



**The Impacts of Bio-Input Resource Centers on Social Inequality and Climate Change
Mitigation in Rajasthan, India**

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I. Introduction

Seva Mandir's Bio-Input Resource Centers (BRCs) aim to strengthen small farmers' climate resilience in southern Rajasthan by localizing the production and distribution of bio-inputs such as biofertilizers and biopesticides. The BRCs aim to foster agricultural practices that lower CO₂ emissions to decrease greenhouse gas emissions. As both sites for entrepreneurship and the dissemination of bio-inputs and agricultural education, Bio-Input Resource Centers work to effectively combat the impacts of climate change on small farmers in rural Rajasthan. The role of Bio-Input Resource Centers is becoming even more crucial amidst increasingly varying temperatures, rainfall, and availability of soil nutrients which have significantly harmed the livelihoods and agricultural supply in rural Rajasthan.

With the increasing necessity of Bio-Resource Centers in mind, this review synthesizes key findings on climate stressors, input-production models, farmer adoption challenges, and scaling strategies to pinpoint best practices for Seva Mandir's roll-out. From this review, Seva Mandir will have a comprehensive understanding of the factors motivating the use of BRCs as well as specific scientific and economic strategies which can be used to implement BRCs to maximize their efficiency in mitigating climate change.

II. Social Implications of Climate Change in Rural Rajasthan – Sania Edlich

On the whole, climate change poses a credible threat due to changes in rainfall to farmers in the Rajasthan region. With 65% of poor, rural communities in Rajasthan relying on agriculture, it is important to understand the risks and mitigation techniques to make these communities more climate-resilient.¹ India's diverse climate makes the country susceptible to varying extreme weather patterns that impact agricultural production. In "Climate Change Impacts, Adaptation, and Mitigation in Indian Agriculture," H. Pathak maintains that increases in atmospheric temperature stifle crop production by harming the enzymes that power CO₂ uptake. This alteration alters the plant's photosynthesis, and ultimately diminishes crop yield.² Looking at these impacts, the rate at which crop yield decreased annually changed from 4.5% to 9% solely due to climate change.³ Among these nationwide findings in India, Pathak points out that rural farmers or people working on small farms are the most vulnerable to these reductions in crop yield. These rural farmers are most sensitive to climate change as they rely on climate-dependent resources and have limited capability to adapt to changes in their environment. In this way, the most vulnerable community to climate change in India is small rural farmers, and they are becoming increasingly impacted by climate change.

Applying these findings to Rajasthan, one can see that the state's rural farmers are particularly vulnerable to climate change. Climate data indicates the extreme variability of rainfall in Rajasthan as rainfall values rapidly rise and fall (Figure 1).⁴ While rainfall variability is normal, the extreme variability Rajasthan is facing is new. Looking at the impacts, only 4.69%

¹ Naida Jahic, "Poverty in Rajasthan: Reduction Measures," *The Borgen Project*, October 2, 2024, <https://borgenproject.org/poverty-in-rajasthan/>.

² H. Pathak, "Impact, Adaptation, and Mitigation of Climate Change in Indian Agriculture," *Environmental Monitoring and Assessment* 195, no. 1 (November 1, 2022): 52, <https://doi.org/10.1007/s10661-022-10537-3>.

³ Ibid.

⁴ Neha Hikare et al., "The Chemistry of Rain: Long-Term Observations and Insights from Indian GAW Stations" (Pune, India: India Meteorological Department, January 2025), <https://imdpune.gov.in/reports.php>.

of rural farmers are “large farmers,” with farmers working on land smaller than 10 hectares constitute the other 95.31% of farmers in Rajasthan.⁵ Out of these, 21.9% are “small farmers,” marked as working on 1-2 hectares.⁶ Rajasthan’s marginal farmers further occupy a smaller share of the state’s agricultural land than small farmers do across India as a whole. Additionally, Rajasthan has a larger proportion of small, rural farmers compared to national rates. These figures emphasize the extreme vulnerability of small farmers in Rajasthan. Further, when put together with the fact that it is small farmers that are most vulnerable to the impacts of climate change, one can see that turning a critical eye to climate mitigation in Rajasthan is imperative to mitigate social inequalities based on caste, wealth, and rural versus urban status.

Within the state of Rajasthan, around 22% of the population lives below India’s national poverty line, as per the Department of Social Justice & Empowerment, laying right around India’s national average population below the poverty line of 27%.⁷ Rajasthan’s government has been effectively lowering the poverty rate in the state throughout the past twenty years. Within Rajasthan, the state’s government has implemented poverty-alleviation programs such as subsidized healthcare and subsidized crop insurance, partially contributing to this decline in poverty. However, the Borgen Project finds that caste systems particularly prevent poor farmers in rural areas from accessing the government programs. This happens also because the government does not extend outreach programs to rural areas, mainly focusing on urban centers. In this way, more action is needed to serve the poor, rural farmers in Rajasthan.

⁵ Meetu Yadav, “STRATEGIES FOR DOUBLING OF FARMER’S INCOME: AN RESEARCH INITIATIVE IN RAJASTHAN,” *International Journal of Advanced Research in Commerce, Management & Social Science (IJARCMSS)* 6, no. 1 (2023): 65–68.

⁶ Ibid.

⁷ “State-Wise Percentage of Population Below Poverty Line by Social Groups, 2004-05 | Department of Social Justice and Empowerment - Government of India,” accessed April 1, 2025, <https://socialjustice.gov.in/common/76672>.

III. Trends in Rainfall, Temperature, and Crop Yield in Rajasthan – Mohemeen Ahmed

Over the past century, Rajasthan has experienced significant changes in its climate, including long-term drought and increases in temperature and variability in rainfall, which are trends that result in consequences for crop yield. In “Trend Detection in Temperature and Rainfall over Rajasthan during the Last Century,” Abira Dutty Roy uses a dataset spanning 100 years (1901-2002) to identify a statistically significant rise in both minimum and maximum temperatures, as well as a decline in monsoon rainfall across most of the state.⁸ She also observes a delayed onset of monsoon with increased rainfall after the monsoon season, which signals a shift in the seasonal water cycle – leaving crops vulnerable during key growth periods. These findings are emphasized in “Trend Analysis of Temperature and Rainfall of Rajasthan, India,” where they demonstrate how Rajasthan has become one of the four most climate-vulnerable states in India, facing large exposure to extreme climate events like droughts and heatwaves.⁹ This unprecedented climate variability is a physical challenge as well as a planning challenge for rural communities in Rajasthan whose crop yield depends on stable seasonal cycles.

