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# Amrit Dhara in Amrit Kaal

## Exploring the Possibility of Organic and Climate Resilient Agriculture Revolution in the North East

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*India will only gain if the North East gains. Yeh Bharat ke bhagya ko badalne ki ashta lakshmi hai.*

*Prime Minister Narendra Modi*

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## 1. Bharat in the Amrit Kaal:

1.1 Bharat, the fifth largest economy in the world, galloped at 7.8 per cent, its quickest pace in a year, in the April-June quarter of 2023-24. The Hon'ble Prime Minister in his address to the US Congress in Capitol Hill had famously said,

> *"When I first visited the US as a Prime Minister, India was the 10th largest economy in the world. Today, India is the 5th largest, and we will be the third largest soon."* [1]

He further added that India is growing faster and when India grows the world grows. In the World's Ocean of economic growth and prosperity, the Indian ship has set sail with its sails wide open. It doesn't matter if the waters are treacherous or inclement, it is poised to travel its course.

1.2 India has embarked on a path of economic excellence and growth in its Amrit Kaal. We entered this phase on the 75th year of its independence and on the 100th year of its independence, we are striving to metamorphose into a world power and a developed nation. Amrit Kaal is therefore the period commencing from India's 75th year of Independence to its 100th year of Independence in which period the Nation aspires to catapult itself into the league of developed nations and achieve its Sustainable Development Goals. With strong policy initiatives, the economy of Bharat has displayed appreciable resilience in the wake of exogenous shocks and black swan events in recent years. It has grown at a healthy rate of growth in the range of 6-8 per cent in recent times which is substantially higher than most countries.

[1] https://www.cnbctv18.com/world/india-is-fifth-largest-economy-will-be-third-largest-soon-says-pm-modi-at-us-congress-17016601.html

1.2 It wouldn't be out of place to say that at the current rate of growth of GDP of 6-8 per cent, the milestones in the size of the economy, namely, USD 5 trillion by 2025-26, USD 7 trillion by 2030, and USD 20 trillion by 2047, the hundredth year of India's independence, are positively achievable. By 2047 the per capita income has the potential to be on the right side of $10,000, a five-time jump from present levels to completely transform the present society. Naturally, a higher rate of growth with a stable exchange rate would hasten the milestones.

1.3 The Amrit Kaal is also the period when the Nation will try to achieve all the goals set in the Sustainable Development Goals (SDGs). SDGs are a set of 17 Goals adopted by 193 member countries of the United Nations at the historic Summit held in New York on 25 September 2015. The SDGs are expected to stimulate developmental actions in areas of critical importance such as ending poverty and hunger, providing healthy lives and quality education, achieving gender equality, providing modern energy, promoting sustainable economic growth, reducing inequality, etc. till the year 2030.

1.4 It is widely acknowledged that the success of the 2030 Agenda globally will depend, in a significant way, on the progress India makes on the SDGs front. It is not only because of the sheer size of the population but also because of the strength and resilience of the Indian economy. Further, India has also emerged as a global leader on the international climate action agenda.

1.5 Bharat, with a glorious yet tumultuous recorded history of over 5000 years is undoubtedly in earnest pursuit of reclaiming its lost glory. It's pertinent to mention that the Union Budget of 2023 aptly lists out the seven priorities that will form the foundation of this pursuit. They are thoughtfully referred to as the Saptarishis, namely, Inclusive development, Reaching the last mile, Infrastructure and investment, Unleashing the potential, Green growth, Youth Power, and Financial sector. Although each of these guiding principles is meant for the whole country, for the North Eastern region this is of particular importance.

## 2. Agriculture as the hub and spoke of the wheel?

2.1 Although agriculture contributes to around 18 per cent of GDP, it employs more than half of the working population of the country. Its forward and backward linkages with the industry and services sectors not only make it a catalyst but an important component of the growth of the other sectors.

2.2 Besides ensuring food security for the most populous country, it is also a cushion of food security for the whole world, as seen during the supply chain disruptions during the Russo-Ukraine war.

2.3 Alternatively, any adverse climatic impact on agriculture threatens the entire gamut of economic growth and prosperity. It triggers high inflation, which permeates other sectors. This triggers a range of fiscal and monetary policies that, in the process of curbing inflation and erosion of wealth, have the side effects of arresting growth and consequently development until agriculture revives again…

2.4 Agriculture's importance has exponentially increased in recent years due to the adverse effects of climate change felt across the world in general, and India in particular. Devastating floods, debilitating heat waves, and uncertain rainfall have exposed agriculture to the ravages of nature. Standing crops have been destroyed, farmers have been impoverished, and institutional financial setups have been strained in the process.

2.5 Besides, an area that has been overlooked in recent times has been the epidemic of chronic diseases mostly triggered by pesticide and fertilizer-laced food and dramatically changing food habits. It's the huge rise in chronic and deadly diseases on the Indian subcontinent that is eating away not only the productive life of citizens but also encumbering people with unbearable financial burdens. It's a silent menace so it cannot be easily correlated and hence goes unaddressed. Some experts have attributed it to the proliferation of pesticides, insecticides, fertilizers, etc. in high-yielding food grains, fruits, vegetables, preservatives, etc. Additionally, there has been weaning away from the traditional varieties of fruits and vegetables towards more hybrid varieties, which rely on excess chemical fertilizers and water. This has led to the depletion of groundwater and traces of chemicals in food eaten by people leading to various illnesses. It may be imperative to revive some of the traditional systems of agriculture that have stood the test of time and be equipped with new technologies to address concerns about diseases and climate vulnerabilities.

