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### **Sustainable rice production in Manipur: Analysis of constraints faced by farmers**

**Bidyapati Thangjam and KK Jha**

#### **Abstract**

Rice is the second most cultivated crop in India. It is grown in the eastern and western shoreline areas, drainage basin of Ganga river and Northeast India. In Manipur, rice is a dominant kharif crop by holding 90% of the Gross Cropped Area (GCA). It is important to understand the challenges faced by farmers in rice cultivation to ensure sustainable rice production. Prioritization of farmer's problems can make easier to target and fix the issues of sustainable production of rice by the farmers. Therefore the study was carried out in Imphal West and Bishnupur district of Manipur to evaluate the socio-economic attributes of rice growers and identify the major constraints faced in adoption of sustainable rice cultivation. Four community blocks namely Imphal West-I and Imphal West-II from Imphal West district and Bishnupur and Moirang from Bishnupur district were selected purposively according to their relative importance in improved rice cultivation (Singh *et al.* 2017a; Singh *et al.* 2017b; Singh *et al.* 2017c; Singh *et al.* 2018; Tiwari *et al.* 2018; Tiwari *et al.* 2019a; Tiwari *et al.* 2019b; Kour *et al.* 2019; Singh *et al.* 2019). A list of villages growing rice under the selected blocks was prepared and two villages from each C.D blocks were selected randomly. Thus a total of eight villages were selected for the study. Finally, among the rice cultivators, 20 farmers were selected from each village based on random sampling procedure making a sample size of 160 respondents. The primary data were collected using a personal interview schedule. The findings of the study revealed that high cost of chemical fertilizers and pesticides, lack of agricultural credit facility, lack of knowledge about fertilizer management, unavailability of fertilizers on time, lack of information about government schemes, lack of irrigation facility, non-availability of water storage tank, lack of awareness about rainwater harvesting technique, perceive increase temperature, increases the risk of diseases and pest due to climate change pattern, irregular rainfall and rising temperature felt reduction of crop yield, sale of agricultural product through middleman and non availability of direct market facility were the major problems faced by the majority of farmers in sustainable rice cultivation. The study suggested that an effort to address sustainable rice cultivation should be promoted by popularizing climate resilient agricultural technologies thereby reducing the constraints and increasing sustainability in rice farming.

**Keywords:** Rice cultivators, socio-economic attributes, constraints, sustainability, Manipur

#### **Introduction**

Agriculture sector play a vital role in the economic development of India by sharing national income and generation of employment to the rural population. Agricultural sector provides raw material to industrial sectors and supply food grains all over the country. India has diversified agro-climatic zones having the potential of growing varieties of crops and optimizing the production to enhance the farm income. Based on the annual report of Department of Agriculture, Cooperation & Farmers Welfare Government of India, 54.6 percent of the total population in India is engaged with agriculture and allied activities by contributing 17.4% Gross Value added for the year 2016-17. Wheat, rice, jowar, millets and sorghum are the major cultivated crops in the country. Among the major cultivated crops, rice is an important staple food crop and holds second position in terms of production which has 42.9 million hectares cultivated area that accounts for about 27.1 per cent of the total rice growing area all over the world (Jha *et al.* 2012) [1].

Rice is grown in the eastern and western shoreline areas, drainage basin of Ganga river and Northeast India.

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Manipur is one of the North eastern state in India and 90% of gross cropped area (GCA) of the state is under paddy cultivation (Singha and Mishra, 2015) [2]. 80% of the total population in Manipur are engaged in agriculture and allied sectors (Roy *et al.*, 2018) [3]. Even though rice is the main crop in Manipur, farmers are still facing various constraints during cultivation in terms of economic constraints, technical constraints, institutional supply constraints, irrigation facility constraints, ecological and marketing constraints.

