	6	3	204	148	4	1	153
	95.59	2.94	1.47	100.00	96.73	2.61	0.65	100.00
6-7 Years	118	9	1	128	90	9	0	99
	92.19	7.03	0.78	100.00	90.91	9.09	0.00	100.00
8-10 Years	24	13	0	37	19	12	0	31
	64.86	35.14	0.00	100.00	61.29	38.71	0.00	100.00
Traditionally	52	34	0	86	28	29	0	57
	60.47	39.53	0.00	100.00	49.12	50.88	0.00	100.00
Total	1568	221	114	1903	954	180	66	1200
	82.40	11.61	5.99	100.00	79.50	15.00	5.50	100.00

Table A6.11: Perception of Non-RA Farmers on the Impact of Regenerative Agriculture on Income From Agriculture in Jharkhand

	Females		Males	
	Freq.	Percent	Freq.	Percent
Increased	162	44.51	133	45.70
Decreased	74	20.33	50	17.18
Remained Same	128	35.16	108	37.11
Total	364	100.00	291	100.00

Table A6.12: Perception of Non-RA Farmers on the Impact of Regenerative Agriculture on Income From Agriculture in West Bengal

	Females		Males	
	221	88.4	139	90.85
Increased	10	4	7	4.58
Decreased	19	7.6	7	4.58
Remained Same	250	100	153	100
Total	364	100.00	291	100.00

Table A6.13: Perception of Non-RA Farmers on the Impact of Regenerative Agriculture on Income From Other Sources in Jharkhand

	Females		Males	
	Freq.	Percent	Freq.	Percent
Increased	169	46.43	136	46.74
Decreased	68	18.68	48	16.49
Remained Same	127	34.89	107	36.77
Total	364	100.00	291	100.00

Table A6.14: Perception of Non-RA Farmers on the Impact of Regenerative Agriculture on Income From Other Sources in West Bengal

	Females		Males	
	176	70.40	137	89.54
Increased	8	3.20	3	1.96
Decreased	66	26.40	13	8.50
Remained Same	250	100.00	153	100.00
Total	364	100.00	291	100.00

Table A6.15: Perception of Non-RA Farmers on the Ability of Regenerative Agriculture to Provide Sufficient Food in Jharkhand

	Females		Males	
	Freq.	Percent	Freq.	Percent
Yes	223	61.26	179	61.51
No	50	13.74	37	12.71
Cannot Say	91	25.00	75	25.77
Total	364	100.00	291	100.00

Table A6.16: Perception of Non-RA Farmers on the Ability of RA to Provide Sufficient Food in West Bengal

	Females		Males	
	Freq.	Percent	Freq.	Percent
Yes	236	94.40	143	93.46
No	3	1.20	2	1.31
Cannot Say	11	4.40	8	5.23
Total	250	100.00	153	100.00

Appendix - 3

Household Questionnaire

Scoping Study on Regenerative Agriculture

Jharkhand

Household-Level Questionnaire

Respondent: F= Female, M = Male, B= Both, anybody if not mentioned)

Name of the District:

Name of the Block:

Name of the Village:

Are you a member of:- SHG, PG, FPO (Tick in the options/multiple)

A. Household Information:

1. Name of the respondent:_____

2. Caste: ST/SC/OBC/Others (Tick the correct option)

3. Education: _____

4. Occupation of the respondent: _(last one year)

    4.1 According to time invested

    4.2 According to income generated

5. Land

Land	Total Area (Acre)	Upland (Acre)	Medium Upland (Acre)	Medium Lowland (Acre)	Low Land (Acre)
Own Land					
Share Crop/ Rented/Leases Land					
For how much land is irrigation available in Kharif 1. All the land 2. Most of the land 3. Half of the land 4. Less than half 5. None					
For how much land is irrigation available in Rabi 1. All the land 2. Most of the land 3. Half of the land 4. Less than 5. None					
For how much land is irrigation available in Summer 1. All the land 2. Most of the land 3. Half of the land 4. Less than half 5. None					

6. Livestock details (Current status) (In numbers)

	Buffaloes	Cattle	Goats	Poultry birds	Pigs	Other
No. of Adult Female						
No. of Adult Male						
No. of Kids/Young						

7. Family Members:

Number of male members of the HH who live in the village and contribute to farm work	Number of female members of the HH who live in the village and contribute to farm work	Number of non-binary members of the HH who live in the village and contribute to farm work

B. Knowledge Dissemination: (B)

8. Have you received any training on Regenerative Agriculture? (Yes/No)-if no then go to next person)

9. If yes, please tell us which of the following aspects are important for Regenerative Agriculture:

   (The enumerators read out the Factors and the respondents Yes/No/I don't know.