2.6 In this regard, the North East of Bharat comprising eight States, named aptly as the Astha Laxmi by the Hon'ble Prime Minister can form the backbone of India's organic agriculture revival which would focus on pesticide, fertilizer-free crops which are climate resilient. North East India is a pocket in India that is well endowed with natural resources like water, land, nutrient-rich soil, manpower, and traditional knowledge. It may be worth the while to develop the area to be a force in the realm of organic farming and traditional seed

conservation. Some of the seed manufacturing hubs have developed seeds that are climate resilient. They can be experimented with in other parts of India and can be developed from the point of view of trade linkages. The North East boasts of hundreds of varieties of rice, banana, green herbs, etc. which are a mainstay in the culinary habits of the people of the reason. It may be time to explore and popularize them across the country to achieve food security in an organic way. The following integral food ingredient is a good example of traditional knowledge of crops cultivated and created in an organic way.

*The Assamese Khar*

https://www.feamag.com/khar-a-distinctive-assamese-stew/

## The Assamese Khar

*Kalakhar or Khar is one of the unique things that truly signify Assamese Cuisine. Kharkhowa Axomiya, as we fondly call ourselves, means Khar eating Assamese. Khar is produced from the ashes of burnt banana stems or banana peels of aathiya kol (M. Balbisiana).The procedure to make kharKolakhar making process is very traditional. The first step of making khar involves collection of a matured and healthy tree of aathiya kol. It is then cut into pieces and sun dried for 10-15 days. After complete drying, the pieces were burned into ashes and sieved.After collecting the ashes, pure water is filtered through it. The modified water is called khar. Health Benefits of kolakharKhar is used as food additive in Assamese cuisine widely. Various vegetables are cooked using khar which marks the first dish of an Assamese thali. It is known to cleanse your stomach curing digestive disorders. Use of kolakhar as soaps and detergent for washing clothes and hair is a well-known practice in villages. Kolalhar is traditionally used by farmers to kill leaches and cure as well as prevent certain cattle diseases. Kalakhar or Khar is one of the unique things that truly signify Assamese Cuisine. Kharkhowa Axomiya, as we fondly call ourselves, means Khar eating Assamese. Khar is produced from the ashes of burnt banana stems or banana peels of aathiya kol (M. Balbisiana). The procedure to make kharKolakhar making process is very traditional. The first step of making khar involves collection of a matured and healthy tree of aathiya kol.It is then cut into pieces and sun dried for 10-15 days. After complete drying, the pieces were burned into ashes and sieved. After collecting the ashes, pure water is filtered through it. The modified water is called khar.Health Benefits of kolakharKhar is used as food additive in Assamese cuisine widely. Various vegetables are cooked using khar which marks the first dish of an Assamese thali .It is known to cleanse your stomach curing digestive disorders. Use of kolakhar as soaps and detergent for washing clothes and hair is a well-known practice in villages. Kolalhar is traditionally used by farmers to kill leaches and cure as well as prevent certain cattle diseases.*

*There is an Assamese saying that goes,*

*তিনিশ ষাঠীজোপা ৰুবা কল,*
*মাহেকে পষেকে চিকুনাবা তল ।*
*পাত পছলা লাভত পাবা,*
*লংকাৰ বনিজ ঘৰতে পাবা ।।*

*which means, Plant 360 banana trees and nurture them at every fortnight: You will get the whole chest full of gold at home along with banana leaves and posola for free.*[2]

[2] https://dpuspanjalee.medium.com/kolakhar-saga-of-well-being-health-benefits-of-banana-trees-28cae9a8e057

## 3. India an agrarian power:

3.1 Agriculture, together with its other sectors, constitutes the primary means of sustenance for the population of India. A significant proportion, namely 70 per cent, of rural families continue to rely predominantly on agriculture as their primary source of livelihood. Moreover, a substantial majority, accounting for 82 per cent, of farmers fall into the category of small and marginal farmers[3]. Agriculture's GDP contribution is declining. The second advance projections of national income—2022-23—show that agricultural and allied sectors' proportion of GDP and growth have decreased in the previous 2-3 years. Agriculture and related industries' GVA was 20.1% in 2020-21, 19% in 2021-22, and 18.3% in 2022-23, according to MoSPI forecasts. India's foodgrains production touched a record 315.7 million tonnes in 2021-22 despite climate change challenges says the Economic Survey 2022-23.

3.2 India holds the distinction of being the foremost worldwide producer, consumer, and importer of pulses, accounting for around 25% of global output, 27% of world consumption, and 14% of imports in this sector. In the fiscal year 2017-2018, India achieved an annual milk output of 165 million metric tonnes (MT), solidifying its position as the leading global producer of milk. Furthermore, India holds the distinction of being the greatest producer of jute and pulses, while also having the largest cattle population in the world. India is recognized as the second-largest global producer of rice, wheat, sugarcane, cotton, and groundnuts. Additionally, it has the second-largest position in fruit and vegetable production, contributing to 10.9% and 8.6% of the world's fruit and vegetable output, respectively.

