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Identifying challenges in rainfed kharif field crops: A ground-level perspective from Bongaigaon, Assam

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Abstract
The study was conducted during the 13-day Vikshit Krishi Sankalp Abhiyan (VKSA) from 29th May to 12th June 2025 in Bongaigaon district of Assam to identify and prioritize constraints faced by farmers in cultivating rainfed kharif field crops. Data were collected through personal interviews and constraints were categorized into four groups: climatic and social**,** technological**,** economic & marketing and institutional & infrastructural. The Garrett Ranking Technique was employed to analyse and rank the responses. Among climatic constraints, erratic rainfall (62.92) and frequent flooding & waterlogging (53.61) were most pressing. In the technological category, farmers reported lack of quality seeds of high-yielding varieties (66.14) and pest and disease infestations (61.33) as top concerns. Under economic and marketing issues, high input costs (66.85) and high cost of land preparation (66.35) were major hurdles. Institutional and infrastructural challenges included weak extension delivery systems (66.35) and poor market linkages and storage facilities (57.79)**.** The findings highlight the urgent need for targeted policy interventions to improve extension services**,** market infrastructure and climate-resilient farming support. Addressing these constraints is crucial for enhancing productivity and ensuring sustainable rainfed agriculture in the district.

Keywords: Rainfed agriculture, constraints, garrett ranking technique, kharif crops, VKSA, Bongaigaon, extension services

Introduction
Agriculture contributes significantly to Assam's economy, accounting for nearly one-third of the Gross State Domestic Product. It directly or indirectly supports over 70 per cent of the state's population and provides employment to more than 57 per cent of the total workforce (Pathak *et al*., 2022) [14]. The kharif season (June to September), aligned with the southwest monsoon, plays a vital role in sustaining the agricultural output of the state. Paddy (*Sali*) is the predominant kharif crop, occupying about 70 per cent of the total cultivated area and is largely grown under rainfed conditions. Other major crops during this season include maize, pulses (black gram and green gram), and oilseeds (sesamum). However, frequent floods, erratic rainfall, and inadequate drainage severely impact crop productivity. These issues are particularly challenging for small and marginal farmers who often lack access to quality seeds, mechanization and timely agricultural inputs.

In Bongaigaon district, agriculture is the backbone of the rural economy, engaging nearly 70 per cent of the population. According to the 2011 Census, 32.62 per cent of the total workforce is fully dependent on agriculture. The district has 83,442 cultivators and 47,406 agricultural labourers. Kharif rice occupied 57 per cent of the total cropped area in Bongaigaon district. It is grown in an area of 35,050 ha with a productivity of 1,814 kg/ha (Ahmed *et al*., 2024) [1]. In addition, maize (844 ha), jute (2,279 ha), sesamum (228 ha), and pulses like black gram (1,953 ha) and green gram (201 ha) are also cultivated ha (Ahmed *et al*., 2024) [1]. The farmers in the district faces many climatic constraints particularly during the kharif season such as unpredictable rainfall pattern, waterlogging in low-lying areas, delayed sowing due to floods along with other technological, economic and marketing constraints. Given these challenges, the present study was undertaken during the Vikshit Krishi Sankalp Abhiyan (VKSA) to identify

and analyse major constraints affecting kharif crop cultivation, aiming to support micro-level planning and agricultural interventions in Bongaigaon district.

Materials and Methods

The present study was conducted during the 13-day long Vikshit Krishi Sankalp Abhiyan (VKSA), held from 29th May to 12th June, 2025, with the objective of assessing major constraints faced by farmers during the cultivation of kharif field crops. A total of 300 farmers were randomly selected from five community development blocks of Bongaigaon district (Dangtol, Boitamari, Srijangram, Tapattary and Manikpur) with 60 farmers from each block. The respondents were interviewed individually using a structured questionnaire. To analyse and prioritize the constraints perceived by the farmers, Garrett's Ranking Technique was employed. Under this method, the respondents were asked to rank a set of constraints based on their severity or impact. The ranks assigned by each respondent were converted into percentile scores using the following formula:

$$\text{Percent Position} = 100(R_{ij} - 0.50) / N_{ij}$$

Where,

R_{ij} = Rank given for the i^{th} factor by the jth respondent

N_{ij} = Total number of factors ranked by the j^{th} respondent

The percentile positions were then converted into scores with the help of Garrett and Woodworth's (1969) conversion table following Krishna *et al*. (2024) [10]. The mean score for each constraint was calculated, and the constraints were ranked accordingly in descending order of their mean scores.

