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E-Mail :
editor.ijasem@gmail.com
editor@ijasem.org

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Impact of Immigration on Agricultural Transformation in Hajo Revenue Circle, Kamrup District, Assam

Md Nurul Islam
Assistant Professor
Department of Economics, Barkhetri College
Email: ni99157@gmail.com
Mobile: 9859981316

Immigration and Its Historical Context in Assam

I.1 Introduction:

Immigration has been a recurring and natural part of Assam's history, shaping its demographic and socio-economic landscape over centuries. Historically, the region remained sparsely inhabited until the 12th century, despite being endowed with abundant fertile land and rich natural resources. These features attracted diverse ethnic groups from various geographical regions, contributing to Assam's multicultural heritage.

A major historical milestone in this context was the migration of the Ahoms in 1228. Crossing the Patkai Hills, they established a strong and enduring kingdom that ruled Assam for nearly six centuries (1228–1826). Their reign introduced administrative reforms, enhanced political stability, and significantly improved agricultural systems in the region.

A transformative shift occurred after the Treaty of Yandabo in 1826, which marked the beginning of British colonial rule in Assam. From 1891 onward, British policies actively promoted the migration of peasant communities from East Bengal (present-day Bangladesh) into western Assam. These settlers were primarily encouraged to cultivate lands categorized as 'wastelands' to boost agricultural production and state revenue.

Concurrently, the rapid growth of the tea industry necessitated a large labor force, prompting the colonial administration to bring in workers from regions such as Bihar and Odisha. These migrations were mainly motivated by colonial economic imperatives, particularly to support plantation agriculture.

Post-independence, especially after the Partition in 1947, Assam witnessed another wave of migration, predominantly from East Pakistan (now Bangladesh). Many of these migrants sought refuge due to political unrest and economic challenges, and gradually settled in riverine (char) areas and reserved forest lands. Despite numerous adversities, these migrant communities are recognized for their resilience and strong engagement in agricultural activities. Their presence has notably influenced crop production, land management

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practices, and the shift toward commercial farming in many parts of Assam.

In regions such as the Hajo Revenue Circle of Kamrup District, these migrant groups have played a pivotal role in reshaping the agricultural environment. Their contributions form a critical component of this study, which seeks to explore the relationship between immigration and agricultural transformation in the area.

1.2 Significance of the Study

Agricultural transformation refers to the process through which farming systems evolve from highly diversified, subsistence-based operations toward more specialized and market-oriented production. This process is typically marked by increased specialization in crop and livestock production, greater reliance on purchased inputs, enhanced capital and resource inflows into agriculture, and significant reductions in unit costs of production driven by technological advancements.

Given the pivotal role agriculture plays in the socio-economic structure of Assam, understanding the key drivers of this transformation is critical. One such driver is immigration, which has significantly shaped agricultural development, particularly in regions like the Hajo Revenue Circle of Kamrup District, Assam. Over time, immigration into this area has altered land use patterns, introduced new agricultural practices, and reshaped the socio-economic composition of rural communities. Migrant populations, often characterized by a strong work ethic and adaptability, have contributed to the intensification and commercialization of agriculture in the region.

This study is significant as it aims to explore and analyze the complex relationship between immigration and agricultural transformation in Hajo Revenue Circle. By investigating how migration has influenced agricultural productivity, land ownership, cropping patterns, and labor dynamics, the research seeks to generate insights that are relevant for evidence-based policymaking.

The findings are expected to inform policymakers, agricultural planners, and rural development practitioners about strategies that can harness the benefits of immigration while ensuring inclusive and sustainable agricultural growth in Assam.

2.1: Literature Review

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Numerous studies have been conducted on agricultural transformation and related domains across India and globally. These studies highlight the interplay of economic, technological, social, and institutional factors in shaping the dynamics of agricultural change.

Agricultural transformation refers to the process by which farming shifts from traditional, subsistence-based practices to a more modern, market-oriented, and technology-driven approach. In the context of migrant farmers in the Hajo Revenue Circle of Kamrup District, Assam, this transformation is shaped by a combination of socio-economic conditions, historical patterns of migration, institutional support, and technological diffusion. Several scholarly works provide insight into the broader themes of agricultural transformation and its regional implications, particularly in areas with significant migrant populations.