3.3 Nevertheless, India continues to face several pressing issues. The contribution of agriculture to India's Gross Domestic Product (GDP) has exhibited a consistent downward trend from 1951 to 2023, as the country's economy has undergone diversification and expansion. Despite making significant progress in reaching food sufficiency in production, India continues to face the uncertainty of the seasonal monsoon and the adverse effects of climate change which threatens to disrupt agricultural production.

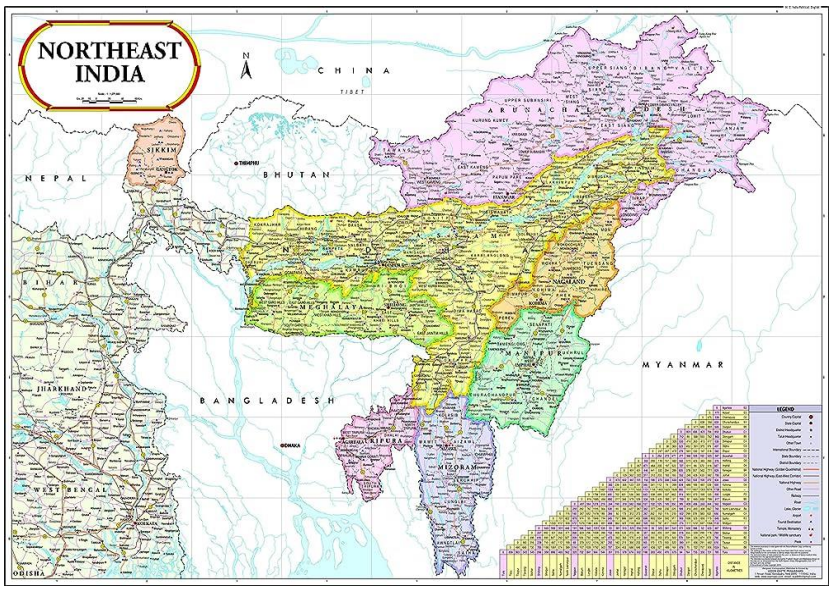
3.4 Although India has attained self-sufficiency in grain production through its agricultural practices, it is important to note that these practices are resource-intensive, primarily focused on cereal crops, and exhibit regional biases. The use of significant resources in Indian agriculture has given rise to substantial concerns over sustainability as well. The escalating strain on the nation's water supplies necessitates a comprehensive reassessment and

[3] https://www.fao.org/india/fao-in-india/india-at-a-glance

reconsideration of policy. The country's agricultural sector is significantly threatened by desertification and land degradation.

## 4. Importance of the North East in the revival of organic agriculture:

4.1 The North East India, attached to the mainland, delicately by a narrow piece of land, imaginatively referred to as the Chicken's neck has lagged behind in key statistics in comparison to its brother and sister states. Therefore, the Saptarishi guiding principles are even more important, for the Noth East, for ensuring a developed status for the nation at the end of the Amrit kaal.




The Hon'ble Prime Minister has echoed this vision in several speeches when he clearly stated that the development of North East India is crucial for achieving this goal. North East India will not only be required to galvanize itself into a higher rate of growth and development but will also play an essential role in the country's growth.

## 5. An overview of the North Eastern Region:

5.1 The North East region of India comprises eight states – Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura – each with its own distinct history and identity. The region shares its borders with Bhutan, China, Myanmar, and Bangladesh and has been one of

the most sensitive regions in India. Since 1947, the history of this region has been marred with insurgency and under development.[4]

5.2 The North Eastern Region, or NER as it is commonly referred to, occupies an area of 2.6 lakh sq. km, or around 8% of India's total land area, and is home to 3.78% of India's population. Each state has a border with at least one of the five countries to the east of the country, making this region a crucial gateway to Southeast Asia.

5.3 The Northeastern States are economically significant primarily on account of two factors: first, the region's strategic location as a link between India and the large Southeast Asian markets, and second, the presence of powerful market catalyzing factors like social capital (diversity, cultural richness), physical capital (potential energy supply hubs), human capital (cheap, skilled labor), and natural capital (minerals, forests).

5.4 In the region, 70% of the population depends upon agriculture as a source of livelihood. Compared to 54.4 % throughout India, agricultural land including fallow land is 22.20% [ranging between 37.43% in Assam and 4.40% in Arunachal]. Contrary to India's 31.65% and 26.55%, respectively, the majority of the workforce is made up of cultivators (41.61%) and agricultural laborers (13.7%). Almost everyone owns the land. There are 78.92% marginal and small farmers[5]. The allocation of land is mostly equitable and founded on the idea of communal life and sharing.