Results and discussion

This section presents the major constraints faced by farmers in the cultivation of rainfed kharif field crops in Bongaigaon district of Assam identified during the study. Analysis of the constrains under different categories provides insights into the severity of these issues, helping to identify critical bottlenecks in rainfed agriculture in the region. The results are presented under each category, supported by respondent rankings and Garrett scores (Table 1 and Figure 1).

Climatic and Social Constraints

Among the climatic and social constraints, erratic rainfall ranked first with a Garret score of 62.92. This constraint was emerged as one of the most pressing, receiving first rank from 174 nos. of farmers, while very few placed it in lower rank. This reflects growing concerns about erratic rainfall pattern *viz*., delayed onset, early withdrawal, and uneven rainfall distribution that disrupt timely sowing, nursery preparation, and transplanting activities. Ashokkumar *et al*. (2018) [2] reported erratic rainfall as a primary reason for low black gram yields, with 94.17% of farmers concurring. Similar findings on rainfall delay were reported by Basyal *et al*. (2019)[4] from Nepal and Tangjam and Sharma (2021) [25] from Arunachal Pradesh.

Following this, frequent flood and waterlogging in low-lying areas emerged as another major concern. A majority of farmers (126 nos.) placed this constraint in the topmost priority (first rank), indicating its critical importance, while fewer respondents ranked it second (50 nos.), third (54 nos.) and fourth (70 nos.). Frequent floods and waterlogging are a major problem faced by the farmers especially in the flood-prone areas of the North Salmara Subdivision, where river systems originating from the Bhutan Himalayas regularly inundate low-lying agricultural lands (Source: Flood Contingency Plan, 2022, District Disaster Management Authority, Bongaigaon). The ranking patterns underscore the immediate threat posed by excess water, resulting in crop damage and loss of seedlings. The severity of these constraints underlines the urgent need for location-specific climate-resilient technologies and integrated watershed development approaches.

Prolonged dry spell ranked third on the basis of Garret ranking score (48.91). This constraint was ranked highest in third (157nos.) followed by second (140 nos.) and fourth (03 nos.), indicated a key issue after the previous two. Lack of government-supported irrigation facilities was noted as a less serious issue as majority of respondent (227 nos.) placed it in fourth rank (Table 1 and Figure 1). Although prolonged dry spells and lack of irrigation facilities were ranked lower, their continued presence in the ranking lists reflects the dual nature of rainfall extremes—floods and droughts—within the same cropping season, further complicating farm-level decisions. This observation aligns with the findings of Singh *et al*. (2024) [23], who analysed 70 years of climatic data (1951-2020) of Assam and found that drought like situations mostly occurred in the month of August and September. Farmers expressed that prolonged dry spell creates yellowing of rice particularly in the month of August and September when crop was of at active tillering stage. Moreover, farmers reported difficulties in jute retting due to inadequate pond water resulting from prolonged dry spells in the month June and July. The problem of insufficient pond water for jute retting during dry spells in June and July was also documented by Sheheli and Roy (2014) [22]. They also reported that drought may also cause wilting of jute plant at later stages and reduces the fibre yield and quality of jute fibre. In case of lack of government supported irrigation facilities, poor convergence between key departments such as agriculture, irrigation and rural development has hindered effective delivery of services and support schemes, resulting in fragmented efforts and reduced impact at the field level.