Studies like those by Goswami (1985) and Hussain (1993) have documented the historical migration trends in Assam and their consequences for land use and rural economies. Migrants, particularly from East Bengal (now Bangladesh), settled in the char areas and forest belts, converting underutilized land into productive farmland. These communities brought intensive agricultural practices and a strong work ethic, contributing significantly to crop output in districts like Kamrup. Hussain emphasized that migrant farmers tend to exhibit higher productivity levels due to their greater dependence on agriculture as their primary livelihood.

Salam (2006) undertook a study on agricultural transformation in North-East India with a special focus on Arunachal Pradesh. He examined both economic and non-economic variables influencing agricultural transformation. The study emphasized that non-economic factors—such as culture, tradition, and local institutions—play a dominant role in shaping and determining the functioning of economic variables in the agricultural sector.

Bezbaruah (1994) explored the technological transformation of agriculture in Assam. His study found that the impact of high-yielding variety (HYV)-based technologies remained limited in the predominantly rice-growing regions of Eastern India. One of the key constraints identified was the lack of adequate infrastructural support. Bezbaruah noted that despite the receptiveness of the farming community towards innovation, technological transformation in Assam remained incomplete. He advocated for targeted policy measures to strengthen rural infrastructure as a precondition for meaningful agricultural modernization.

Schultz (1970) contributed a seminal perspective on the role of technology and farm inputs in transforming traditional agriculture. He argued that farmers in traditional agricultural settings do respond rationally to market signals and allocate their resources efficiently. However, the continued reliance on outdated technologies and inputs traps them in a cycle of poverty and low productivity. Schultz maintained that breaking this low-level equilibrium required the infusion of modern science and technology to displace the traditional mode of cultivation.

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Rath (1980) posited that technological improvement and the selection of appropriate farming technologies are crucial in initiating the transition from traditional to modern agriculture. He highlighted that this transformation is inherently multidimensional and demands the participation of various actors—agricultural scientists, research institutions, extension workers, farm input suppliers, marketing agencies, financial institutions, planners, policy makers, and, most importantly, the farmers.

MacDonald (1976) studied the challenges associated with the adoption of agricultural technology in developing countries, particularly focusing on social factors that influence the acceptance and diffusion of modern agricultural practices. His findings underscore the importance of social structures and cultural values in determining the success of technological interventions in agriculture.

Rahudkar (1962), in his paper Farmers' Characteristics Associated with the Adoption and Diffusion of Improved Farm Practices, analyzed two key aspects: (i) the relationship between selected personal and social characteristics of farmers and the adoption of improved practices, and (ii) the extent to which communication media influenced the adoption process. His study revealed that education was the only socio-economic variable significantly correlated with adoption levels. Farmers with primary or middle school education were more likely to adopt about half of the recommended practices, while those with high school or college education adopted a larger number. Furthermore, farmers with greater exposure to information sources were more likely to be adopters. The study also observed that adopters typically relied more on impersonal and official sources of information than on personal ones.

Recent studies (Nangia, 2019; Sharma & Das, 2020) have started to focus on how agricultural modernization impacts gender roles and labor division in migrant farming communities. These studies show that while male migrants dominate field-level decision-making, women have increasingly taken on significant roles in farm management and market participation, particularly in labor-scarce households. Such shifts are gradually redefining traditional gender dynamics in rural Assam.

The literature clearly indicates that migrant farmers in the Hajo Revenue Circle have been instrumental in advancing agricultural transformation. Their contributions are not only visible in increased production but also in the adoption of modern inputs, diversification of crops, and changes in land use patterns. However, institutional gaps, legal uncertainties, and social tensions continue to challenge the full potential of this transformation. Further research is needed to assess long-term sustainability and policy measures that can make this shift more inclusive and resilient.

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3.1 Coverage of Study

The universe of the present study comprises the farming practices of migrant households in Assam. This specific group has been chosen due to its observed engagement in modern agricultural techniques and practices. Migrant farmers in the region have demonstrated a greater tendency to adopt modern farming technologies and often exhibit signs of specialization in market-oriented crop production.

Their agricultural behavior suggests a transition from traditional subsistence farming to more commercialized, technology-driven farming systems. By focusing on this population, the study aims to gain insights into the drivers, patterns, and implications of agricultural transformation among migrant farming communities, thereby contributing to a deeper understanding of regional development dynamics in Assam.