While average annual rainfall has increased slightly in certain parts of Rajasthan, the distribution of rainfall has become much more erratic. Patel et. al observed decades of precipitation data and found that although annual rainfall has shown an increasing trend, there have been increasing dry drought events, especially in the monsoon season.¹⁰ Such shifts, like

⁸ Abira Dutta Roy, “Trend Detection in Temperature and Rainfall over Rajasthan during the Last Century,” *Asian Journal of Research in Social Sciences and Humanities* 5, no. 2 (2015): 12–26. https://www.researchgate.net/publication/272390327_Trend_detection_in_Temperature_and_Rainfall_over_Rajasthan_during_the_Last_Century

⁹ Suresh Kumar Sharma, Durga Prasad Sharma, Manoj Kumar Sharma, Kiran Gaur, and Pratibha Manohar, “Trend Analysis of Temperature and Rainfall of Rajasthan, India,” *Advances in Meteorology*, 2021, Article ID 6296709. <https://doi.org/10.1155/2021/6296709>

¹⁰ Shahid Patel, Darshan Mehta, Vijendra Kumar, Shakera Patel, and Deepak Kumar Tiwari, “Trend Analysis of Precipitation and Drought Characteristics over Churu District of Northeast Rajasthan, India,” *Journal of Water and Climate Change* 15, no. 9 (2024): 4457–4474. <https://doi.org/10.2166/wcc.2024.144>

higher rainfall totals but more frequent droughts, demonstrate an interesting contradiction: more rainfall may be falling, but less of it is usable to farmers. When rain occurs in intense, short periods or during non-growing periods, it is unable to support crops and usually runs off instead of being absorbed into the soil to promote crop yield. While rainfall in Rajasthan has increased, it is not useful or beneficial for agriculture. It instead increases uncertainty in planning for farmers, especially ones who lack access to immediate, real-time weather forecasting.

Furthermore, these climate trends have greatly affected crop yields across Rajasthan, especially for rain and temperature-sensitive crops. In “Assessing Impact of Climatic Variability on Crop Yields in Rajasthan,” Shalander Kumar discovers that crop yields will respond positively to moderate increases in rainfall, but large increases in maximum temperatures reduce yields significantly, particularly for wheat and pulses.¹¹ In his study, he highlights that the interaction of rainfall and temperature extremes, like heat waves during flowering stages or a drought during germination, can cause devastating damage to crops. Kumar also emphasizes that the timing of climate changes are just as important as the magnitude of such changes. For instance, an early-season drought could be even more damaging than a general decrease in annual rainfall, as the timing of such changes during the process of growing crops can define the success or failure of farming.

Expanding on this information, in “Heterogeneous Climate Effect on Crop Yield and Associated Risks to Water Security in India,” Mohapatra et. al additionally introduce a national perspective that includes Rajasthan and focuses on how such anomalies in rainfall affect the

¹¹ Shalander Kumar, “Assessing Impact of Climatic Variability on Crop Yields in Rajasthan,” *Annals of Arid Zone* 51, no. 3–4 (2012): 199–207.
https://www.researchgate.net/publication/282674481_Assessing_impact_of_climatic_variability_on_crop_yields_in_Rajasthan

variability of crop yields.¹² By using the Just-Pope Frontier approach, the study finds that high summer rainfall and low monsoon evaporation helps stabilize crop yields of groundnut and chickpea, but erratic weather events, like dry monsoon periods, will heighten the unpredictability of yield. This trend is especially dangerous in Rajasthan, as farmers rely heavily on groundwater. The study warns that inefficient irrigation practices in combination with rising climate stresses are leading regions like Rajasthan closer to water insecurity, which further increases agricultural risk for farmers.

Despite such challenges, there have been some notable instances of agricultural growth. In “An Analysis of Growth Behavior of the Production of Major Crops of Rajasthan,” Usha Rani examines production trends from 2003-2023. This investigation reports there is a compound annual growth rate of 7.6% for rice, which is the highest among the crops that were studied.¹³ Yet, even this statistic hides other important nuances in crop yield. Rani’s data also demonstrates that growth in other crops, including coarse cereals, pulses, and oilseeds, has been slower and less consistent. Her analysis highlights that certain high-input crops that are well-irrigated like rice have benefited from state-level support and new technologies, but more traditional crops remain vulnerable to climate variability. It indicates that there remains a divergent trend in agricultural yields, where some farmers, especially those with access to irrigation will succeed, while others face stagnation or decline in their yields.

¹² Souryabrata Mohapatra, Dukhabandhu Sahoo, Auro Kumar Sahoo, Basil Sharp, and Le Wen, “Heterogeneous Climate Effect on Crop Yield and Associated Risks to Water Security in India,” *International Journal of Water Resources Development* 40, no. 3 (2024): 345–378. <https://doi.org/10.1080/07900627.2023.2244086>

¹³ Usha Rani, “An Analysis of Growth Behaviour of the Production of Major Crops of Rajasthan,” *International Journal for Multidisciplinary Research (IJFMR)* 6, no. 1 (2024): 1–10. <https://www.ijfmr.com/papers/2024/1/12659.pdf>

IV. The Impact of BRCs on Tribal Farming – Luke Steene

The high poverty rate of Rajasthan's tribal farmers poses a unique challenge as to how they can best deal with the impacts of climate change. Bolstering farmers to handle these challenges in sustainable ways is essential to maintaining their livelihood and long term well-being. One identifiable solution is transitioning from chemical farming to natural farming practices. Bio-input resource centers (BRCs) are hubs that make this transition possible as they are facilities that produce and supply organic "bio-inputs," aiming to provide low-cost, locally made alternatives to chemical inputs. BRCs exist to reduce dependency on synthetic fertilizers and pesticides, cut input costs for small farmers, and improve soil health in a community-driven, sustainable manner. In addition, BRCs are known to increase communities' climate resilience.¹⁴ Bio-input resource centers have gained national attention in India: the National Mission on Natural Farming (NMNF) envisions establishing 10,000-15,000 BRCs across the country to serve clusters of villages.¹⁵

Financial Feasibility of BRCs. In catering to a consumer-base of tribal farmers in rural Rajasthan, it is recommended that Seva Mandir pursue a low-investment low-income model (LIM).¹⁶ The characteristics of the LIM model pertaining to capital expenditure and bio-input holdings are elaborated on in the following analysis. Seva Mandir's initial startup cost is 30,000 rupees per center and two or three farmers will assume control over the BRCs operations. The BRC Technical Manual recommends that the BRC be initially run using existing assets (ex. a shed) and minimal equipment purchasing.

¹⁴ Council on Energy, Environment and Water, *Bio-inputs* (New Delhi: Council on Energy, Environment and Water, n.d.), <https://www.ceew.in/sites/default/files/bio-inputs.pdf>

¹⁵ Ministry of Agriculture & Farmers Welfare, "Promotion Of Natural Farming," Press Information Bureau, March 14, 2023, <https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=1906884>.