Technological Constraints

Lack of availability of quality seeds of high-yielding variety (HYV) was ranked first among the five constraints. This constraint was assigned a Garret score of 66.14. The constraint was ranked first and second by 114 and 116 farmers respectively, indicating its high priority, while only a few assigned it lower ranks. This finding is consistent with earlier studies of Jat *et al*., 2017 [8] and Rohila *et al*., 2021 [17], that documented importance of seeds of new high yielding varieties for enhancing productivity and sustainability of agriculture. Many farmers in the district are unaware of where to obtain certified seeds, leading them to rely on local or substandard seed sources, often sourced from the neighbouring state of West Bengal.

The high incidence of pest and disease in kharif crops was ranked second with Garret score of 61.33. Only 86 farmers considered it as the topmost constraints, whereas it was more commonly placed at rank second (125 nos.) and third (89 nos.). Farmers ranked HYV seed related issues and insect pests and disease problem closely as evidenced by the marginal gap in their Garret scores, implying farmers experienced both challenges at nearly the same intensity. Field observations and

farmer reports revealed the prevalence of pests such as stem borers and leaf folders in rice, bihar hairy caterpillar in sesamum, red hairy caterpillar in jute, blast and brown spot of rice, stem rot of jute and yellow mosaic virus in pulse, highlighting the need for integrated pest management (IPM) and integrated disease management (IDM) strategies. In recent years, incidence of rice swarming caterpillars, fall armyworm in maize and yellow mosaic virus disease in black gam and green gram are most frequently observed (Banerjee *et al*., 2018 [3], Sarma and Gupta, 2018 [19], Sarma *et al*. 2023 [20]). The high rainfall and humidity during the kharif season favour the development of pests and diseases (Kumar *et al*. 2023 [11]. They also reported that monsoon conditions promote pest and disease outbreaks in maize, leading to 10-15% yield losses. Similar observation on high pest and disease incidence in paddy was also reported by Konsam and Sakthivel (2020) [9] from Manipur.

Lack of availability of farm machinery at the time of cultivation was ranked first by 65 farmers, second by 55, third by 94, fourth by 22 and fifth by 64 farmers, indicating its moderate to hight level of concern among respondents (Figure 1). Although 65 farmers considered it the most pressing issue, majority of farmers (94 nos.) ranked it third, reflecting variability in perception based on local conditions or priorities. Lack of availability of farm machineries at the time of cultivation of crops may be due to most small and marginal farmers in the district cannot afford to buy machineries and there are not enough custom hiring services available to meet the seasonal demand. Moreover, lack of trained manpower in custom hiring centres to operate the implements is another reason for less availability of farm implements to the farmers.

Lack of knowledge about scientific cultivation practices was ranked fourth (Garrett score: 35.38). A majority of farmers considered these constraints of lesser importance, as indicated by 218 and 78 respondents placing it in the fourth and fifth ranks respectively. Many farmers in the district still adhere to traditional farming methods due to limited awareness of modern agronomic practices such as soil testing, balanced fertilizer use, seed treatment, and integrated pest management. This knowledge gap hampers productivity and resource use efficiency, highlighting the need for more effective extension services and farmer training programs to promote the adoption of improved cultivation techniques. Yadav *et al*. (2020) [28] and Verma and Kumawat (2020) [27] from Rajasthan also observed lack of scientific knowledge on crop production as a constraint faced by the farmers during their study.

Limited access to custom hiring centres (CHCs) was received its highest number of respondents in rank fifth (158 nos.), followed by rank third (86 nos.) and rank fourth (56 nos.), showing that farmers considered it a relatively low-priority issue. Many CHCs are located far from remote villages making them less accessible to small and marginal farmers. Moreover, lack of awareness about the availability and booking procedures, as well as poor rural roads in the district further restricts timely access during peak agricultural operations. The persistent concern regarding unavailability of machinery at peak periods calls for strengthening of CHC services in the district. Similar challenges on lack of access to CHCs were observed by Mishra *et al*. (2014) [13] and Varshita *et al.* (2023) [26].