Jhum cultivation in Nagaland

[4] https://pib.gov.in/FeaturesDeatils.aspx?NoteId=151186&ModuleId%20=%202, A New Era of Peace and Prosperity in the North East, 13 Nov 2022

[5] Agricultural backwardness analysis of the North-East India: A concern for National development. http://journalcra.com/article/agricultural-backwardness-analysis-north-east-india-cause-concern-national-development

5.5 According to NITI Aayog, 95 per cent of India's trade with its East and Southeast Asian neighbours is in products originating from regions other than NER. This requires attention. Since the NER has adequate soil and other agro-climatic conditions, it has enormous potential in the agricultural trade. According to estimates, there is a sufficient marketable excess of various agricultural goods to support exports. For example, the marketable surplus for pineapple (95 per cent), jackfruit (83 per cent), cabbage (74 per cent), orange (85 per cent), and banana (79 per cent) is high enough for exports. Some of the commodities that are already officially exported through various LCSs along the NER are rice and maize to Bhutan; ginger, orange, and betel nut to Bangladesh; and wheat flour, dry chilli, and dry grapes to Myanmar[6].

5.6 The northeast area is well poised for investment and economic expansion because of its abundance of natural resources, including agro-horticultural and forest resources, hydropower potential, oil and natural gas, and mineral reserves.

5.7 The Central government has identified three core objectives for the North East Region:

(a) to preserve its dialects, languages, dance, music, food, and culture and to create attraction for it all across India;
(b) to end all disputes in the North East and to make it a peaceful region,
(c) to make the North East a developed region and bring it on par with the rest of India

5.8 In this regard, various border dispute settlement agreements and peace accords have been signed with relevant stakeholders. Further, with the help of the armed forces, satellite camps of insurgent groups operating from foreign soil have also been neutralized at scale.

5.9 When policy and capacity are aligned, it is time to work on the comparative advantage of the region, organic agriculture, unique product base, and traditional seed hub, to not only economically develop the region but also to forge a strong trade linkage domestically and internationally.

## 6. Making Northeast the Economic Hub of India:

6.1 Under the Act East Policy, the government wants to develop the Northeast and make it an economic powerhouse for Southeast Asia. Under 10% gross financial assistance from 54 Central Ministries, North East

[6] Special Report no. 147 (2021), Enhancing Trade & Development in India's Northeast, Observer Research Foundation.

development expenditures grew 110% from Rs 36,108 crore in 2014-15 to Rs 76,040 crore in 2022-23. The Union Budget 2022-23 introduced PM-DevINE, a Rs 1,500 crore initiative.

6.2 The 'Act East Policy' announced in November 2014 is the upgrade of the 'Look East Policy' which was promulgated in 1992. The Objective of ''Act East Policy" is to promote economic cooperation, and cultural ties and develop strategic relationships with countries in the Asia-Pacific region through continuous engagement at bilateral, regional, and multilateral levels thereby providing enhanced connectivity to the States of North Eastern Region with other countries in our neighbourhood. The Act East policy is playing an instrumental role in bringing a paradigm shift and marking a significant change in the potential role of the North-East region.

## 7. Biggest challenge to agriculture and mankind:

*"The greatest threat to our planet is the belief that someone else will save it."*

*— Robert Swan*

7.1 As the Preamble to the G20 Leaders declaration states,

> *We are One Earth, One Family, and we share One Future.*
>
> *We, the Leaders of the G20, met in New Delhi on 9-10 September 2023, under the theme 'Vasudhaiva Kutumbakam'. We meet at a defining moment in history where the decisions we make now will determine the future of our people and our planet. It is with the philosophy of living in harmony with our surrounding ecosystem that we commit to concrete actions to address global challenges.*

The course of action for protecting and preserving the human race and the planet Earth would start from a recognition of the threat to its nurturing climate which has come under intense stress and upheavals due to human action. The world leaders have pledged to reverse the climate change in a decisive way. To put it in perspective, the adverse effects of climate change are listed below.

7.2 Some of the key pointers are,[7]

(i) Extreme Heat: Unusual and unprecedented spells of hot weather are expected to occur far more frequently and cover much larger areas. Under 4°C warming, the west coast and southern India are projected to

[7] https://www.worldbank.org/en/news/feature/2013/06/19/india-climate-change-impacts

shift to new, high-temperature climatic regimes with significant impacts on agriculture.

(ii) Changing Rainfall Patterns: A decline in monsoon rainfall since the 1950s has already been observed. The frequency of heavy rainfall events has also increased. A 2°C rise in the world's average temperatures will make India's summer monsoon highly unpredictable. At 4°C warming, an extremely wet monsoon that currently has a chance of occurring only once in 100 years is projected to occur every 10 years by the end of the century. An abrupt change in the monsoon could precipitate a major crisis, triggering more frequent droughts as well as greater flooding in large parts of India. India's northwest coast to the south-eastern coastal region could see higher than average rainfall. Dry years are expected to be drier and wet years wetter.

(iii) Droughts: Droughts are expected to be more frequent in some areas, especially in north-western India, Jharkhand, Orissa and Chhattisgarh. Crop yields are expected to fall significantly because of extreme heat by the 2040s.

(iv) Groundwater: More than 60% of India's agriculture is rain-fed, making the country highly dependent on groundwater. Even without climate change, 15% of India's groundwater resources are overexploited.

(v) Glacier Melt**:** The Indus and Brahmaputra are expected to see increased flows in spring when the snows melt, with flows reducing subsequently in late spring and summer. Alterations in the flows of the Indus, Ganges, and Brahmaputra rivers could significantly impact irrigation, affecting the amount of food that can be produced in their basins as well as the livelihoods of millions of people (209 million in the Indus basin, 478 million in the Ganges basin, and 62 million in the Brahmaputra basin in the year 2005).