Sustainability is commonly described as resting upon three pillars, i.e., social, economic, and environmental concepts (Purvis *et al.*, 2019) [4]. Thus, equal consideration should be given to social equity, livability, community development, etc. (social sustainability) as to long-term economic growth and development (economic sustainability), and carbon footprint and biodiversity (environmental sustainability) (Husenov *et al.*, 2020) [5]. Rice production system can be sustainable when rice growers recover from the stresses and constraints by enhancing the capability to access technology without undermining the nature. As per many studies there are various constraints faced by the paddy cultivators all over the places in India. Major problems faced by most of the paddy growers include lack of irrigation water, diseases and pest, poor infrastructures, high cost of inputs and availability of credits (Thanh and Singh, 2006) [6]. Lack of processing facilities, poor extension contact, lack of credit facilities, high cost of agro-inputs, delay in supply of improved rice varieties and lack of inorganic fertilizer (Emodi, 2012) [7]. High temperature during crop production, scarcity of labour during peak periods, diversion of farmers from rice cultivation, involvement of middlemen and distress sale were also found important production constraints faced by rice cultivation farmers (Affia Phenica *et al.*, 2018) [8]. Such constraints can be the major limiting factor in achieving maximum productivity of paddy crop. The success of any technology

and sustainable crop production system depends among the potential users. Reduction of constraints in rice cultivation can achieve food security and socio-economic development. So, identification of constraints expressed by rice growers play an important role to take an appropriate action in the specific area for sustainable rice production. Therefore a research study was undertaken to identify the constraints faced by the farmers of Manipur in sustainable rice cultivation.

### Research Methodology

The present study was conducted in Manipur state which is located in the North-eastern part of India covering an area of 22,327 Km<sup>2</sup> which constitutes 0.7 per cent of the total land surface of the country. Manipur was selected purposively as rice is a major crop in the state. According to the Economic Survey (2016-2017), rice contributed 98 percent of the total food grain production in Manipur. The research study followed a multistage sampling design. From Manipur, two districts namely Imphal west and Bishnupur were selected purposively according to their relative importance in improved rice cultivation. Four community blocks namely Imphal West-I and Imphal West-II from Imphal West district and Bishnupur and Moirang from Bishnupur district were selected purposively. Two villages were selected randomly from each of the selected blocks. A list of farmers cultivating rice crop from the selected districts were prepared and 20 farmers were selected from each villages randomly. Thus a total 160 respondents were interviewed personally with the help of well-structured interview schedule for collection of primary data. An interview schedule was constructed by collecting statements under the categories of economic constraints, technical constraints, institutional supply constraints, irrigation facility constraints, ecological constraints and market constraints.

## Findings and Discussion

### Socio-Economic profile of rice growers

**Table 1:** Distribution of respondents based on their Personnel, Socio-economic and Psychological characteristics

Particulars	Category	Frequency	Percentage
Age (Years) Mean=49.53, SD=11.32	Young (<35)	25	15.63
	Middle age (35-55)	107	66.87
	Old (>55)	28	17.50
Gender Mean=1.87; SD=0.33	Male	139	86.87
	Female	21	13.13
Experience in paddy cultivation Mean=15.48;SD=8.84	Upto 10 years	54	33.75
	11-20 years	69	43.12
	21-30 years	22	13.75
	Above 30 years	15	9.38
Family size Mean=5.64, SD=2.29	Small (less than 4)	15	9.38
	Medium (4-7)	117	73.12
	Large (above 7)	28	17.50
Education level Mean=2.70, SD=1.49	Illiterate	20	12.50
	Primary level	14	8.75
	Middle	28	17.50
	Secondary	13	8.12
	Higher secondary	34	21.25
	Graduate	40	25.00
Land holding size Mean=1.80, SD=2.33	Above graduate	11	6.87
	Marginal (< 1ha )	112	70.00
	Small (1-2ha)	41	25.62
	Semi-medium (2-4ha)	4	2.50
	Medium (4-10ha)	2	1.25
	Large (above 10ha)	1	0.63

Particulars	Category	Frequency	Percentage
Area under paddy crop Mean=1.77, SD=2.04	Marginal (1ha or less)	132	82.50
	Small (1-2ha)	24	15.00
	Semi-medium (2-4ha)	3	1.87
	Medium (4-10ha)	1	0.63
Annual income Mean=113956.25, SD=116180.05	40000-80000	45	28.13
	80000-120000	38	23.75
	120000-160000	25	15.62
	160000-200000	16	10.00
	Above 200000	36	22.50
Net Income from paddy Mean=23412.50, SD=41897.0	Below 40000	128	80.00
	40000-80000	20	12.50
	80000-120000	8	5.00
	Above 120000	4	2.50
Training exposure Mean=0.34, SD=0.48	Respondents who attended training	61	38.13
	Respondents who did not attend training	99	61.87
Social participation Mean=1.03, SD=0.97	Low (0.06)	47	29.37
	Medium (0.06-2)	77	48.13
	High (>2)	36	22.50
Information sources utilization, Mean=11.28, SD=5.49	Low (<5.79)	15	9.38
	Medium (5.79-16.77)	48	30.00
	High (>16.77)	97	60.62
Knowledge level of improved paddy cultivation Mean=3.80, SD=1.44	Low (2.36)	31	19.37
	Medium (2.36-5.24)	106	66.25
	High (>5.24)	23	14.38
Attitude towards improved paddy cultivation Mean=31.23, SD=5.50	Less favourable (<25.73)	25	15.63
	Favourable (25.73-36.73)	120	75.00
	Highly favourable (>36.73)	15	9.37