Economic and Marketing Constraints

The high input cost surpassed other economic and marketing challenges, recording the highest Garret score of 66.85. It was most frequently cited in the top three priority rankings, with 155 farmers rating it first, 118 second and 27 third, indicating its critical impact on farming profitability. Similar observations were made by Rani *et al*. (2012) [16], who noted that the higher prices of high-yielding variety (HYV) seeds in rainfed rice systems often stem from elevated production costs or lack of transparent pricing by state and private seed agencies. Additionally, the increasing cost of land preparation is primarily attributed to rising diesel price, hiring cost of tractor and wages for skilled labour, particularly tractor operators.

The high cost of land preparation was identified as another major concerns by the farmers. It ranked just below high input cost in terms of severity. A considerable number of farmers had recognized this constraint as critical with 145 respondents ranking it first, 128 second and 27 third (Figure 1). These findings indicated that both input costs and land preparation expenses together had constituted the bulk of financial pressure during the initial stages of the cropping season. This problem is primarily attributed to rising diesel price, hiring cost of tractor and wages for skilled labour, particularly tractor operators.

The lack of availability of labour during peak season was perceived as a moderate constraint by farmers. Although it did not receive any first-rank responses, it was placed second by 54 farmers, third by 119 and fourth by 127. The absence of first-rank responses indicated that farmers did not view labour scarcity as the most pressing issue, but its consistent presence in middle ranks reflecting its steady influence on production efficiency, especially during peak agricultural operations. One of the key reasons could be the migration of rural youth to southern Indian states in search of higher daily wages. This trend aligns with the findings of Sheheli and Roy (2014) [22], who reported similar patterns of labour migration affecting agricultural activities. Additionally, the implementation of Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) has provided alternative employment opportunities in rural areas, offering less physically demanding work and often more attractive wages compared to traditional farm labour (Bhubaneswari, 2012) [5].

Low farm gate price was another issue, although it was not considered an immediate priority by most farmers. It received no first and second rank, but was ranked third by 127, fourth by 146 and fifth by 27 farmers. In contrast, the lack of availability of market price information was perceived as a relatively lower concern. It did not receive any ranking within the top three, but was ranked fourth by 27 farmers and fifth by as many as 273 farmers. This indicated that although lack of price information was widespread, it was not regarded as severely limiting compared to other economic and marketing constraints. The absence of organized markets and collection centres in most rural areas of the district continues to hinder effective price realization. Moreover, seasonal overproduction, combined with poor road connectivity and involvement of middlemen in marketing channel, often results in decline in prices immediately after harvest. Phenica *et al*. (2018) [15] during their study observed involvement of middlemen was one of the most pressing issues under marketing constrains. These challenges highlight the critical need to strengthen Farmer Producer Organizations (FPOs), improve price discovery mechanisms, and enhance farmers' access to timely and reliable market intelligence.

Institutional and Infrastructural Constraints

Among the institutional and infrastructural challenges, weak government extension delivery system was perceived as the most critical by the majority of farmers. It was ranked first by 216, second by 57 and third by 27 farmers. The absence of fourth and fifth ranks further reinforced that this issue was seen as primary barrier rather than a secondary concern. The high concentration of top rankings highlighted the adequacy of timely technical guidance and field -level support during the crop cycle. Saikia *et al*. (2013) [18] also documented weak government extension delivery system as one of the major constraints faced by the farmers in Assam. The predominance of higher ranks assigned to this constraint reflects widespread farmer dissatisfaction regarding the frequency, timeliness, and contextual relevance of technical advisory services. These findings are consistent with the observations of Satishkumar *et al*. (2013) [21], who reported that although India's extension network has a broad geographic reach, it continues to face significant challenges in effectively addressing the needs of farmers in rainfed regions.

The lack of well-developed market linkages and facilities also emerged as a prominent issue, though slightly less severe. It was ranked first by 84 farmers, second by 154 and third by 62 while receiving no fourth and fifth rankings. This indicated that farmers faced persistent difficulties in accessing organized markets and value chains, which limited their ability to realize fair price and scale up production effectively. Most small and marginal farmers in the study area do not have access to organized markets or formal procurement centres, compelling them to sell their produce to local traders or middlemen, often at unfavourable prices. These findings are in line with the observations of Devi *et al*. (2022) [7], who also reported similar challenges faced by farmers due to limited market access and inadequate post-harvest infrastructure.