4.1 Objectives

a) To examine the extent of agricultural transformation among migrant household farmers in Assam, particularly their transition from traditional to modern modes of production.

b) To assess the availability and accessibility of essential infrastructural components required for agricultural transformation, which include:
i) Access to resources such as investible funds for agricultural investment;
ii) Availability of irrigation facilities; and
iii) Agricultural support systems such as extension services, input delivery mechanisms, credit facilities, and market access for agricultural outputs.

c) To identify the gaps and needs for strengthening the aforementioned support systems in order to facilitate a successful and sustainable transformation of agriculture among the migrant farming households of Assam.

5.1 Methods

This study employed a mixed-method approach to fulfill its research objectives, combining both qualitative and quantitative data collection and analysis techniques. A layered sampling framework was used to systematically identify the study area and target respondents, particularly focusing on migrant farmers practicing agriculture as their main livelihood.

First Layer: Selection of Revenue Circle
The Hajo Revenue Circle of Kamrup (Rural) District in Assam was purposefully selected as the first sampling unit. This circle was chosen due to the strategic presence of the Hajo Development Block, which is known to have a significant concentration of migrant farming households. These migrants primarily depend on agriculture as their core livelihood strategy, making the circle ideal for examining agricultural transformation.

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Second Layer: Selection of Development Blocks
Within the Hajo Revenue Circle, two development blocks were selected: Hajo Development Block and Sualkuchi Development Block. These were strategically chosen for comparative analysis. The Hajo Block exhibits a high concentration of migrant farmers actively involved in agriculture, while Sualkuchi Block, known as the "Manchester of the East," is primarily famous for its silk weaving and handloom industries. The choice of Sualkuchi, with a relatively smaller number of migrant farmers, allowed the study to explore contrasting livelihood patterns and assess how the presence or absence of agricultural dependence among migrants affects transformation processes.

Sualkuchi, often referred to as the only silk town of Assam, is renowned for the production of high-quality Pat and Muga silk, which is deeply rooted in the cultural fabric of the region. In contrast, Hajo remains primarily agrarian, particularly among migrant communities. This contrast enriched the comparative dimension of the study.

Third Layer: Selection of Villages
From each of the selected development blocks, three villages were selected, resulting in a total of six villages. The village selection was guided by the following criteria:
- Presence of a noticeable number of migrant farming households.
- Diversity in agricultural practices and infrastructural availability.
- Accessibility and cooperation of local leaders such as Gaonburahs for facilitating household identification.

These criteria ensured that the selected villages offered representative variations in terms of migrant engagement in agriculture, infrastructural support, and socio-economic environment.

Table 5.1
Sampling Framework by Layers

1st Layer: Selection of the Revenue Circle from Kamrup District	2nd Layer: Selection of Development Block from Hajo Revenue Circle	3rd Layer: Selection of the Villages from Each Development Block	4th Layer: Selection of the Household from Each Village
The Hajo Revenue Circle was selected from Kamrup District where a	Two Development Blocks were selected: Sualkuchi Development Block and Hajo Development Block. These were strategically chosen for	Three villages were selected from each Development Block, making a total of six villages. From Sualkuchi Block: Sualkuchi Bhatipara,	Fifteen households were selected using snowball sampling from

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large number of migrant farmers practice agriculture as their core activity.	comparative analysis. Hajo Block has a high concentration of migrant farmers, while Sualkuchi, known as the 'Manchester of the East', has fewer migrant farmers.	Bongshar, and Nig-Gonghmow; From Hajo Block: Bangalpar, 1 No Soulmara, and 2 No Soulmara.	each of the six villages mentioned in the 3rd layer.

Table 5.1: Layering stages

To collect data from each household, a well-structured interview schedule was designed. During the pilot survey, it was observed that due to low literacy levels and the busy schedules of farmers, they were reluctant to complete questionnaires.