Table 1 revealed that majority 66.87 per cent of the respondents belonged to middle age group followed by old age group (17.50 percent) and young age group (15.63 per cent). Thus, it can be inferred that a large proportion of the respondents belonged to middle age group ranging from 35 to 55 years. This might be due to the fact that farmers belonging to the middle age group had greater motivation towards improved paddy cultivation. This finding was in accordance with the findings of (Chavai *et al.* 2015) [9]. Majority (86.87%) of the respondents were male and 13.13 per cent of female respondents. It may be due to that fact that male are more responsible in rice cultivation. Majority (43.12%) of them had 11-20 years of farm experience followed by 33.75 per cent had below 10 years experience in rice cultivation and 13.75 per cent had 21-30 years experience in rice cultivation. Majority (73.12%) of the respondents had medium size of family followed by large family size and more than 17.50 per cent and 9.38 per cent of them belonged to small sized family. The result clearly indicates that majority of the respondents had medium size of family. This might be because of realization of farmers regarding the importance of size of family which sustain impacts on their economy. This finding was in accordance with the findings of (Boruah *et al.* 2015) [10].

Majority (25.00%) of the respondents were educated up to graduate level, 21.25 per cent of them had education up to higher secondary level, 17.50 per cent educated up to middle school, 12.50 percent of the respondent were illiterate, 8.75 per cent were educated up to primary level and 8.12 per cent were educated up to secondary level. Only 6.87 per cent of them had education above graduate level. This clearly indicates that a large proportion of the respondents were educated up to graduate. They should be motivated and encouraged through trainings and demonstrations by the government agencies towards improved rice cultivation. Majority of the respondents (70.00%) had marginal size of

total land holding, 25.62 per cent of them had small size of land holding, 2.50 per cent had semi-medium size of land holding, 1.25 per cent had medium size of land holding and only 0.63 per cent had large size of land holding. Thus, it can be inferred that majority of the rice growers had marginal size of land holding. This finding is in line with the findings of (Jaisawal *et al.* 2013) [11]. Majority (82.50%) of the respondents had marginal land holding size under paddy crop, whereas 15.00 per cent of them had small land holding size area under rice followed by 1.87 per cent of farmers had semi-medium land holding size and 0.63 percent of respondents had medium size of land holding under rice. Thus, it can be inferred that a majority of the respondent had marginal land holding area under rice cultivation.

Majority (28.13%) of the respondent had Rs. 40000-80000 of annual income, 23.75 per cent of them had an annual income ranging from Rs. 80000-120000 and 22.50 per cent of them had an annual income of above Rs. 200000. Further it was revealed that 15.63 per cent of the respondents had an annual income above Rs. 200000 followed by 15.62 per cent who had annual income of Rs. 120000-160000 and 10.00 per cent of the respondents had annual income of Rs. 160000-200000. Thus, it can be inferred that majority of the paddy growers had annual income of Rs. 40000-80000. Majority (80.00%) of the rice farmers had income below Rs. 40000 followed by 12.50 per cent who had income ranging Rs. 40000-80000 and 5.00 per cent of them obtained Rs. 80000-120000 from paddy cultivation. Only 2.50 per cent of the respondents had an annual income above Rs. 120000 per year from rice cultivation. Thus, it can be inferred that majority of the paddy growers had an annual income below Rs 40000 from rice cultivation. It may be due to the fact that respondents were having less land holding under paddy crop.