On the other hand, lack of access to institutional credit was perceived as a moderate to serious constraint. It received no first rank, but was placed by 27, third by 160 farmers and fourth by 113. Although lack of access to institutional credit was ranked slightly lower compared to other constraints, it remains a persistent and structural barrier to agricultural development. A significant number of small and marginal farmers continue to rely on informal lending sources, primarily due to rigid collateral requirements, bureaucratic delays, and limited outreach of formal credit institutions. In remote areas, awareness of government credit schemes such as the Kisan Credit Card (KCC) remains low, compelling many farmers to depend on private moneylenders, often at exploitative interest rates. Similar findings have been reported by Rani *et al*. (2012) [16], Satishkumar *et al*. (2013) [21], Choudhury *et al*. (2017) [6], Phenica *et al*. (2018) [15], Sinha *et al*. (2019) [24] and Verma and Kumawat (2020) [27], all of whom highlighted the exclusion of farmers from mainstream financial services. This underlines the urgent need for targeted financial inclusion strategies that are context-specific, accessible, and aligned with the credit needs of rainfed farming communities.

Similarly, the lack of well-developed proper storage facilities showed a ranking distribution identical to that of market linkages-84 first, 154 second and 62 third, indicating its importance among infrastructure bottleneck. Most rural areas in the district lack cold storage or godowns. Existing facilities are often far from farms or controlled by private traders, making them inaccessible for too costly for small and marginal farmers.

Table 1: Garrett's ranking of constrains faced by the respondent farmers

S. N.	Constrains	Percent position	Garret Table value	Total score	Mean score	Rank
Climatic and social constraints						
1	Erratic rainfall	12.5	72	18876	62.92	1
2	Frequent floods and waterlogging in low lying areas	37.5	56	16084	53.61	2
3	Long dry spells during critical periods of crop growth	62.5	43	14672	48.91	3
4	Lack of government supported irrigation facilities	87.5	27	9697	32.32	4
Technological constraints						
1	Lack of availability of quality seeds of high yielding variety (HYV)	10	75	19841	66.14	1
2	Pest and disease infestation	30	60	18400	61.33	2
3	Lack of availability of farm machineries at the time of cultivation of field crops	50	50	15269	50.90	3
4	Limited access to custom hiring centres (CHCs)	70	39	10276	34.25	5
5	Lack of knowledge about scientific cultivation of field crops	90	24	10614	35.38	4
Economic and marketing constraints						
1	High input cost	10.00	75	20055	66.85	1
2	Lack of availability of labour during peak season	30.00	60	14143	47.14	3
3	High cost of land preparation	50.00	50	19905	66.35	2
4	Low farm gate price due to market intermediatory	70.00	39	12692	42.31	4
5	Lack of availability of market price information	90.00	24	7605	25.35	5
Institutional and infrastructural constraints						
1	Weak govt. extension delivery system	12.50	72	19905	66.35	1
2	Lack of availability of proper storage facilities	37.50	56	10714	35.71	4
3	Lack of well-developed market linkage and facilities	62.50	43	17338	57.79	2
4	Poor Institutional credit facilities	87.50	27	11443	38.14	3

