

Constraints and remedies

of wheat cultivation in north-east India

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Wheat production and productivity in north-eastern part of India is very less. There are various constraints regarding the wheat production and productivity starting from soil characteristics to crop harvesting. The climate and weather conditions are adverse for wheat cultivation in north-eastern part of India. Topography of northeast India is somewhat undulating, covered with dense forest, flood plains and hills. Other problem is indigenous farming system in northeast India. Pest and disease problems may also arise due to high humid climatic conditions. Marketing, transportation and storage are very big problem even in this modern time. Railway is passive in various regions. In this article we have addressed the wheat cultivation problems and prevention measures for the wheat cultivation in northeastern part of India

Keywords: Constraints, India, North-east, Remedies, Wheat

NORTH-east India consists of eight states and one of the most diverse regions of India. However, wheat cultivation faces several challenges in the North East. Cultivation area and the production of wheat are negligible in the North East states except Assam (Table 1). Three states namely Tripura, Arunachal Pradesh and Meghalaya have higher wheat productivity in comparison to other states of North East. Wheat cultivation is highly distressing especially in humid and subtropical environment where excessive rainfall with high temperature is the common feature. The foremost challenge is the precocious germination of seeds at the time of harvest due to pre-monsoon showers which affects grain quality and produce is not accepted by the consumers thus, fetches lower price in the market. Amidst climatic difficulties, the scientific advancements which involved development of rain resistant wheat through genome editing and induced mutagenesis is most encouraging for cultivating

wheat in the regions experiencing rains at maturity.

Except Assam, the cultivation area and production of wheat is negligible in other north-eastern states (Table 1). However, Tripura, Arunachal Pradesh and Meghalaya have higher wheat productivity in comparison of other north eastern states (Table 1). Various NGOs might help for efficient extension system in a public-private partnership (PPP) way. Initiation of co-operative societies by the farmers and entrepreneurship development of farmers to overcome the marketing related problems in this region. It provides a plan for the betterment not only to the farmers also to the government also. So, there may be various problems but to overcome that, encouragement is necessary.

Constraints of wheat production in northeast India

Climate, soil and topography: North-east India has a humid and subtropical climate. Average rainfall in this region is about 2000 mm per annum and influenced

by the southwest and northeast monsoon in the Brahmaputra and Barak valley. The temperature varies from valley to hilly areas. In plains of north-east India, mean summer temperature is 28°C and goes up to 33-35°C and mean winter temperature is 14-16°C. Distribution of pre-monsoon rains during March-April affects the ripened grains of the wheat crop at harvesting stage. The wheat grain germinates in the spike itself and grain quality deteriorates heavily resulting into poor price in the market. Further, the contrasting climatic conditions in this zone from the north western states of Punjab causes higher respiration which negatively affects the grain filling thus, poor filled grains. Soil is mostly acidic in nature. Soil in north-east India consists of laterite and lateritic soil, red soil, and alluvial soil in the Brahmaputra valley, peat soils in wetlands. Wheat plant growth depends greatly on soil physical and chemical properties. Soils are highly acidic in nature in the most of North Eastern states. The pH is mostly less than 6.0 (in some areas pH is around

Table 1. Five years area, production and productivity of wheat in north-eastern states of India

Years	Arunachal Pradesh	Assam	Manipur	Meghalaya	Nagaland	Sikkim	Tripura
<i>Area ('000 Hectares)</i>							
2016-17	3.91	17.45	2.25	0.46	3.38	0.32	0.2
2017-18	3.93	17.79	2.25	0.46	3.41	0.17	0.2
2018-19	3.93	16.95	2.29	0.46	3.42	0.16	0.16
2019-20	3.39	11.34	2.3	0.46	3.43	0.17	0.15
2020-21	3.93	9.34	2.3	0.46	3.43	0.1	0.03
<i>Production ('000 Tonnes)</i>							
2016-17	7.7	23.45	5.62	0.88	6.22	0.35	0.46
2017-18	7.74	24.65	5.62	0.89	6.26	0.19	0.4
2018-19	7.74	23.69	5.73	0.89	6.26	0.18	0.33
2019-20	6.68	14.43	5.75	0.9	6.28	0.18	0.33
2020-21	7.74	12.88	5.83	0.9	6.29	0.12	0.06
<i>Productivity (Kg/Hectare)</i>							
2016-17	1969	1344	2498	1913	1840	1078	2300
2017-18	1970	1386	2498	1928	1836	1079	2031
2018-19	1970	1398	2502	1931	1830	1079	2115
2019-20	1970	1273	2502	1935	1831	1082	2230
2020-21	1970	1379	2535	1935	1834	1154	2071

4), while wheat require an optimum soil pH of 6.4 to grow. Topography of this region ranges from fertile plains of Brahmaputra and Barak valley in Assam, Nagaland, Meghalaya, Mizoram, and Manipur while lower Himalayan Mountain ranges in Arunachal Pradesh and Sikkim. Due to undulating topography, it becomes difficult to manage wheat crop operations from sowing to harvesting.