(vi) Sea level rise: Sea-level rise and storm surges would lead to saltwater intrusion in the coastal areas, impacting agriculture, degrading groundwater quality, contaminating drinking water, and possibly causing a rise in diarrhoea cases and cholera outbreaks, as the cholera bacterium survives longer in saline water.

(vii) Agriculture and food security: Even without climate change, world food prices are expected to increase due to growing populations and rising incomes, as well as a greater demand for biofuels. Rice: While overall rice yields have increased, rising temperatures with lower rainfall at the end of the growing season have caused a significant loss in India's rice

production. Without climate change, average rice yields could have been almost 6% higher (75 million tons in absolute terms). Wheat: Recent studies shows that wheat yields peaked in India and Bangladesh around 2001 and have not increased since despite increasing fertilizer applications. Observations show that extremely high temperatures in northern India – above 34°C – have had a substantial negative effect on wheat yields, and rising temperatures can only aggravate the situation.

(viii) There are other areas of concern pertaining to energy security, water security, and health.

## 8. Estimated losses from Climate change:

8.1 India faced significant economic loss due to flood, drought and heatwave-related disasters in 2022.[8] A new report published by World Meteorological Organisation said India lost USD 4.2 billion due to disasters relating to floods followed by drought and heatwaves. The other Asian countries that faced significant losses were Pakistan and China. Much of the cost was attributable to agricultural losses.

8.2 According to the report 'The State of Climate in Asia 2022', India's lower course of the Ganges and Brahmaputra basins had one of the region's largest precipitation deficits, triggering drought-like conditions. These basins support millions of people's livelihoods through agrarian activities in India as well as Bangladesh. South Asia witnessed 12.5 million internal displacements due to disasters in 2022, with floods triggering 90% of the movements in the region.[9]

8.3 As per a study by the UN Office for Disaster Risk Reduction India suffered economic losses of $80 billion from 1998 to 2017[10].

## 9. Harnessing Agricultural Potential in North Eastern Region of India:

9.1 Background of Indian Agriculture:

(i) Indian farms used to be little parcels of land covered with trees and shielded from the wind. For millennia, farmers used a variety of organic husbandry techniques, crop rotation, and extended periods of field

[8] https://www.newindianexpress.com/nation/2023/jul/27/climate-change-induced-substantial-economic-losses-for-india-in-2022.
[9] https://www.thehindu.com/news/national/natural-disasters-caused-25-million-internal-displacements-in-india-in-2022-report-says/article66865269.ece
[10] https://timesofindia.indiatimes.com/india/natural-disasters-cost-india-80-billion-in-20-years-un-report/articleshow/66156074.cms

abandonment to help the soil keep its nutrients. Although they preserved the soil's balance and reduced the demand on the land, these methods were viewed as being less productive.

(ii) During the 1960s-era "Green Revolution," India's agriculture was transformed into a cutting-edge industrial system via the application of technology, including high-yielding variety (HYV) seeds, mechanised farm equipment, irrigation systems, pesticides, and fertilisers. Green Revolution initiative started by Norman Borlaug, which used agricultural science and technology to boost agricultural output in the developing countries with HYV seeds, and was primarily directed by agricultural scientist M. S. Swaminathan in India.

(iii) Although the Green Revolution saw the introduction of high-yielding monohybrid crops, the main issue with indigenous seeds was not that they weren't high-yielding, but rather their innate inability to survive the chemical fertilisers utilised[11]. However, in order to increase yields while utilising chemical fertilisers and heavy irrigation, new varieties were developed. Following the Green Revolution, there was a significant uptick in the usage of chemical fertilisers as well as an increase in their consumption for crop production. To achieve high yields, artificial chemical fertilizers are overused, which degrades the soil physically and chemically by changing its natural microflora and elevating its alkalinity and salt levels. The excessive usage of groundwater for irrigation has led to depleted water tables across the country.

(iv) The newly introduced high-yielding seeds had a very narrow genetic base as compared to the indigenous species. In comparison to the native species, the newly introduced high-yielding seeds had a relatively limited genetic background. The farmers removed a number of native species from cultivation since they only cultivated monohybrid crops there. A recurring drop in yields and quality of food grains produced has been brought due to the instability of acquired features in the modern varieties, such as high-yielding rice types, hybrids, and genetically modified rice, as well as the environmental degradation linked to their production. Even while the yields were originally great, they gradually decreased and, after a few years of their introduction, they disappeared from cultivation.

[11] The impact of Green Revolution on indigenous crops of India, 2019, Journal of food ethics. https://doi.org/10.1186/s42779-019-0011-9

(v) The following list summarises the main ecological and socioeconomic effects of the Green Revolution:

- The extinction of native landraces in our nation,
- The depletion of soil nutrients, which renders the soil unproductive,
- Excessive pesticide usage results in increased pesticide residues in food and the environment,
- Farmers switch to unsustainable farming methods to boost production,
- Rising suicide rates among farmers,
- Small farmers surrendered their property to huge commercial farmers because they were unable to pay their debts and rising farming costs, and
- Farmers who couldn't handle the food inflation and economic turmoil turned to other occupations and abandoned farming.