Table 1 revealed that majority (61.87%) of the respondents did not attend training on improved and sustainable paddy cultivation and 38.13 per cent of them attended training

programme on improved and sustainable rice cultivation. Majority (48.13%) of respondents had medium level of social participation followed by low level of social participation 29.37 per cent of them had high level of social participation 22.50 per cent. Thus, it can be inferred that a majority of the paddy growers had medium level of social participation. Majority (60.62%) of the respondents had medium level of information sources utilization followed by 30.00 per cent who had medium level and 9.38 per cent of respondents had low level of information sources utilization. Majority (66.25%) of the respondents had medium level knowledge followed by 19.37 per cent had low level of knowledge and 14.38 per cent of them had high level of knowledge. Thus, it can be inferred that majority of the respondents had medium level of knowledge. This finding is in line with the findings of

(Devarani, 2014) [12]. Majority (75.00%) of the respondents had favourable attitude towards the sustainable paddy cultivation practices followed by 15.63 per cent who had less favourable attitude and 9.37 per cent of them possessed highly favourable attitude. The more favourable attitude towards sustainable rice cultivation might be due to the higher productivity of sustainable rice cultivation practices than the conventional paddy cultivation practices. The above finding is in line with the findings of (Mohanraj and Karthikeyan, 2014) [13].

### Constraints faced by the farmers in sustainable rice production

#### Economic constraints

**Table 2:** Distribution of the respondents based on the economic constraints faced by farmers in adopting sustainable rice cultivation n=160

Economic constraints	Frequency	Percentage	Mean	Ranks
High cost of agri inputs	137	85.63	22.84	1 <sup>st</sup>
Lack of agricultural credit facility	123	76.88	20.50	2 <sup>nd</sup>
Lack of remunerative price of farm produce	109	68.13	18.17	3 <sup>rd</sup>
High labour cost	92	57.50	15.34	4 <sup>th</sup>
High cost of improved seeds	73	45.63	12.17	5 <sup>th</sup>

Table 1 revealed that 85.63 per cent of the respondents perceived major economic constraints due to high cost of various agri-inputs required for sustainable rice cultivation having 1<sup>st</sup> rank with mean score of 22.84, 76.88 per cent of the respondents expressed having faced problem due to lack of credit facility in adopting sustainable rice cultivation ranking 2<sup>nd</sup> with mean score of 20.50, 68.13 per cent of expressed having problem on getting remunerative price of farm produce having 3<sup>rd</sup> rank with mean score of 18.17, 57.50 per cent of them faced problem due to high labour cost on

sustainable farming having 4<sup>th</sup> rank with mean score of 15.34 and 45.63 per cent of them faced problem due to high cost of improved seeds having 5<sup>th</sup> rank with mean score of 12.17. It was evident that majority of the respondents didn't have access to the institutional credit facilities, instead they depended more on non institutional sources like friends, relatives and neighbours paying higher interest and getting more burdened in course of sustainable rice production.

#### Technical constraints

**Table 3:** Distribution of the respondents based on the technical constraints faced by farmers in sustainable rice cultivation n=160

Technical constraints	Frequency	Percentage	Mean	Ranks
Lack of knowledge about input management	129	80.63	25.8	1 <sup>st</sup>
Increase incidence of pest and diseases	118	73.75	23.6	2 <sup>nd</sup>
Difficulty due to high weed infestation	113	70.63	22.6	3 <sup>rd</sup>
Improved technologies are complex	96	60.00	19.2	4 <sup>th</sup>
Lack of post harvest management	55	34.38	11	5 <sup>th</sup>

Table 2 revealed that 80.63 per cent of the respondents faced problem of lack of knowledge about input management having 1<sup>st</sup> rank with mean score of 25.8, 73.75 per cent of the respondents faced problem due to increase of pest and diseases having 2<sup>nd</sup> rank with mean score of 23.6, 70.63 per cent of them expressed that they faced difficulty due to high weed infestation having 3<sup>rd</sup> rank mean score of 22.6, 60.00 per cent of them faced problem due to complexity of the improved technology having 4<sup>th</sup> rank with mean score of 19.2

and 34.38 per cent of them faced problem on lack of post harvest management having 5<sup>th</sup> rank mean score of 11. The probable results might be due to the fact that respondents didn't contact the agricultural staffs and majority of them expressed lack of skills about the implemented techniques and improved technologies of sustainable rice cultivation.