¹⁶ National Coalition for Natural Farming, *Bio-Input Resource Center: Natural Farming Technical Process Manual*, version 1.0 (Hyderabad: National Coalition for Natural Farming, September 2022).

A traditional model of capital expenditure for BRCs operating under the LIM model is as follows. Community institutions, such as farmer producer organizations (FPOs) to self-help groups (SHGs) like Seva Mandir, may finance loans, typically at an annual interest rate of ~10% and repaid over three years.¹⁷ A loan at this level keeps upfront costs low for the farmer entrepreneurs and the BRC Technical Manual affirms that even a model working capital (as low as 2,000 rupees) is effective in maintaining a BRC on the LIM model.

Revenue streams for BRCs on the LIM model are traditionally broken down into these four categories: sale of bio-input products, service fees, allied product sales, and training/community involvement activities.

Sale of bio-input products. As the BRC produces and sells its bio-fertilizers and bio-pesticides, it is recommended that a 50% profit margin on products be the standard target. Simpler products with longer shelf-life may carry lower margins, whereas more labor-intensive inputs justify higher markups.¹⁸ For example, a batch of Ghana Jeevamruth might cost 610 rupees to make and could be sold to roughly double that, given recommended margins. Obviously, the profit margins should be measured explicitly based on the needs of the farmer entrepreneurs' and the resources and capabilities of the consumer, tribal farmer base. The goal of the BRCs is to make natural farming products and practices accessible to both the farmer entrepreneurs and the tribal farmer consumer base, so ensuring that cost not remain too high of a barrier is important to adequately fulfill the goals of the BRC.

Service fees. To overcome the challenge of transporting bulky, short-lived inputs, some BRC models include on-farm services. Some models include a provision where farmer entrepreneurs visit the fields of tribal farmers and prepare inputs on-site for a fee. This is

¹⁷ National Coalition for Natural Farming, *Bio-Input Resource Center: Natural Farming Technical Process Manual*.

¹⁸ Ibid.

specifically cited to be helpful for liquid Jeevamruth or waste-decomposer solutions.¹⁹ This provision generates income whilst saving farmers the effort of production and mitigating transport costs for liquids, as well as transforms part of the BRC's offering into a service model rather than merely product sales. One key benefit to this practice is that it increases accessibility to these bio-inputs, however, transportation costs would have to be taken into account. However, given the benefits that offering services poses to the profitability and accessibility of the BRC, it is recommended that BRC entrepreneurs add practices like this to their model when they feel they are willing and able to.

Allied product sales. It is typical for BRCs to stock items needed for natural farming that they may not produce in-house (including botanical extracts, pheromone traps, sticky traps, and quality seeds and saplings).²⁰ By acting as a one-stop agro-input shop (with an eco-friendly focus), BRCs increase their accessibility to tribal marginal farmers and bolster their reputation as the market leader for agricultural products in the region, strengthening the regions' ties with natural farming practices. Typically, a ~10% commission might be given to sales representatives or partner organizations involved in a distribution.²¹

Training & Community Involvement. As the BRC matures, it is recommended that they offer paid training courses for other farmers or even beginner entrepreneurs from neighboring villages.²² While information and informal training should be available to regional farmers so that they feel comfortable using these bio-inputs, formal training courses are sound ways to increase revenue services and further establish a reputation for the BRC as not only a place for natural farming supplies but a hub for knowledge about the practice.

¹⁹ National Coalition for Natural Farming, *Bio-Input Resource Center: Natural Farming Technical Process Manual*.

²⁰ Ibid.

²¹ Ibid.

²² Ibid.

Acknowledging the seasonality of BRC income is important for planning capital expenditures and revenue streams.²³ The busiest season spans the monsoon cropping season: May to November. This corresponds greatly to times in which farmers are most in need of seed treatments, soil preparations, and pest controlling substances and equipment. During off-season months, production should slow or pause to respond to a presumed decrease in demand. Planning should account for this. Important measures to consider are storing shelf-stable products for sale in-season, ensuring that products with a lesser shelf life are held at a time where they are likely to be sold, and saving earnings to cover lean months.

Additionally, it is vital to understand that profitability in the first year may be limited as farmers slowly gain trust in the BRC. Projections assume that only 30-50% of farmers in rural, high-poverty areas like Rajasthan will adopt bio-inputs initially, with uptake growing in subsequent years.²⁴ One suggestion to increase the sustainability of the BRC is a phased expansion, in which profits are reinvested to expand outreach each season. Additionally, slowly adding the additional streams of revenue outlined above ensure that running costs of offering services do not become overwhelming and unsustainable.

One way in which low-investment BRCs can maintain sustainability is through focusing on just three basic products: Jeevamrut, Beejamrut, and Nimastra.²⁵ These inputs have been cited for yielding modest, but positive income for entrepreneurs, with income margins expanded as more products and services are offered each season. Additionally, LIM BRCs operate on the B2C model, selling directly to farmers at the village. They also traditionally benefit from family labor to avoid hired labor costs.

²³ National Coalition for Natural Farming, *Bio-Input Resource Center: Natural Farming Technical Process Manual*.

²⁴ Ibid.

²⁵ Ibid.

The table below compares low-investment and high-investment BRCs. This is to offer insight as to how other models choose to operate the BRCs as well as provides insight into opportunities for growth of Seva Mandir's BRCs as profit margins increase, should the entrepreneur feel that evolving into a high-investment model is feasible in the long-run.²⁶

	Low-Investment (LIM)	High-Investment (HIM)
Products	2-3 basic products (typically Jeevamrut, Handikhata, and Nimastra).	Larger product range. (example: bio-inoculant cultures like Trichoderma or Azotobacter).
Area of Coverage	One, local village.	Regional coverage
Business Model	B2C	A blend of B2C and B2B
Sources of Capital	FPO or SHG loans	FPO/SHG loans, NGO or trust grants, government subsidies, consumer donations.
Services	Primarily selling bio-inputs, may transition into a service-model or sale of other equipment useful and relevant to natural farming practices	Sell bio-inputs, offer services/training, sell equipment, sell to retail.

Storage, Preparation, and Distribution. Maintaining a BRC that, in the LIM model, sells preparations such as Jeevamruth and Nimastra, requires that entrepreneurs source the materials needed to make the inputs and properly store them so that they can be sold to the tribal, marginal farmer consumer base. The following table outlines key raw materials that BRCs must store as well as best practices for retrieving them.²⁷

²⁶ BRC Technical Manual

²⁷ Council on Energy, Environment and Water, *Bio-inputs*.