## 10. The 'whys' and 'hows' of Organic Farming as a panacea:

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*Organic farming is based on "Nature can provide for everyone's needs but not for greed"*

*Mahatma Gandhi*

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10.1 Organic farming implies- "Nurturing the Earth's bounty naturally for a healthier, sustainable tomorrow."

10.2 The fundamental objective of organic farming is to cultivate the land and raise crops in a way that maintains the soil's life and health by using organic wastes (crop, animal, and farm wastes, aquatic wastes), other biological materials, and helpful microbes (bio-fertilizers) to release nutrients to crops for increased sustainable production in a pollution-free environment.

10.3 As per the definition of the United States Department of Agriculture (USDA)- "Organic farming is a system which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives etc.) and to the maximum extent feasible rely upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection".

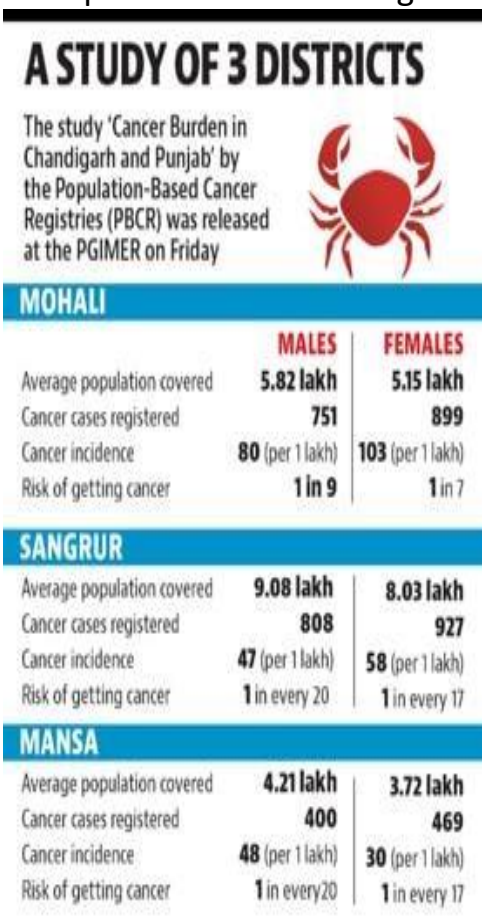
10.4 FAO suggested that "Organic agriculture is a unique production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity, and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs".

## 11. Has the time of Organic farming arrived?

*"No force on earth can stop an idea whose time has come"*

*— Victor Hugo*

11.1 In the last 50 years, the use of a heavy amount of fertilizers and pesticides has led to the production of food grain reaching a peak, and the law of diminishing returns has come into play, necessitating a need to apply more input (fertilizer and pesticides) to get a small rise in production. This has given rise to second-generation problems, some which have serious consequences. It has been argued by experts of that certain regions of Punjab have shown high intensity of cancer cases (cancer belt of country) and the Endosulfan story of cashew plantations area in Kerala (proving finding of Rachel Carson's Silent Spring was published in 1962). [12]




[12] https://www.hindustantimes.com/punjab/cancer-incidence-higher-in-punjab-s-urban-areas-than-rural-says-report/story-WehBhfNEZsJ4uc8utI2wMP.html

### Cashew Plantations of Padre Village[13]

In Kasargod's Padre Village, residents reported that aerial spraying of Endosulfan in the cashew plantations began as early as 1976. A few years later, there were reports of calves being born with deformed limbs. Frogs, fishes, bee colonies, fireflies and jackals vanished from these areas. Many local children and a large number of people below the age of 25 were suffering from severe disorders. Families who lived along the Kodenkiri stream and its smaller tributaries endured the most. Protests and efforts mobilized by residents helped throw light on these troubles. However, it took many years for officials to fully address the dangers of the pesticide.

### The Mango Orchards of Muthalamada Panchayat

Additionally, in Palakkad's Muthalamada Panchayat, Endosulfan was used extensively in mango farms. Here too there were reports of animals giving birth to offspring with deformities, and residents witnessed the death of monkeys, reptiles and thousands of butterflies each day. A 2014 survey identified over 150 Endosulfan victims in Muthalamada, of which 40% suffer from chronic conditions. Even by May 2018, victims in Muthalamada who had been promised benefits, scientific studies and full-scale surveys to properly assess conditions in the area reported neglect.

11.2 The utilisation of pesticides has experienced a notable surge, leading to India becoming as one of the primary pesticide manufacturers on the Asian continent (Narayanan et al., 2016). While it is true that the use of pesticides has resulted in substantial economic benefits (Gollin et al., 2018), research indicates that a considerable quantity of these chemicals is deemed superfluous in both developed and developing nations. For example, Choudhary et al. (2018) observed that the occurrence of pesticides in freshwater is a significant issue, since the discovered concentrations beyond the established thresholds for pesticide presence. Despite the fact that the average quantity of pesticide usage in India is comparatively smaller than that of several other nations, the presence of elevated levels of pesticide residue is a significant concern. This phenomenon results in significant water contamination and soil degradation. Another significant concern pertains to pest infestations, which occur as a consequence of an ecological disruption in the pest population dynamics. The current imbalance between predator and