Factors	Response (multiple selections) *Yes/No/I don't know*
Soil Health	
Soil Moisture (Mulching)	
Manure/organic content (FYM, Cowdung, green leaves)	
High Quality manure (Shivansh Khaad, Jeevamrit/ Ghan Jeevamrit/Matka Khad) Super compost (Pahalwan khad/Balwan Khad/Marang Khad/ Sanjivani Khad/Mahabali Khad/Others)	
Local seed varieties	
Organic seed treatment (with Beejamrit/ trichoderma)	
Plant protection concoctions (Neemastra/ Bramhastra/Agniastra)	
Plant protection (Mechanical, Trap, bird parch/ others)	
Agronomic practices (Intercropping/mix cropping/ multilayer/Silvopasture	
Plant growth enhancer (Multi seed extract/ Neembu anda tonic)	

10. From where did you acquire this knowledge? (Multiple selection)

    (Code: PRADAN, other NGO, Friend, Government extension department, neighbours, observing others in the village, intergenerational knowledge)

11. Do you apply the knowledge in your farming practices? (Yes/No), if no then go to q.no-13

12. If yes, to what extent do you apply this knowledge?

    12.1 Do you apply Regenerative Agriculture to all your land? (Yes/No) If Yes, go to Q12.3.

    12.2 If 'No', why (Code: complicated process/ raw material not available as per requirement/ high cost/ labour intensive/less yield/less income/pest attack/other)

    12.3 Area of land where Regenerative Agriculture is practised

Season-wise Regenerative Agriculture crops details – (anybody)

Season	Crop (crop code)	Area (Acre)	Land type (Upland, M. upland, M. lowland, Low land	Soil type (fertile/rocky/sandy/ clayey)	Is the land irrigated? (Yes/No)	Yield
Kharif 2022						
Rabi 2022						
Summer 2023						
Kharif 2023						

12.4 Do your neighbours in the next fields use Regenerative Agriculture; (Yes/No) if yes, go to 12.6

12.5 If No, Does their use of synthetic fertiliser, insecticides, etc. impact your capacity to use Regenerative Agriculture? (Yes/No)

12.6 Do the village level groups such as Tola Sabha/Gram Sabha/parha Samity/SHG/VO that you are part of help you

12.6.1 To exchange traditional seed varieties, (Yes/No)

12.6.2 Learn about local ways of handling pest attacks, etc (Yes/No)

13. If no, go to Q 11

13.1. please explain why you do not apply this knowledge (Code: complicated process/ raw material not available as per requirement/ high cost/ labour intensive/less yield/less income/ pest attack/other – multiple selection)

13.2. What is the most important reason? (Code: complicated process/ raw material not available as per requirement/ high cost/ labour intensive/less yield/less income/pest attack/ other)

C. Food Security: (B)

14. Has the adoption of Regenerative Agriculture practices affected your/others' food production compared to conventional agriculture practices? (Options: More/Less/Same/don't know)

'Your'- for Regenerative Agriculture HH (If 10=yes)-

'Other'- for Control HH (if 10=No)

15. Do you believe Regenerative Agriculture will provide sufficient food for your/others' household consumption if applied to your/others' entire land/field?(Options: Yes/No/Can't say)

Your'- For Regenerative Agriculture HH (If 10=yes)

'Other'- for Non-RA HH (if 10=No)

D. History of Regenerative Agriculture (if 10 = yes):

16. Since when have you been practising Regenerative Agriculture? (Year: - Last year/1-3 years/3-5 years/5-7 years/7- 10 years/traditionally this is what we practice)

17. Has your Regenerative Agriculture area increased/decreased/remained the same over the years

18. What motivated you to start practising Regenerative Agriculture? (Code: Reduced Cost, better soil quality, tasty food, healthy food, biodiversity, better shelf-life of vegetables, less pest and disease in crops, require less irrigation, other-specify -multiple selection)

E. Current Livelihood Routes (if 10 = yes):

19. Have there been any changes in your livelihood activities before and after adopting

	More	Less	No Change	Don't Know
Agriculture (gross area) (considering all seasons)				
Migration(Time & number of persons)				
Forest-based livelihoods (Produce)				
Livestock-based livelihoods (Herd/ flock size)				
Wage days				
Other (specify)				

Regenerative Agriculture? (Yes/No)

20. If yes, please describe the changes.

F. Income Level: (B)

21. Has your/others' income from agriculture increased, decreased, or remained the same after adopting Regenerative Agriculture?