#### Institutional supply constraints

**Table 4:** Distribution of the respondents based on the institutional supply constraints faced by the farmers on sustainable rice cultivation n=160

Institutional supply constraints	Frequency	Percentage	Mean	Ranks
Unavailability of required inputs on time	141	88.13	28.2	1 <sup>st</sup>
Lack of information about government schemes	125	78.13	25	2 <sup>nd</sup>
Unawareness of inputs supply sources	105	65.63	21	3 <sup>rd</sup>
Difficult to get improved variety of seeds at right time	91	56.88	18.2	4 <sup>th</sup>
Non availability of good quality seeds	60	37.5	12	5 <sup>th</sup>

From Table 3 it was observed that 88.13 per cent of the respondents faced problems due to unavailability of required inputs on time having 1<sup>st</sup> rank with mean score of 28.2, 78.13 per cent faced problems due to lack of information about government schemes having 2<sup>nd</sup> rank with mean score of 25, 65.63 per cent of them faced problem due to unawareness of input supply having 3<sup>rd</sup> rank with mean score of 21, 56.88 per cent expressed having difficulty to get improved varieties of seeds at right time having 4<sup>th</sup> rank with mean score of 18.2 and 37.5 per cent of them faced problem due to non

availability of quality seeds having 5<sup>th</sup> rank with mean score of 12. It might be due the fact that respondents possessed low access of formal information sources. Another reason could be respondents were not involved in the social organizations where they could have got the opportunity of input supply by the government. Jha & Das (2019) [14] reported that 52.77 per cent of the respondents faced constraints due to unavailability of required inputs for cultivation.

### Irrigation facility constraints

**Table 5:** Distribution of the respondents based on constraints faced by the farmers to avail irrigation facility for sustainable rice cultivation  
n=160

Irrigation facility constraints	Frequency	Percentage	Mean	Ranks
Lack of irrigation facility	160	100	32	1 <sup>st</sup>
Non availability of water storage tank	140	87.50	28	2 <sup>nd</sup>
Lack of awareness about rain water harvesting technique	114	71.25	22.8	3 <sup>rd</sup>
Drought occurs during rice cultivation	101	63.13	20.2	4 <sup>th</sup>
Flood occurs during rice cultivation	68	42.50	13.6	5 <sup>th</sup>

Table 4 shows that 100 per cent of the respondents faced problems due to lack of irrigation facility having 1<sup>st</sup> rank with mean score of 32, 87.50 per cent of the respondents expressed problem on non availability of water storage tank having 2<sup>nd</sup> rank with mean score of 28, 71.25 per cent of them expressed problems on lack of awareness about rain water harvesting techniques having 3<sup>rd</sup> rank with mean score of 22.8, 63.13 per cent of the farmers expressed problem on drought occurrence during rice cultivation and harvesting time having 4<sup>th</sup> rank with 20.2 mean score, 42.50 per cent of them faced problem of flood occurrence during rice cultivation having 5<sup>th</sup> rank with 13.6 mean score. 40,000 hectares of rice had destroyed and 14,079 hectares of cropland were worst affected by flood in

Manipur (Thokchom, 2017) [15]. Due to the occurrence of irregular irrigation during cropping season most of the farmers failed to continue cultivation throughout the whole year hence it reduces farm outputs. It can be concluded that lack of irrigation facility, non availability of water storage tank and lack of awareness were the major irrigation constraints expressed by the respondents in sustainable rice cultivation. It is suggested that promotion of productive irrigation solution together with the farmers and concerned department may achieve the target of sustained progress in rice cultivation.

### Ecological constraints

**Table 6:** Distribution of the respondents based on the ecological constraints faced by the farmers for sustainable rice cultivation  
n=160

Ecological constraints	Frequency	Percentage	Mean	Ranks
Perceive increase in temperature	160	100	26.67	1 <sup>st</sup>
Increased risk of diseases and pest due to climate change pattern	149	93.13	24.84	2 <sup>nd</sup>
Irregular rainfall and rising temperature felt reduction crop yield	142	88.75	23.67	3 <sup>rd</sup>
Heavy rainfall damage crops	55	34.38	9.17	4 <sup>th</sup>
Declining soil quality due to use of chemicals	41	25.63	6.84	5 <sup>th</sup>
Cyclone damage crop	29	18.13	4.84	6 <sup>th</sup>