Raw Material	Uses	Best Practices
Cow dung and cow urine	Foundational ingredient for Jeevamrut	Be located in an area near cattle, collect fresh dung and urine daily, cow urine collection systems: waterproof cow sheds and channel urine into central storage tanks.
Neem leaves	For botanical pesticides and Nimastra.	May leverage local trees or cultivate neem plants in a nursery, organize drive collections seasonally.
Jaggery and Gram Flour	Feed microbial growth in fermentations like Jeevamruth	Purchased from market (120-140 rupees per batch of Jeevamrut), buy in bulk post-harvest season to reduce expenses for the following season.

The following table outlines useful practices for preparing key bio-inputs. These should be standardized and streamlined across all BRCs for consistent results.²⁸ These insights as to the storage, making, and distribution of bio-inputs reveals how the meticulous planning of BRCs is vital to their longevity and general functioning.

Bio-Input	Ingredients	Process	Storage	Use
Jeevamrut (Liquid)	10 kg fresh cow dung, 10 L of cow urine, water, a kilo of jaggery and pulse flour, fertile soil.	Stirred in a barrel and left to ferment for 2-4 days in a relatively shaded area, stirred twice daily	Use within one week because it is a live culture. Ideally used fresh. It must be stored briefly,	Enriches soil microbial activity and converts organic nutrients into things that plants can consume for

²⁸ Council on Energy, Environment and Water, *Bio-inputs*.

			they should be kept in cool, dry conditions in airtight containers.	growth.
Ghana Jeevamrut (Dry)	Same ingredients as liquid jeevamrut	Condense into miniature balls, dry in shade for a week, once fully dried, crumble into a power and store in bags.	Can be stored for six months. Store in cool, dry conditions in airtight containers under shade.	Enriches soil microbial activity and converts organic nutrients into things that plants can consume for growth.
Nimastra	Neem, neem leaves	Method 1- boil neem leaf paste in cow urine until halves. Method 2- ferment neem leaves with cow dung and urine in a close container for 48 hours.	Cannot be stored. The BRC would have to prepare on demand for farmers to use within a day or two of being brewed.	Repels pests: eats up insects and young larval stages on crops.
Beejamrut	Cow dung, water, cow urine, lime, soil.	Tie 5 kg cow dung in a cloth and immerse in 20L water, add 5L cow urine, lime juice, and local soil. Ferment for 12-24 hours.	Zero self life: Beejamrut must be used the day after preparation.	Treats seeds before sowing: the microbial coating enhances seed germination and protects against soil-borne diseases.

Proximity to cattle is the first important consideration here. As specifically liquid jeevamrut does not have a long shelf life, it is essential that BRCs be able to make this input by demand and onsite when farmers need it. This will become particularly important during the harvest season.

A second consideration is inventory management. BRC facilities require a dedicated storage space. For these three inputs, this space does not need to be large, but it should be one, simple room or shed with shelving to organize the inventory. In terms of timing, producing in small batches to meet near-term demand, thereby avoiding large unsold surpluses that expire is essential for cost minimization and waste reduction. Further, BRC entrepreneurs should be keen on setting up an organized system of logging consumer orders for certain inputs so that they can ensure the input is readily available when the time and need arises.

Thirdly, BRC entrepreneurs must ensure that they, or their sources of labor, are capable of making certain inputs, specifically Nimastra and Beejamrut (which have little to no shelf life), onsite and at demand. This entails ensuring that BRCs are equipped with the proper material to make these inputs as well as training employees to make these inputs.

Overall, maintaining these three bio-inputs as part of the LIM model is feasible, although BRC entrepreneurs should be cautious of their proximity to raw materials, the equipment they have, and their general feasibility to create these inputs.

Environmental Impact of BRCs. Bio-Input Resource Centers (BRCS) play a crucial role in reducing the environmental impact of agriculture in Rajasthan by replacing chemical fertilizers and pesticides with environmentally-friendly, locally produced bio-inputs. This replacement would promote soil health and biodiversity while also contributing directly to climate change mitigation. One major source of agricultural greenhouse gas (GHG) emissions in

India is the manufacturing of and use of synthetic fertilizers, especially ones that are nitrogen-based. While the amount of CO₂ released per ton of chemical fertilizer does depend on the type of fertilizer, the Council of Energy, Environment, and Water report that for every ton of chemical fertilizer produced, approximately 0.58 tons of CO₂ are released into the atmosphere.²⁹ By localizing and scaling the production of natural alternatives to chemical fertilizers like jeevamrut, beejamrut, and nimastra, each BRC will effectively offset a portion of this environmental burden.

Estimates suggest that a single decentralized BRC producing around 7-11 metric tons of bio-inputs annually, as demonstrated by WASSAN's model in Andhra Pradesh, could reduce GHG emissions by 4 to 6.4 tons of CO₂ per year, assuming the replacement of equivalent chemical fertilizers. Each BRC entrepreneur produces around 11 metric tons of bio-inputs annually. Given that replacing chemical fertilisers would cut CO₂ emissions by 0.58 tons per ton, this results in approximately 6.38 tons of CO₂ being avoided per BRC per year. We have included a range in order to accommodate variation in production or substitution rates. This approximately aligns with broader findings from Lorenz and Lal in “Environmental Impact of Organic Agriculture” where they calculate that organic agricultural systems can sequester up to 1.65 Mg CO₂ ha⁻¹ yr⁻¹ through improved soil carbon retention and reduced emissions from soil processes such as nitrous oxide and methane release.³⁰

Furthermore, the transition to bio-inputs helps decrease nitrous oxide emissions, which is a potent GHG, since organic inputs are less prone to leaching and volatilization. Lorenz and Lal note that nitrous oxide emissions under organic be up to 492 kg CO₂-eq ha⁻¹ yr⁻¹ lower than

²⁹ Patidar, A., et al. Bio-inputs. Council on Energy, Environment and Water.
<https://www.ceew.in/sites/default/files/bio-inputs.pdf>

³⁰ Lorenz, K., & Lal, R. Environmental Impact of Organic Agriculture. *Advances in Agronomy*, Elsevier. 10.1016/bs.agron.2016.05.003

conventional systems. In the context of Rajasthan, where most farmers suffer from soil degradation due to excessive chemical use, the environmental benefits of BRCs are especially important. By improving organic matter content and microbial activity, BRCs can help contribute to greater water retention and improved nutrient cycling, which together enhance the region's agricultural resilience to climatic stress. Thus, supporting and scaling BRCs will not only help develop socio-economic goals for farmers but also paves the path for progress toward India's climate targets and sustainable development goals.

Community Engagement and Farmer Education. In order for BRCs to succeed in building community trust and engagement in natural farming practices, it is vital that they serve as a place of building community knowledge and support. There are several crucial strategies to consider in doing so.