[13] https://r.search.yahoo.com/_ylt=Awr1QHlx3v5kOY0ZMwy7HAx.;_ylu=Y29sbwNzZzMEcG9zAzEEdnRpZAMEc2VjA3Ny/RV=2/RE=1694453489/RO=10/RU=https%3a%2f%2fborgenproject.org%2fthe-endosulfan-tragedy-in-kerala%2f/RK=2/RS=5J1sFR9aF2xArSY9UdFYDgsW0ak-

prey bugs, resulting from heightened pesticide use, has led to an overabundance of a particular pest species that poses a threat to specific crops. Consequently, there is a disparity in the production of such crops. In order to effectively combat the pests that are inflicting damage upon these crops, it is imperative to employ more potent pesticides or explore novel pesticide formulations. Furthermore, this phenomenon has resulted in the disturbance of the food chain (Narayanan et al., 2016).[14]

11.3 India uses the most freshwater, and 91% of it is used in agriculture (Kayatz et al., 2019). Irrigated agriculture is causing water stress in several places in India (Davis et al., 2018). Water-intensive crops were developed during the Green Revolution. Cereals account for roughly 50% of India's dietary water footprint (Kayatz et al., 2019). These crops demand a lot of water due to their shorter crop cycle. Rice requires floodwater for growth (International Rice Research Institute). Canal networks and irrigation pumps draw water from the groundwater table for water-intensive crops like sugarcane and rice (Taylor, 2019). Punjab is one of India's most water-depleted regions since it grows wheat and rice (Alisjahbana, 2020). In the coming years, Punjab may face water shortages (Kumar et al., 2018). Diminishing water resources and soil toxicity polluted subsurface water.[15]

11.4 In an ideal scenario, insecticides and herbicides are only fatal to the intended target species; humans and other species are safe. However, this concept is not consistently adhered to, and the indiscriminate use of these chemicals threatens both human life and ecosystem health. In order to determine whether we are not making a mistake by relying on off-farm inputs—which are a recycling system of nature—we must look back in history. Because crop production is a recycling system of nature, by putting too much off-farm input we are making it increasingly fragile day by day.[16]

11.5 The agricultural cycle repeated to enhance crop output and prevent crop failure, depleting soil nutrients (Srivastava et al., 2020). Intensive cropping techniques also depleted soil organic matter since crop residues and organic matter were not returned (Singh and Benbi, 2016). As soil quality declined, producers added fertilisers to satisfy new seed needs (Chhabra, 2020). Pesticides and fertilisers increased soil heavy metals, including Cd, Pb, and As. Environmentally harmful weedicides and herbicides. After the green

[14] Lessons From the Aftermaths of Green Revolution on Food System and Health, Daisy A. John, Giridhara R. Babu
[15] Lessons From the Aftermaths of Green Revolution on Food System and Health, Daisy A. John, Giridhara R. Babu[2*]
[16] The major challenges & scope for sustainable agriculture development in India, ICAR https://sarr.co.in/2023/02/10/the-major-challenges-and-scope-for-sustainable-agriculture-development-in-india/

revolution, alkaline chemicals raised soil pH (Sharma and Singhvi, 2017). Monoculture (only wheat–rice agriculture) reduces organic carbon and migrates silt from the surface to the subsurface (Singh and Benbi, 2016). Toxic compounds in soil killed beneficial pathogens, which maintain soil fertility. Reduced soil fertility reduces yield. Tractors and mechanisation also impacted soil physicochemical qualities, affecting biological activity. In traditional approaches, soil heals from any stressor (Srivastava et al., 2020). Modern methods avoid this. A Haryana study identified waterlogging, salinity, soil erosion, groundwater table drop, and rise associated to brackish water and alkalinity, which could influence production and food security (Singh, 2000).

11.6 The green revolution destroyed about 1 lakh indigenous rice varieties in India (Prasad, 2016). Since the Green Revolution, indigenous rice, millet, lentils, etc. have been cultivated less. Consequently, hybrid crops grew quicker and were harvested more (Taylor, 2019). Figure 1 shows this. Wheat, soybean, and rice production is rising. Sorghum, millets, barley, and groundnuts are also grown less. Due to HYV seed availability and increased production area, several crops increased (Singh, 2019). Crop cultivation preferences altered for farmers. Moong, gram, tur, and other local pulses and oilseed crops like mustard and sesame were not grown as much. Traditional crops like millets thrive well in dry and semi-arid climates due to their low water needs. Due to a lack of high-yielding millets, farmers switched to rice and wheat (Srivastava et al., 2020).[17]

11.7 Organic farming is one of these sustainable, recyclable, and natural methods of agriculture. In the agriculture sector, it is the most practical and economical method for achieving sustainable development (IFOAM, 2010). The problem of multi-nutrient insufficiency and low organic content in our soil, which is limiting the production of important food crops at farmer fields can also be addressed by organic sources of nutrients.

## 12. Historical Background of Organic Farming in India:

12.1 In India, the notion of organic farming is not new. Traditional agricultural methods that are resource-efficient and kind to the environment have a long history in India. It was the Vedic period and the later vedic period when the first scientific approach to organic farming originated. The core of the Vedas is to live in harmony with Mother Nature emphasizing on sustainability. Several organic ingredients are briefly mentioned in our ancient literature, like the Rigveda, Ramayana, Mahabharata, Kautilya Arthashashtra, etc.