Production technique in north-east India: Subsistence nature of farming prevails in north-eastern plains of India. *Jhum* cultivation or shifting cultivation prevails in hilly areas of north-east. *Bari*-system or homestead system of farming is the most important integration of farming system in Assam. Farmers of Brahmaputra and Barak valleys are mostly confined to cultivation of rice in *kharif* season and mustard/potato/vegetables in *rabi* season. The package of practices for the wheat crop in the valley is hardly followed due to the acceptability of farmers to age old crop growing practices. Non-availability of companies or public infrastructure such as fertilizer plants, pesticide industry, tractor and modern equipment supplying agencies and seed industry are

lacking in this region of the country. An oldest fertilizer plant at Namrup district of Assam is struggling for existence. Agriculture especially wheat crop cultivation in other parts of India is highly organized and commercial whereas North East India is not following the trend and struggling to attain required yield and productivity. Seed availability is poor in the region and farmers depends on neighbouring states for quality seed of newly released climate resilient, disease resistant and high-yielding varieties. Development of highly productive varieties is not at the pace the climate is changing in the North East and it is a biggest challenge as the varieties/genotypes are not identified based on area specific difficulties.

Humid climate of north-east India is prone to outbreak of various pests and diseases as seen in different crops as compared to other semi-arid or dry states. Not only pest and disease are a problem in humid climate but also, the weed problem and the management are related to various aspects from financial to the availability of pesticide. Non-availability of sufficient water for irrigation during *rabi* season is another constraint.

Water component in any crop system is vital therefore inadequate availability of water leads to failure of crop. In *rabi* season, where water is scarce even in the north-east India, so production of wheat without irrigation is very difficult and sometimes it leads to total failure of the crop if there is no irrigation or uneven distribution of rainfall as the most critical stage of water requirement at crown root initiation.

Post harvest, storage and marketing: Total number of flour mills in north-east is very less compared to other states or being closed due to certain reasons like inadequate availability of wheat produce and un-certainty of wheat production in north-east India. Transportation is also a problem due to the adverse terrain and under-development of roads and infrastructures in the north-east India. Lack of railway network in the hills of north-east India creates downfall to the economy from wheat produce. Cold storage is very important in case of storing food grains, but about 15 to 20% of food grains get wasted every year due to lack of proper storage facilities in north-east India and it causes the loss of millions of rupees. Marketing is a very important from an economic point of view. In north-east India, there is still many middlemen and other limitations like lack of storage or roadways in the rural areas of plains and hills, mostly illiterate farmers are forced to sell their produce to middlemen due to their low bargaining power and not directly connected with consumers, price fluctuation, and lack of market information makes the whole situation worst.

Remedies to wheat production in the North-Eastern India

The wheat cultivation in north-eastern region is very challenging because of many constraints. The list of some important constraints and their remedies is enlisted in Table 2. The soil acidity, climatic conditions and market place are three main constraints those affect wheat cultivation in north-eastern region. Therefore, to manage

Table 2. List of constraints and their remedies

Constraints	Remedies
Climate in north-east India	Need climate adaptive varieties
Soils of north-east India	Apply lime (@ 200-500 kg) in each year or alternate years
Topography of north-east India	Farmers should use contour farming system
Farming system and nature of the farmers	NGOs may be encouraged and they might help to uplift the standard and could improve the extension system of poor farmers in northeast India through PPP (Public-private partnership)
Use of seed as inputs	Upliftment and up gradation of seed industry or establishment of seed industry in the region nearby for development of climate adaptive wheat varieties
Limited number of new varieties or high-yielding wheat varieties	Development of early duration variety that mature at least 15 days before pre-monsoon shower. Encouraging the breeders for such varieties
Pests, diseases, weed and water management	The crop should be planted timely to escape the pest or disease incidence. Proper drainage and irrigating at the critical stages are important
Food processing and handling	Proper infrastructure, communication network and storage are the key to immense increase of profit and dramatic decrease of food waste
Marketing	For creation of more man-power in marketing system, formation of co-operative society and to sell their produce is necessary



the soil conditions, farmers need to apply lime in the field as per recommended dose. To rectify the second cultivation problem, breeders and biological scientist should be focused, to breed hardy, early maturing, tolerant to acidic soil and having other responsive

trait those are well fitted in north-eastern India climatic situations. The third and most prominent problem is market problem, as the north-eastern India people traditionally consume and cultivate rice crop therefore the market is fully captured by rice dealers and private companies who export rice outside the counties. Government should step forward and make the policy to give the appreciation to the wheat cultivating farmers. As soon as possible working plan for the prevention of these problems should be created and everyone should be encouraged for the better service of the govt. agencies/department of agriculture. It could improve the living standard of the poor Indian farmers in the region of such high tension and could enhance the chance of better education, living standard and income, and overall development of the nation as a whole.

SUMMARY

In Northeast India, even there are various problems such as climate, soil and market are the related to production and productivity of wheat, but the prevention of these problems is a big challenge for the farmers, extension workers, breeders and the agricultural department of the state or center. The breeders and agricultural scientists should step forward to breed the climate adaptive wheat varieties and government should make various policies to appreciate the farmer to apply the lime to the soil and facilitates the market system to sell the farmers produce.

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Water

- Even though households are relatively low consumers of water, population growth and expanded water use have outweighed the effect of water saving technology and behavior.
- Less than 3% of the world's water is fresh (drinkable), of which 2.5% is frozen in the Antarctica, Arctic and glaciers. Humanity must therefore rely on 0.5% for all of man's ecosystem's and fresh water needs.
- Man is polluting water faster than nature can recycle and purify water in rivers and lakes. More than one billion people still do not have access to fresh water.
- Excessive use of water contributes to the global water stress. Water is free from nature but the infrastructure needed to deliver it is expensive.

See more at: http://www.unep.org/wed/theme_water.asp#sthash.ki5vg3IB.dpuf
Courtesy: United Nations Environment Programme website - <http://www.unep.org/wed>