Training local farmers is essential to facilitating a community-wide transformation to natural farming practices. Even before launching the BRC, the entrepreneur must undergo hands-on training in bio-input preparation and usage. Educating the consumer base is equally as critical, and regular farmer demonstration plots and exposure visits can build confidence in natural farming practices as well as make farmers feel empowered to implement these practices themselves.³¹ One idea is that side-by-side plots (one with chemical inputs versus one with bio-inputs) can illustrate to farmers the efficacy in improving soil health and yields. Additionally, as farmers gain experience, the BRC can introduce new products gradually which encourages farmers to replace their current chemical inputs with natural inputs more slowly over time. This from gradual adoption, backed by training increases success rates of conversion to organic methods.

³¹ Council on Energy, Environment and Water, *Bio-inputs*.

A BRC should additionally function as a local resource center for sustainable farming knowledge. Farmers should see the BRC as the place to go with questions about pest outbreaks, composting techniques, soil improvement, and implementation methods. It is recommended that BRCs maintain demonstration plots or a small nursery or garden where they showcase good implementation practices for the bio-inputs.³² In an extension, the BRC entrepreneur doubles as an educator that gives farmer advice and troubleshooting problems. This showcases the importance of educating BRC entrepreneurs so that they are equipped with the knowledge and tools to answer these questions and concerns. Some initiatives also distribute pamphlets through the BRC. For example, simple how-to guides for each bio-input could serve as valuable resources for farmers.³³ In these ways, by acting as a hub of information and a meeting point for eco-friendly farming champions, the BRC strengthens the social fabric around natural farming.

Facilitating Trust in BRCs. To build customer confidence and boost early adoption, Seva Mandir may consider offering bundled starter kits (example: Jeevamrut and a demonstration training session) at subsidized rates in the first season. This allows farmers to get accustomed to their transition from chemical farming to natural farming in a low-stakes way. It also makes natural farming seem more appealing with a lower cost and hands-on involvement from the BRC entrepreneurs.

Another way that BRCs should seek to attract farmers is by emphasizing the cost difference between natural and chemical farming. Seva Mandir should reference a chart such as the one below to highlight the cost-effectiveness of switching to natural farming. This chart highlights input costs, per acre, per season using approximate national averages.³⁴

³² National Coalition for Natural Farming, *Bio-Input Resource Center: Natural Farming Technical Process Manual*.

³³ Ibid.

³⁴ Council on Energy, Environment and Water, *Bio-inputs*.

Cost Category	Chemical Farming	Natural Farming via BRC
Fertilizers	₹3,000-5,000	₹300-600 (Jeevamrut, Nimastra, etc.)
Pesticides	₹2,000-3,000	₹200-400 (Botanical solutions like Nimastra)
Soil enhancers	₹1,000-1,500	₹100-200 (Handikhata, Beejamrut)
Irrigation-related chemicals	₹500-1,000	₹0-200 (natural methods and mulch)
Total Input Cost	₹6,500-10,500	₹600-1,400

The chart shows the dramatic cost reduction of natural farming compared to conventional chemical farming of 80-90%. The decreased reduction in input spending translates into significantly higher net profit margins for small farmers. BRCs should leverage these figures in cost reduction to further incentivize farmers to make the transition to natural farming.

Community Accountability. Paramparagat Krishi Vikas Yojana (PKVY) is a central scheme to promote organic farming through community clusters. It fosters group-based natural input production that can serve trust-building amongst farmers to switch from chemical to natural farming. Under PKVY, clusters of farmers commit to chemical-free farming under an agreed upon conversion period.

During this transitional period farmers commit to using the bio-input resource centers to facilitate their switch to natural farming. Farmers can showcase their commitment to their community cluster with a Participatory Guarantee System (PGS) Certification. Farmers obtain the certification by conducting peer inspections of each other's fields to ensure that natural farming standards are being met. After one year of doing so, the farmers obtain "PGS-Green"

status and after two years, they receive “PGS-Organic” certification for their produce.

Rajasthan’s Regional Council can assist with maintaining records, submitting certification data, and verifying certification.³⁵

Seva Mandir’s BRCs can act as a facilitator of the PKVY contract by inviting and sponsoring clusters. The BRC would have to compile the required documentation to send to the Regional Council a list of member farmers and their land details, a pledge to follow organic practices, baseline soil health data, and an annual action plan. Seva Mandir’s BRCs can further help farmers in the clusters obtain funding from the Regional Council (each cluster typically receives (₹50,000/hectare of land for the 3 years).³⁶ This will enable those in the cluster to purchase bio-input materials from the bio-input resource center, thus mutually benefitting community members and the BRC.

After 2-3 years of participation, the cluster’s farms collectively achieve PGS-Organic certification, and this logo can go on the farms’ produce.³⁷ The benefit of this certification in building trust is two-fold. Buyers of the farmers’ produce trust the organic label, improving access to organic food markets for farmers. Additionally, the process of peer-review amongst the farmers themselves mandates transparency and mutual assurance in a group-setting. This encourages the farmers during their transition as they will seek to contribute to and meet the expectations of their cluster.

The Digital BRC. Adapting to 21st century needs, Seva Mandir has pursued “The Digital BRC,” a digital complement to the centers Seva Mandir will establish in the region. The Digital BRC enables center resources to be available in an online setting, increasing accessibility

³⁵ Government of India. *Paramparagat Krishi Vikas Yojana (PKVY)*. MyScheme. <https://www.myscheme.gov.in/schemes/pkvy>.

³⁶ Ibid.

³⁷ Ibid.

for farmers in the area who have internet access and digital devices. The following include components of existing digital structures that Seva Mandir has put in place for their bio-input resource centers and suggestions for expansions.

Keeping Inventory. Seva Mandir's current model updates inventory for equipment, bio-inputs, as well as tracks standard pricing.³⁸ Entrepreneurs should be vigilant in providing live updates to users. It would also be helpful to provide a description of each equipment or bio-input so that users who have not actually visited the center gain an understanding of the resources the center can provide to them.

There are a few other things to consider. Seva Mandir should take into account through which medium their inventory will be displayed through a website or an app. We recommend that Seva Mandir make an app available for Apple and Android devices. Apps are downloadable and permanent (unless deleted) on mobile devices, so having one for the BRCs' inventory will ensure that this information is easily accessible to farmers. To build the app, we recommend Glide³⁹ or AppSheet.⁴⁰ These platforms would allow Seva Mandir to integrate their inventory spreadsheets into the app in a way that does not require coding, and also includes nonprofit discounts.

Infrastructure and Services. Seva Mandir's other established digital programs (some free, some monetized) are well planned and outlined in the briefing.⁴¹ Seva Mandir's platforms for communication, private aid, pest management, and weather monitoring will make farming practices more efficient as well as further ease the transition from chemical farming to natural farming.