21.1 .Your income (If 10= yes)- I think code 11

21.1.1 From Agriculture: increased/decreased/remained the same

21.1.2 From all sources: increased/decreased/remained the same

21.2 Your assumption about Others' income (If 10= no) I think code 11

21.2.1 From Agriculture: increased/decreased/remained the same/don't know

21.2.2 From all sources: increased/decreased/remained the same/don't know

Input	Cost (component: Raw material purchase+labour day+preservation cost)/Price Rs	Area of land for which bio input will cover	Source (code - self-prepared, purchased, collected)	Availability of raw materials as per requirement (Easy, moderate, tough, not available locally)
Seed (Bio-input)				
Vermicompost (Bio-input)				
Shivansh Khaad				
Super compost (Pahalwan khad/ Balwan Khad/Marang Khad/Sanjivani Khad/ Mahabali Khad/Others				
Multi seed extract/ Neembu anda tonic				
Beejamrit/trichoderma				
Jeevamrit/Ghan Jeevamrit/Matka Khad				
Cowdung/FYM				
Plant Protection materials (Neemastra/ Bramhastra/Agniastra				
Mulching (Bio-input)				
Others				
Others				

G. Cost and Access to Bio-inputs (if 10 = yes):- I think code 11 (anybody)

22. Please provide item-wise information about the cost per unit area and availability of inputs. Specify the source and availability of each bio-input.

H. Labour Availability and Opportunity Cost: (B)

23. In your experience, does Regenerative Agriculture require (More/Less/Same/don't know) labour compared to conventional/synthetic input-based agriculture?

24. If more labour is needed, does Regenerative Agriculture provide better returns on labour compared to other opportunities? (Yes/No)

I. Experience and Exposure: (B)

25. Have you participated in any exposure programs related to Regenerative Agriculture? (Yes/No)

26. Place you received exposure. (Place code)

27. Was it helpful to motivate you start adopting Regenerative Agriculture practices (Yes/No)?

J. Requirement of irrigation:: (B)

28. What do you feel after practising Regenerative Agriculture, the water holding capacity of the soil, Increased/Decreased/Remain the same (Please tick the correct option) 28.2 What do you feel after practising Regenerative Agriculture, the amount of irrigation required Increased/Decreased/Remain the same (Please tick the correct option)

K. Perception of Farmers (if 10 = yes): (B) I think code 11

29. Do you prefer individual unit preparation of bio-inputs over purchasing from external sources? (Yes/No)

30. For each bio-input considering the labour cost, availability of raw materials, labour time, and shelf-life of the input, will you prefer individual preparation or purchase from external sources?

Input	Preference (own unit/purchase)
Seed	
Vermicompost	
Shivansh Khaad	
Super compost (Pahalwan khad/Balwan Khad/Marang Khad/Sanjivani Khad/ Mahabali Khad/Others	
Multi seed extract/Neembu anda tonic	
Beejamrit	
Jeevamrit/Ghan Jeevamrit/Matka Khad	
Cowdung	
Plant Protection materials (Neeastra/ Bramhastra/Agniastra	
Mulching (Bio-input)	
Others	
Others	

L. Perception (if 10 = yes): (B)

31. What do you prefer between synthetic input-based and Regenerative Agriculture (tick), and why (code- better soil health, more bio-diversity, better human health, tasty food, less labour, more production, less pest and disease, more income, other-specify)?

32. In Regenerative Agriculture, who makes decisions regarding various farming activities? (Male/Female/Both) (code- selection of plot, selection of crop, selection of seed, deciding plant protection process, deciding interculture process, deciding harvesting time, Where to sell, fixing price, other-specify.)

M. Willingness and ability to invest:

33. Compare Conventional(synthetic input based) and Regenerative Agriculture in terms of your a) Willingness to invest b) Ability to invest

    Consider Cost, Return, labour requirement, dependency on external systems for a) input procurement, f) output marketing

		Conventional	RA
Willingness to invest (Tick in one response only)	Cereals (Paddy/Maize)		
	Vegetables		
	Oilseeds & Pulses		
Ability to invest (Tick in one response only)	Cereals (Paddy/Maize)		
	Vegetables		
	Oilseeds & Pulses		

N. Impact on Women's Workload: (F)

34. In the Regenerative Agriculture practices, is the workload more than in conventional agriculture? (Yes/No)

35. Specify which farming activities contribute to this increased workload. (Code - field preparation, nursery bed, manure preparation, interculture, manure application, inoculant preparation, plant protection, harvesting)

P. Changes in Soil Quality: (B)

36. Have you observed any changes in your Regenerative Agriculture plots regarding:

- Water holding capacity of the soil (more/less/same/don't know)
- Soil colour (code: darker/lighter/no change)
- Humus content: (more/less/same/don't know)
- Soil texture: (Code: Finer/coarser/lumpier/no change)
- Soil organism diversity (e.g., earthworms, molluscs, crab) - more/less/same/don't know

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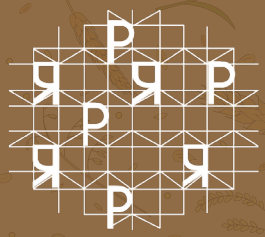

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