Since interview schedules yield higher response rates compared to self-administered questionnaires, this method was deemed more effective (Goyder, 1985; Rindfuss, Choe, Tsuya et al., 2022). Several factors justified the choice of interview schedules as the primary data collection tool. Interviews allowed for flexibility in adapting questions based on respondents' answers, enabling a deeper exploration of topics and better clarification of responses, ultimately leading to richer data. The ability to provide immediate clarifications helped minimize misunderstandings, ensuring comprehensive and accurate data collection. Furthermore, response rates were significantly higher in face-to-face interviews compared to self administered questionnaires, as personal engagement encouraged participation. Building rapport was also easier through interviews, making respondents feel more comfortable and willing to share information, which contributed to more honest and open responses. Additionally, non-verbal cues such as body language, facial expressions, and tone of voice provided valuable contextual insights. Interviews proved to be particularly effective for complex or open-ended questions, ensuring respondents fully understood the inquiries. They also overcame literacy barriers, allowing those with reading or writing difficulties to participate without constraints. The possibility of immediate feedback and real-time question adjustments reduced ambiguities and enhanced data quality. By integrating both closed-ended and open-ended questions, this approach facilitated the collection of quantifiable data alongside rich, qualitative insights, ensuring a comprehensive understanding of the research topic. The mixed-method approach further incorporated qualitative methods, observations, literature reviews, and stakeholder opinions, enabling effective data triangulation. Cross-verification of information from multiple sources strengthened the reliability and validity of the findings (Rugg, 2010; Bhandari, 2022). The interview schedule was structured into two sections: the village schedule and the household schedule. The village schedule captured essential village-level information, including the name of the village and district, the total number of households and farm households, the total population, and the availability of basic infrastructure such as electricity and road connectivity. It also recorded the distance of the village from various

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essential facilities, including educational institutions, healthcare centers, markets for agricultural produce, transport and communication services, banking and financial institutions, and township access. The household schedule focused on individual household details, covering demographic, economic, agricultural aspects. Weaving work, and level of education. This structured methodology ensured comprehensive and reliable data collection, providing an in-depth analysis of the research subject. For quantitative analysis, average mean, multiplication, division, percentage etc. have been used.

6 Results and Discussions

6.1 Extent of Agricultural Activity

The extent of agricultural activity among the sample migrant farmers is examined by considering parameters such as farm size, cropping patterns, and the adoption of modern technologies, particularly High-Yielding Variety (HYV) seeds, fertilizers, and irrigation (water) technologies. A detailed analysis of these aspects is presented below.

Table 6.1: Cropping Pattern in the Study Area

Crops	Sualkuchi Development Block (Area in ha / %)	Hajo Development Block (Area in ha / %)	Total Area (ha)	Total (%)	Remarks
Autumn Rice	0.00 / 0.00	7.07 / 22.56	7.07	5.63	
Winter Rice	16.20 / 28.75	18.13 / 57.87	34.33	27.35	
Summer Rice	4.73 / 8.39	6.13 / 19.57	10.86	8.65	
Rice Total	20.93 / 37.15	31.33 / 62.83	52.26	41.63	
Wheat	0.23 / 0.40	0.00 / 0.00	0.23	0.18	
Oilseeds	2.20 / 3.90	3.33 / 6.68	5.53	4.40	
Vegetables	8.80 / 15.62	8.27 / 16.58	17.07	13.60	
Potato	4.13 / 7.33	4.40 / 8.82	8.53	6.70	
Jute	4.40 / 7.81	2.93 / 5.88	7.33	5.84	
Sugarcane	0.14 / 0.24	0.00 / 0.00	0.14	0.11	
Others Total	15.50 / 27.51	18.93 / 37.17	34.43	27.43	
Total	56.33 / 100%	50.26 / 100%	125.52	100%	

The cropping pattern in the study area reveals a clear emphasis on rice cultivation, which accounts for 41.63% of the total cropped area. Among the three types of rice, winter rice dominates with 27.35% of the total area, followed by summer rice (8.65%) and autumn rice (5.63%). The Hajo Development Block shows significantly higher engagement in rice

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cultivation compared to the Sualkuchi Block, especially in autumn and winter rice. This reflects a higher level of seasonal crop rotation and land utilization in Hajo.

Other crops such as vegetables (13.60%), potatoes (6.70%), and jute (5.84%) are also cultivated across both blocks, indicating some level of crop diversification. The contribution of oilseeds (4.40%), wheat (0.18%), and sugarcane (0.11%) remains relatively marginal. However, the significant percentage of land under vegetables and potato suggests growing commercial orientation among the farmers.