³⁸ Seva Mandir. *Digital BRC*. Udaipur: Seva Mandir, 2025.

³⁹ Glide, *Glide: No-Code App Builder*, <https://www.glideapps.com/>.

⁴⁰ AppSheet, *AppSheet: Build Apps with No Code*, <https://about.appsheet.com/home/>.

⁴¹ Seva Mandir. *Digital BRC*. Udaipur: Seva Mandir, 2025.

We notice one potential hindrance to the effectiveness of Seva Mandir's Digital BRC efforts. Studies show that most small, marginal farmers in Rajasthan have access to informational technology and use mobile phones to gather agricultural information. However, their digital literacy with other technological mediums, especially artificial intelligence, is limited.⁴² Given this, it is important that BRC entrepreneurs are adequately trained with all of the digital technologies and services Seva Mandir seeks to make available to farmers. This ensures that entrepreneurs are able to navigate farmers using new or unfamiliar technologies, such as Kisan GPT.

⁴² Jat, Jeewan & Punjabi, N.K. & Bhinda, Rashmi. (2021). Use of ICTs by Tribal Farmers for Obtaining Agricultural Information in Southern Rajasthan. *Indian Journal of Extension Education*. 57. 16-19. 10.48165/IJEE.2021.57304.

V. Importance of Bio-Inputs on Crop Yield – Adam Vu

Effectively mitigating climate change's impacts on crop yield hinges on education and proper resource usage. One of these resources is the correct usage of fertilizers on crops. For successful crop yield, crops need two classes of soil nutrients: macronutrients, such as nitrogen, phosphorus, magnesium, and potassium, used for building proteins and nucleic acids, and micronutrients, including iron, zinc, manganese, and copper, as cofactors for enzyme activity.⁴³ According to a mapping of available soil nutrients in North-Western India, due to the terrain and climate of the region, about 49% of the hot arid regions of Rajasthan are deficient in available phosphorus, 11% in available potassium, 56% in zinc, and 41% in iron.⁴⁴ In specific regions of Rajasthan, certain macronutrients are lacking tremendously. For example, in the Bikaner district of Rajasthan, about 40% of soil samples had insufficient nitrogen for crop growth.⁴⁵ Due to the mobile nature of nutrients, considerable amounts of phosphorus and nitrogen are lost to the rainfall runoff during the monsoon season, which is only increasing as rainfall trends increase, as established previously.⁴⁶

A lack of any type of soil nutrient, even if it is one element, can cause a considerable detriment to the farmer's crop yield. On a micro level, a lack of nitrogen or phosphorus results in shorter root length and root biomass as it negatively affects the plant's leaf area and the photosynthetic capacity per unit of leaf area, consequently leading to a decrease in carbohydrates to be invested in root growth.⁴⁷ A lack of soil macronutrients leads the plant to have discolored

⁴³ Mukesh Kumar et al., "Correlation between Soil Nutrient and Plant Nutrient Concentration in Mustard," *Journal of Pharmacognosy and Phytochemistry*, 2017, 751–54.

⁴⁴ Mahesh Kumar et al., "Assessment and Mapping of Available Soil Nutrients Using GIS for Nutrient Management in Hot Arid Regions of North-Western India," *Journal of the Indian Society of Soil Science* 69, no. 2 (2021): 119–32, <https://doi.org/10.5958/0974-0228.2021.00035.9>.

⁴⁵ Pankaj Kumar, Rajaram Choyal, and M L Reager, "NUTRIENT DYNAMICS IN SOIL OF CANAL COMMAND AREA OF DISTRICT BIKANER, RAJASTHAN," *Journal of Phytological Research*, no. 33 (2020): 13–19.

⁴⁶ Ibid.

⁴⁷ Gina Lopez et al., "Nutrient Deficiency Effects on Root Architecture and Root-to-Shoot Ratio in Arable Crops," *Frontiers in Plant Science* 13 (January 4, 2023): 1067498, <https://doi.org/10.3389/fpls.2022.1067498>.

leaves, rot more easily, and have poor flowering or fruiting.⁴⁸ For micronutrients, there is also discoloration, but the plant is also shrunk in size in comparison to plants with enough micronutrients.⁴⁹ Studies have shown that only a zinc deficiency can lead to significant yield losses between 5% and 30% in crops like rice, wheat, maize, and pulses.⁵⁰ Similarly, iron deficiency in soil has led to yield reductions and poor crop quality.⁵¹ Even the slightest insufficiency of any soil nutrient in any crop would permanently damage its health and appearance, reducing the farmers' crop yield by limiting the amount of sellable crops they can market. This pattern has already been seen on a macro scale globally: in 2000, the worldwide average wheat, rice, maize, and barley grain yields declined due to the K, P, and N deficit being 1,372, 1,093, and 670 kg hectare⁻¹ year⁻¹, respectively.⁵² Since Rajasthan is deficient in soil nutrients, as established above, this correlation between soil nutrients and crop yield illustrates how important soil nutrient management is for farmers in Rajasthan aiming to optimize their crop yield. As Rajasthan disproportionately has fewer micronutrients than other Indian states, it is clear that worrying about soil nutrient management in Rajasthan must be prioritized.⁵³

Like soil nutrients, successful crop yield also depends on the availability of soil organic carbon. High soil organic carbon correlates with improving soil structure, reducing erosion

⁴⁸ Reckitt Benckiser, "Signs of Nutrient Deficiency," Challenging Plants: Plant Science (Royal Society of Chemistry, n.d.), <https://edu.rsc.org/resources/challenging-plants-plant-science/880.article>.

⁴⁹ Ibid., 2.

⁵⁰ Prity Kushwaha et al., "Zinc-Solubilizing Microbes for Sustainable Crop Production: Current Understanding, Opportunities, and Challenges," in *Phytobiomes: Current Insights and Future Vistas*, ed. Manoj Kumar Solanki, Prem Lal Kashyap, and Baby Kumari (Singapore: Springer Singapore, 2020), 281–98, https://doi.org/10.1007/978-981-15-3151-4_11.

⁵¹ Yashwant Gehlot et al., "Spatial Variability in Soil Micronutrients and Soil Separates of Ujjain Tehsil of Ujjain District of Madhya Pradesh, India," *International Journal of Environment and Climate Change* 13, no. 11 (November 9, 2023): 2569–79, <https://doi.org/10.9734/ijecc/2023/v13i113424>.

⁵² Z. X. Tan, R. Lal, and K. D. Wiebe, "Global Soil Nutrient Depletion and Yield Reduction," *Journal of Sustainable Agriculture* 26, no. 1 (June 14, 2005): 123–46, https://doi.org/10.1300/J064v26n01_10, 134.