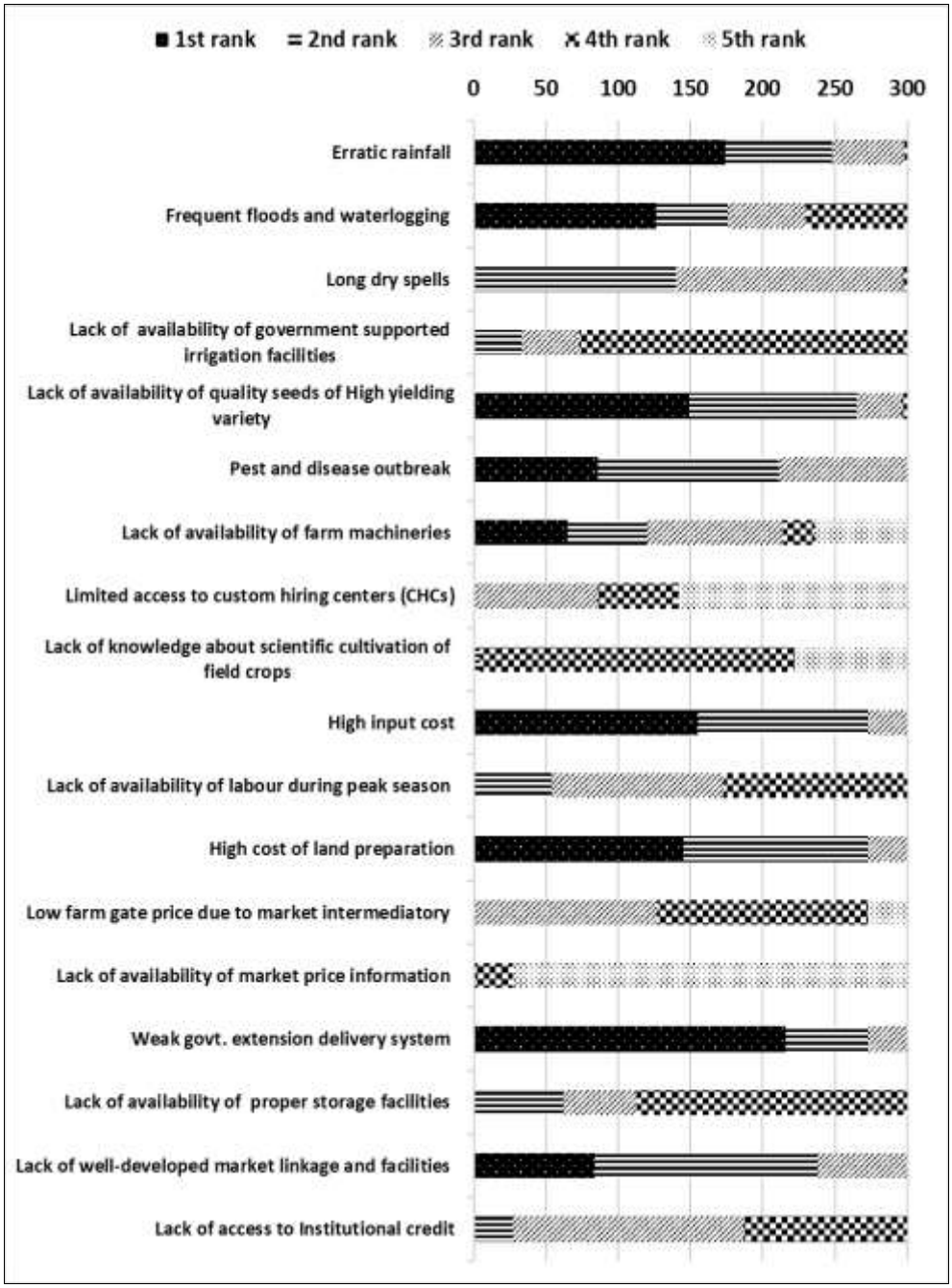

Fig 1: Constrains and rank given by respondent farmers

Conclusion

The study reveals that the constraints to rainfed kharif crop cultivation in Bongaigaon are multi-layered, with climatic variability, technological gaps, rising production costs, and institutional inefficiencies forming a complex of challenges. The high priority assigned to extension, input access, and market connectivity underscores the need for an integrated extension strategy that goes beyond farm-level technologies to address infrastructural and systemic issues. Collaborative efforts involving Krishi Vigyan Kendras (KVKs), local governance bodies, farmer groups, and financial institutions are essential to build resilience and improve livelihoods in rainfed agricultural systems.

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