6.2 Operational Holding and Cropping Intensity

One of the critical determinants of agricultural transformation is the size and effective use of operational land holdings. Operational holdings refer to the land actually under cultivation, which may include both owned and leased land, whereas ownership holdings refer solely to land owned by the farmer regardless of use.

In the context of this study, the distinction is particularly important because several migrant households operate on leased-in land, which allows for expanded cultivation despite limited ownership. The efficient utilization of operational holdings is closely linked to cropping intensity.

Cropping intensity serves as a key indicator of agricultural development. It is calculated as the ratio of the gross cropped area to the net sown area, expressed in percentage terms. A higher cropping intensity typically reflects better utilization of available agricultural land and improved farming practices.

"Cropping intensity is not only a measure of how intensively land is used but also reflects farmers' access to inputs, irrigation, and extension services" (Kanthamma, 1997, p. 125; Daimari, 2011, pp. 114–115).

In the study area, multiple cropping patterns, especially in Hajo Block, point to higher cropping intensity and better adaptation to modern inputs and irrigation techniques. This suggests a positive trend toward agricultural transformation, particularly among migrant farmers who actively engage in maximizing land use through diverse and seasonal cropping.

6.3 Cropping Pattern and Intensity Analysis

The study revealed that rice cultivation accounted for approximately 41.63% of the total cropped area among the sample farms, while the remaining 58.37% was allocated to other crops such as wheat, oilseeds, potatoes, tomatoes, garlic, vegetables, jute, and sugarcane. This distribution reflects a continued reliance on rice as the dominant crop, although other crops are gradually gaining importance.

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Cropping intensity, defined as the number of crops grown on a given plot of land within an agricultural year, was calculated at 131.95%. While this indicates some level of land utilization beyond a single cropping cycle, it is not particularly high, suggesting limited multi-cropping or sub-optimal land use.

The transition from subsistence-oriented rice farming to market-oriented cropping patterns—such as those involving jute, mesta, sugarcane, vegetables, oilseeds, and tomatoes—has been slow in both development blocks. Rice continues to be the principal crop in the region.

A block-wise analysis shows that in the Hajo Development Block, approximately 62.83% of the total cropped area was devoted to rice cultivation, with only 37.17% allocated to other crops. In contrast, the Sualkuchi Development Block had 37.15% of its cropped area under rice, while the remaining 62.85% was devoted to other crops. These findings indicate that farmers in Hajo are more rice-dependent, whereas Sualkuchi farmers demonstrate greater crop diversification.

It is also observed that cropping intensity is higher in the Sualkuchi Development Block, possibly due to better utilization of operational holdings, more diverse cropping patterns, and possibly greater access to inputs and irrigation facilities.

6.4 Level of Shift in Farming Technology

Most farmers who adopted HYV seeds primarily cultivated rice. However, in Raumari and Bongshar village, a significant number of farmers were found to be growing heirloom tomatoes. According to Anderson (2019), heirloom varieties are often open pollinated, meaning they are naturally pollinated by insects or wind and maintain their genetic traits from one generation to the next. This biodiversity contributes to their robustness and ability to adapt to local environmental conditions.

A total of 80 out of 90 sampled farmers (88.88%) had adopted HYV rice, covering nearly 76% of the total area under HYV crops. Moreover, over 83% (75 farmers) of the sampled population cultivated winter and summer vegetables of high-yielding varieties, covering approximately 18.28% of the total area under HYVs. However, farmers in Raumari village relied heavily on heirloom tomato seeds.

Additionally, 44.12% of the sampled farmers engaged in HYV potato cultivation, which covered about 5.05% of the area under HYVs. Furthermore, 11.54% of the sampled farmers adopted HYV oilseeds, covering about 1.75% of the total HYV area, while 1.47% cultivated HYV sugarcane, which accounted for only 0.12% of the total HYV area.

These findings suggest that while there has been a moderate shift in farming technology from traditional to modern methods among the sample migrant farmers in the Hajo Revenue Circle, Kamrup District, of Assam, the shift has predominantly been toward HYV

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rice. In the case of HYV rice, winter varieties occupied approximately 68.35% of the total area under cultivation in 2023–24, whereas summer and autumn varieties accounted for 21.78% and 7.87%, respectively.