⁵³ Vivek Kumar Singhal, "Addressing Micronutrient Deficiencies in Indian Soil: Challenges and Strategies," *International Journal of Research in Agronomy* 7, no. 1S (January 1, 2024): 225–29, <https://doi.org/10.33545/2618060X.2024.v7.i1Sc.801>, 226.

risk, and fostering microbial activity, all contributing to higher crop yield.⁵⁴ Unfortunately, the same study on mapping available soil nutrients also found that in Rajasthan, 99.4% of the area contains “low to very low” soil organic carbon. If a lack of organic carbon, combined with the lack of soil nutrients imperative for the growth of plants, already inhibits farmers from continuously sustaining their crop’s health and yield to produce enough income to sustain themselves, then it is even more challenging to expand their yield without the means of proper soil nutrient and organic carbon management—one of the more significant issues small marginal farmers and those in poverty face in Rajasthan.

To combat the region's lack of soil nutrients and organic carbon, farmers have used various fertilizers to provide those missing components required for plant growth. One of these varieties is chemical fertilizers. According to a survey conducted with Rajasthani farmers, 100% of farmers surveyed reported that they do use chemical fertilizers.⁵⁵ The promise of higher yield growth motivates their use, but many farmers do not know the correct dosage to use, resulting in a detrimental long-term impact on soil health.⁵⁶ For example, a case study of Todaraisingh Tehsil, District in Rajasthan from 2019 to 2024, discovers that agricultural output has varied as a result of incorrect application of chemical fertilizers not following the region's optimal consumption ratio of 4.0: 2.0: 1.0 for nitrogen, phosphorous, and potassium and that the NPK levels found in the soil exceeded the soil's assimilative capacity. Although readily accessible to farmers, chemical fertilizers are costly, providing an additional barrier for the aforementioned majority of Rajasthani farmers. Many of these farmers are considered marginal, and 22% of those are below

⁵⁴ Humberto Blanco-Canqui et al., “Soil Organic Carbon: The Value to Soil Properties,” *Journal of Soil and Water Conservation* 68, no. 5 (September 2013): 4, <https://doi.org/10.2489/jswc.68.5.129A>.

⁵⁵ Seva Mandir, Digital BRC, 4.

⁵⁶ Ibid.

the poverty line as deemed by the Indian government.⁵⁷ Thus, although commonly used by farmers, chemical fertilizers come at too much of a burden, both in cost and risk of misuse.

A safe and cost-effective alternative to chemical fertilizers is biofertilizers, microorganisms that, when given to the host crop's seeds, plants, or the soil, augment its growth by enhancing the nutrient supply.⁵⁸ Many studies have already been conducted on the effectiveness of biofertilizers on the growth and yield of a variety of crops in Rajasthan, such as the combination of rhizobium and phosphate-solubilizing bacteria significantly increasing seed and straw and biological yield of over the control on cowpeas, integration of chemical fertilizers with farmyard manure significantly enhancing chickpea growth and yield in Western Rajasthan, maize grain, stover, biological yields and harvest index in Southeast Rajasthan, and growth and yield parameters in pearl millet in Jaipur, Rajasthan.⁵⁹ Additionally, the application of jeevamrut, a traditional Rajasthani biofertilizer, in combination with “consortia of plant growth-promoting microorganisms” was reported to “attenuate the negative effects of synthetic fertilizers over microbial and physicochemical properties of soil” and increase the organic carbon, available nitrogen, phosphorus, and potassium of soil, increasing crop yield growth of potatoes.⁶⁰ Through extensive field research of biofertilizers on crop yield on a variety of crops, the combination of

⁵⁷ Ibid., 21.

⁵⁸ Augustine Innalegwu Daniel et al., “Biofertilizer: The Future of Food Security and Food Safety,” *Microorganisms* 10, no. 6 (June 14, 2022): 1220, <https://doi.org/10.3390/microorganisms10061220>.

⁵⁹ J.S. Meena, H.P Verma, and Pinki Pancholi, “Effect of Fertility Levels and Biofertilizers on Growth and Yield of Cowpea on Sandy Loam Soil of Rajasthan,” *AN ASIAN JOURNAL OF SOIL SCIENCE* 10, no. 1 (June 15, 2015): 55–58, <https://doi.org/10.15740/HAS/AJSS/10.1/55-58>; Jitendra Kumar Balyan, “Effect of Integrated Nutrient Management on Productivity of Maize (Zea Mays L.) in South-East Rajasthan” (Udaipur, Maharana Pratap University of Agriculture and Technology, 2004), <https://krishikosh.egranth.ac.in/items/77535393-6134-493c-ae9-2f2f31f34c23>; Seema Sharma et al., “Influence of Organic Nutrients and Bioinoculants on Growth and Productivity of Pearl Millet (Pennisetum Glaucum L.) under Semi-Arid Conditions of Rajasthan,” *Indian Journal Of Agricultural Research*, no. Of (May 16, 2022), <https://doi.org/10.18805/IJARe.A-5933>.

⁶⁰ Rudra Pratap Singh Gurjar, Dashrath Bhati, and Shailesh Kumar Singh, “Impact of Jeevamrut Formulations and Biofertilizers on Soil Microbial and Chemical Attributes during Potato Cultivation,” *Journal of Applied Biology & Biotechnology*, 2024, <https://doi.org/10.7324/JABB.2024.165084>.

chemical and biofertilizers has proven to be the most effective in supporting farmers to optimize their crop yield for selling.

Yet even with extensive data on the benefits of biofertilizers, biofertilizer usage or the combination of biofertilizers and chemical fertilizers has not been as popular as solely chemical fertilizers among Rajasthani farmers. Studies have been conducted to determine why and have found that a common theme arises regarding why biofertilizers are not being used: their non-use is simply due to a gap in knowledge and access. A high level overview on the status of organic farming in India by an institution that supports learners to pass the Indian Civil Services Exam identified six different areas that prevent biofertilizers from being accessed by farmers: farmers' poor awareness of biofertilizer usage, shortage of biomass in rural communities, inadequate supporting infrastructure, higher organic input costs, long crop yield drop when transitioning to bio-inputs period, and the lack of quality seeds supporting organic agriculture.⁶¹ A report specifically on biofertilizer usage in Rajasthan underscores similar aspects that the greater scope study suggests that the "lack of scientific orientation, risk bearing capacity, technical guidance for organic manures, low level of communication ability for compost making, lack of knowledge of field functionaries about organic farming, complex and expensive procedure for organic certification, unawareness about policies and programmes for organic farming and lack of proper planning and coordination" are barriers for farmers to implement organic farming.⁶² Comparing both results, it can be seen that each commonality between barriers evolves from inaccessibility. Additionally, the same survey on Rajasthani farmers mentioned earlier records that after farmers learned about BRCs, 100% of them would buy organic inputs given the opportunity, reinforcing

⁶¹ RAU's IAS Study Circle, "Organic Farming- Status, Initiatives, Challenges," n.d., <https://compass.rauias.com/economy/organic-farming/#issues-and-challenges>.