From Table 5 it was observed that 100 per cent of the respondents expressed having problem on increases temperature under having 1<sup>st</sup> rank with mean score of 26.67. Increase in temperature may have negative effect on paddy cultivation and other agricultural practices. The result is evident with the findings “an increasing trend of temperature in Manipur was observed from 1954-2011 and found that the maximum temperature rose from 26.8 °C to 27.3 °C and minimum temperature from 13.8 °C to 15.3 °C (Sethi and Sharma 2017) [16]. Increase in temperature may reduce paddy crop yield since increase in 1% of temperature reduces 3.44% of paddy and 0.03% of paddy yield decrease in the following year (Alam *et al.* 2014) [17]. Increased risk of diseases and pests due to change pattern of climate were reported as constraint by 93.13 per cent of the respondents having 2<sup>nd</sup> rank with mean score of 24.84. From the source Rice Knowledge Bank, farmer’s loss estimated at an average of 37 per cent of rice crop due to pest and diseases every year. Irregular rainfall and rising temperature resulting in reduction of crop yield was reported by 88.75 per cent of the

respondents having 3<sup>rd</sup> rank with mean score of 23.67. Heavy rainfall damage crops were reported by 34.38 per cent respondents having 4<sup>th</sup> rank with 9.17 mean score. Declining soil quality due to excess/misuse of chemicals was expressed as constraint by 25.63 per cent of the respondents having 5<sup>th</sup> rank with mean score of 6.84. Low quality soil has potential to reduces crop yield which is a major threat to sustainable of agriculture and food security (Tan *et al.* 2005) [18]. Constraints expressed on cyclone damaging crop were reported by 18.13 per cent of them having 6<sup>th</sup> rank with mean score of 4.84. The challenges faced by the respondents indicate that rice cultivation is extremely vulnerable to climate change. Negative impacts of climate change are already being felt in the form of yield reduction and more frequent extreme weather events affecting sustainable rice production. Investment of climate change adaptation will be required to maintain current yields and to achieve sustainable rice production.

### Market constraints

**Table 7:** Distribution of the respondents based on the market constraint faced by the farmers

n=160

Market constraints	Frequency	Percentage	Mean	Ranks
Sale of agricultural product through middleman	122	76.25	20.34	1 <sup>st</sup>
Non availability of direct market access	109	68.13	18.17	2 <sup>nd</sup>
Low marketable surplus	98	61.25	16.34	3 <sup>rd</sup>
Price determined by wholesale buyers	77	48.12	12.84	4 <sup>th</sup>
Lack of Transportation	54	33.75	9	5 <sup>th</sup>
Lack of proper storage	49	30.63	8.17	6 <sup>th</sup>

Table 7 revealed that 76.25 per cent of the respondents expressed having problem of sale of rice through middleman with mean score of 20.34 having 1<sup>st</sup> rank in market constraints, 68.13 per cent faced problem on non availability of direct market access with mean score of 18.17 having 2<sup>nd</sup> rank, 61.25 per cent expressed constraint of low marketable surplus with mean score of 16.34 having 3<sup>rd</sup> rank, 48.12 per cent faced the problem on the price determination by wholesale buyers with mean score of 12.84 having 4<sup>th</sup> rank, 33.75 of them expressed lack of transportation with mean score of 9 having 5<sup>th</sup> rank and 30.63 per cent faced problem of lack of proper storage with mean score of 8.17 having 6<sup>th</sup> rank in market constraints. The results indicate that sale through middleman, non-availability of direct market access and low marketable surplus were the major constraints faced by the respondents. The probable reason for the above problems might be due to the fact that majority of respondents were located far from the markets and they have to pay high transportation costs, therefore majority of them sale through middleman lowering their profitability.

### Conclusion

It may be concluded for the present research that high cost of inputs, lack of agricultural credit facility, lack of knowledge about input management, unavailability of required inputs in time, lack of information about government schemes, lack of irrigation facilities, non-availability of water storage tank, lack of awareness about rainwater harvesting techniques, perceived increase in temperature, increased risk of diseases and pests due to climate change, irregular rainfall and rising temperature reducing crop yield, sale of agricultural product through middleman and non availability of direct market facilities were the major constraints faced by the respondents. These constraints often lead to hinder the adoption of improved technology for sustainable rice cultivation practices. The overriding problems of farmers should be monitored to attain sustainability in rice production thereby promoting income and prosperity among the farmers.

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