Overall, the percentage of the total cropped area under HYV rice stood at 98%. The most cultivated HYV rice varieties included Pankaj, Aijong, Bahadur, Piolee, Lachit, Lohit, Arise, MPU Chandra Mashuri, Jaya, Jaimati (Mala), and Topchini.

6.5 Use of Chemical Fertilizers

The use of adequate fertilizer inputs is crucial for the successful cultivation of HYV crops. According to the Economic Survey of Assam (2022), the state's average fertilizer consumption stands at approximately 140.60 kg per hectare. The study found that all sample farmers who adopted HYV seeds also used fertilizers. The fertilizer consumption among the sample farms was above 200 kg per hectare of cultivated land, significantly exceeding the state average. Among the selected study areas, the highest fertilizer consumption per hectare of combined crops was recorded in Hajo Development Block at 246.83 kg, while the lowest was observed in Sualkuchi Development at 153.17 kg.

7. Impact of Agricultural Transformation by Migrant Households on the Economy of Assam

Agricultural transformation brought about by migrant households has had notable impacts on the rural economy of Hajo Revenue Circle, Kamrup District of Assam. The key dimensions of this influence are outlined below:

1. Adoption of New Farming Technologies:

Migrant farming households in the study region have made significant progress in embracing modern agricultural techniques. A large proportion of these farmers now utilize High-Yielding Variety (HYV) seeds, implement shallow tube well (STW) systems for irrigation, and apply appropriate quantities of chemical fertilizers and pesticides. Despite these advancements, several key elements of comprehensive agricultural modernization—such as full-scale mechanization, improved post-harvest processing methods, and effective institutional support systems—are yet to be widely adopted. This indicates that while the transition towards modern agriculture has begun, it remains incomplete and uneven across the area.

2. Increased Agricultural Production:

The transition from conventional to modern farming practices has resulted in a noticeable increase in agricultural productivity. Evidence from regional studies suggests that yields per hectare tend to be significantly higher on farms that utilize mechanized tools and

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modern inputs, compared to those following traditional methods. This underlines the importance of technological adoption in enhancing crop output.

3. Expansion of Employment Opportunities:

The modernization of agriculture has also contributed to the growth of rural employment. With the adoption of multiple cropping systems and the extension of farming seasons, more labor is required throughout the year. This shift has led to greater demand for both permanent and seasonal workers in rural areas, thus improving livelihood opportunities.

4. Rise in Commercial Significance of Agricultural Products:

Agricultural modernization has enhanced the market value of various crops including rice, spices, tobacco, jute, and cotton. These developments have supported the emergence of agro-based industries in Assam. Nonetheless, limited access to formal credit facilities remains a barrier for many small farmers. Providing affordable and accessible credit would enable wider adoption of modern technologies and promote further transformation.

5. Strengthening of Forward and Backward Linkages:

The shift towards modern agriculture has reinforced the connections between agriculture and industry. There is now increased demand for industrial inputs such as fertilizers, machinery, and irrigation tools, which strengthens backward linkages. Likewise, agriculture continues to supply essential raw materials to agro-industries, contributing to stronger forward linkages within the local economy.

6. Role of Agricultural Extension Services:

Extension workers at the village level have played an instrumental role in guiding farmers through the process of adopting new agricultural practices. By offering continuous support and training, they have helped bridge the knowledge gap and encouraged the adoption of improved cultivation methods among migrant farmers.

7. Emerging Socio-Economic Challenges:

While agricultural transformation has brought about economic benefits, it has also led to certain unintended consequences. The introduction of large-scale commercial farming has sometimes resulted in the displacement of tenant farmers and sharecroppers. As a result, many have been forced to work as agricultural laborers, reflecting growing inequalities in the rural economy.

8. Conclusion

The ongoing transformation of traditional agricultural practices has contributed significantly to higher levels of production in the study area. Migrant households, through the partial adoption of modern inputs and methods, have helped advance the rural economy.

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However, the process has also introduced some socio-economic disparities, particularly affecting vulnerable farming groups. To ensure a more inclusive and sustainable transition, it is essential to develop and promote low-cost agricultural technologies that small and marginal farmers can easily adopt. Such innovations would facilitate broader participation in modern agriculture and contribute to equitable growth across rural communities.

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