⁶² G.S. Rathore, "Problems and Prospects of Organic Farming: An Option for Sustainable Agriculture in Udaipur District (Raj.)" (Udaipur, Maharana Pratap University of Agriculture and Technology, 2008), <https://krishikosh.egranth.ac.in/items/fd6e49ab-de2b-4cde-a110-dfb1868678a1>.

that knowledge and access to the bio-inputs positively correlate with biofertilizer usage and enhance organic farming practices.⁶³

Farmers in Rajasthan who are educated in organic farming have seen benefits to their methods compared to those who are not. One study that captures data through a questionnaire that has asked about organic farming practices, attitudes on organic farming, and sustainable agriculture indicators to 285 respondents in Jaipur, Jodhpur, and Udaipur reports that adopting organic practices enhances soil health, conserves water, promotes biodiversity, and improves the economic viability for farmers.⁶⁴ A case study on the socio-economic impact of organic farming in Rajasthan goes further and breaks these benefits down: organic farming contributed to 20% higher labor demand, which has positively impacted employment in rural areas, and raised soil organic carbon levels by 19.5% and soil moisture retention by 33% in comparison to conventional farming.⁶⁵ These benefits funnel into the finding that, on average, those who practice organic farming enjoy a higher net income of 33% compared to those who do not.⁶⁶ Simply by learning about organic farming and then implementing it, farmers take on healthier crops, higher incomes, and create more jobs for the local economy.

This is where Seva Mandir can step in with its proposals for Bio-input Resource Centers. By providing affordable access to bio-inputs and working to close the knowledge gap on using them as biofertilizers to Rajasthani farmers, Seva Mandir equips them with an effective tool that negates the effects of climate change on their farming, such as rainfall removing soil nutrients and soil erosion, by providing essential soil nutrients and organic carbon proven to ameliorate

⁶³ Seva Mandir, Digital BRC, 4, 8.

⁶⁴ Chitranshu Kumar Maurya and Pooja Tarun, “Assessing Impact of Organic Farming for Achieving Sustainable Agriculture Development of Rajasthan: Structure Equation Remodeling,” *International Journal of Science and Research Archive* 13, no. 2 (November 30, 2024): 739–47, <https://doi.org/10.30574/ijrsra.2024.13.2.2093>, 745.

⁶⁵ Pitambar Sharma, “Socio-Economic Impact of Organic Farming in Rajasthan: A Case Study Approach,” *IJIRCT* 2, no. 3 (2016): 1–10, 4-6.

⁶⁶ *Ibid*, 4.

crop growth and yield for farmers to gain profit on. In return for preferencing bio-inputs to chemical fertilizers, CO₂ emissions could be cut by 0.58 tonnes per tonne of chemical fertilizer produced, thereby lessening the severity of the escalating growth in temperature and rainfall in that region that strips the soil away from necessary nutrients for plants.⁶⁷ This results in a positive feedback loop where crop yield growth improves by mitigating climate change's current effects through organic inputs and minimizing future impacts of climate change through curbing carbon emissions created in chemical fertilizer production. And as suggested by survey results about farmers' interest in bio-inputs, BRCs would be highly anticipated and utilized by farmers across Rajasthan.

Seva Mandir is not alone in its endeavor to improve farmers' access to bio-inputs. Many policies and initiatives in Rajasthan and greater India have already promoted bio-inputs for the same population as Seva Mandir. For example, Paramparagat Krishi Vikas Yojana (PKVY) 2025 is a government scheme that encourages organic farming based on traditional knowledge by distributing financial help of up to ₹50,000 per hectare for three years, training and implementation at the district level, and support of organic inputs and certification for participants in cluster groups of 20+ farmers.⁶⁸ Rashtriya Krishi Vikas Yojana (RKVY) 2025 gives participants organic farming modules, skill development, cluster-based farming models customized by state, and subsidies available for participating in organic farming.⁶⁹ Jaivik Bharat Certification Initiative 2025, by the Food Safety and Standards Authority of India, supports farmers in obtaining an official organic certification label, allowing them to price their crops at a

⁶⁷ Patidar, Rishabh, Kartheek Nitturu, Deepak Yadav, and Hemant Mallya, 2024. Evaluating Net-zero Trajectories for the Indian Fertiliser Industry: Marginal Abatement Cost Curves of Carbon Mitigation Technologies. New Delhi: Council on Energy, Environment and Water.

⁶⁸ Government of India, Paramparagat Krishi Vikas Yojana (PKVY).

⁶⁹ Press Information Bureau, "Cabinet Approves the PM Rashtriya Krishi Vikas Yojana (PM-RKVY) to Promote Sustainable Agriculture and Krishonnati Yojana (KY) to Achieve Food Security for Self Sufficiency," Press Release (New Delhi: Government of India, October 3, 2024), <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2061649>.

premium in both domestic and export markets.⁷⁰ Finally, the National Horticulture Board (NHB) Subsidy grants up to 50-75% subsidy for compost units, bio-fertilizers, and organic inputs.⁷¹

Although these initiatives are easily accessible through the internet and generous in their support, according to the same Digital BRC survey, no farmer has ever applied for a government scheme online.⁷² As the lack of knowledge and awareness is one of the main reasons why farmers have not begun using bio-inputs in lieu of chemical fertilizers, it also serves as an explanation for why farmers have not applied to existing initiatives to support organic farming: bureaucratic hurdles, complex documentation, and digital illiteracy prevent many from accessing available government support.⁷³ Without guidance, farmers cannot take advantage of organic farming programs meant for them to use. Seva Mandir can step in as a catalyst for these farmers by assisting them in applying to government initiatives as a part of their Digital BRCs. Connecting farmers with existing government schemes would put less strain on local communities to be entirely self-reliant and give them an extra nudge in converting to organic farming. For these reasons, Seva Mandir should consider educating farmers on applying to government assistance programs in addition to bio-input farming practices.

⁷⁰ Mahatma Gandhi Gramodaya University Blog, “10 Government Schemes for Organic Farming in India – Farmer Support, Subsidies & Loans [2025],” Blog, *Mahatma Gandhi Gramodaya University Blog* (blog), n.d., <https://agrigramodaya.com/government-schemes-for-organic-farming-in-india>.

⁷¹ Ibid.

⁷² Seva Mandir, Digital BRC, 6.

⁷³ Seva Mandir, Digital BRC, 6.

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