[17] ibid

**Bio Pesticides with Vedic formula**

Apart for receiving high and nutritive yield, organic farmers can't avoid the nutrient deficiency and pest attack while farming. In order to deal with it, they produce bio pesticide (using locally available medicinal herbs and cow urine) and bio fertilizers (Jeeamrutha, Amritjal, Panchagavya etc). This local method of producing bio pesticide and bio fertilizer has helped the community to use chemical free pesticide and fertilizer as well as save their money in buying the respective.

12.2 In fact, traditional farming methods that have been used for ages in innumerable villages and farming communities are the foundation of organic agriculture. Major milestones in the area of organic farming are presented in Table below-

**Table 1: History of Organic farming in India**

| Period | Historical perspective of organic farming in India |
|---|---|
| **Ancient** | The oldest practice 10000 years old, dating back to Neolithic age, practiced by ancient civilization like Mesopotamia, Hwang-Ho basin etc. |
| **Ramayana** | All dead things - rotting corpse or stinking garbage returned to earth are transformed into wholesome things that nourish life. Such is the alchemy of Mother Earth - as interpreted by C. Rajagopalachari |
| **Kautilya's Arthashatra** | Mentioned several manures like oil cake, excreta of animals |
| **Brihadsamhita** | Described how to choose manures for different crops and the methods of manuring. |
| **Rig Veda** | Mention of organic manure in Riga Veda 1, 161, 10, 2500–1500 BC, is Green Manure in Atharva Veda II 8.3, (1000 BC). In Sukra (IV, V, 94, 107–112) it is stated that to cause healthy growth, the plant should be nourished by dungs of goat, sheep, cow, water as well as meat. A reference of manure is also made in Vrksayurveda by Surpala (manuscript, oxford, No 324 B, Six, 107-164) |
| **Holy Quran** | At least one third of what you take out from soils must be returned to it implying recycling or post-harvest residue. |

Source: Bhattacharya and Chakraborty, 2005[18]

[18] Current status of organic farming in India and other Countries, Indian Journal of Fertilisers 1(9): 111–123.

12.3 Mahatma Gandhi advocated for organic farming more recently through his constructive campaigns in numerous Indian states. It was the fervent promotion, perhaps justified at the time, in the wake of severe scarcity, of the green revolution, that halted the organic farming project of the Gandhian movement. Evidence suggests that small farmers, particularly those in developing nations, are more likely to use agricultural techniques like crop rotation and mixed cropping, which are fundamental components of organic farming. They typically mix livestock raising with agriculture and use the manure to restore soil fertility.

## 13. Advantages of Organic Farming in India:

13.1 Further empirical data supports the notion that organic farming works better on small farms whereas conventional agriculture works better with vast holdings. According to research by Gupta and Verma (1997) comparing grain output using organic vs. conventional techniques, the benefits of organic rotation become less apparent as farm size grows. The study also revealed that organic farming was more successful and fruitful than conventional farming on a smaller scale. This is ideally suited for the land-holding system in India. But with Research and Development, it is possible to develop a more climate-resilient and high-yielding variety of organic seeds.

13.2 Alternatives to traditional high-input agriculture, such as agroecological practices, produce superior yields while protecting future generations' needs and preventing intergenerational conflict. The United Nations Food & Agriculture Organisation (FAO) has also supported them.

13.3 Natural farming is a kind of farming devoid of chemicals that relies on animals and locally accessible resources. Padma Shri Subhash Palekar made great efforts to popularise traditional cow-centric agricultural methods used in India. These methods include the use of natural inputs like cow dung, cow urine, jaggery, and pulse flour along with mulching techniques and symbiotic intercropping.

13.4 There are four essential elements to zero-budget natural farming (ZBNF), including Beejamrit (seed treatment), Acchadana (mulching), and Waaphasa (soil aeration/moisture). Beejamrit is made from the dung and urine of indigenous cows (no exotic or cross-bred cows, bulls, or buffaloes). Butter, cow milk, pepper powder, neem seed, and green chilies are all used as plant protection agents (Palekar, 2016).

13.5 ZBNF is a low-input, climate-resilient farming method that encourages farmers to utilize inexpensive, locally accessible inputs rather than synthetic

fertilizers and insecticides. Natural farming entails using only natural resources instead of synthetics and chemicals. It is assumed that it promotes the organic coexistence of crop plants and soil microorganisms. As a result, it is anticipated to have little or minimal negative impacts on the environment's and soil's health. In order to break the cycle of debt for helpless farmers, ZBNF vows to refrain from depending on loans and substantially decrease production expenses[19].

13.6 As part of a government initiative, a centrally sponsored scheme-Paramparagat Krishi Vikas Yojana (PKVY), the Indian government is encouraging natural farming under the name Bharatiya Prakritik Krishi Paddhati (BPKP). BPKP is a diversified farming system that combines crops, trees, and animals to make the best use of functional biodiversity. It promises to increase farmer income while also providing a wide range of additional advantages, such as restoring soil fertility and improving environmental health**.**

## 14. Can the North East region offer a road to sustainable agriculture?

14.1 Being bestowed with favourable endowments of soil, agro-climate, agro and forest biodiversity, wetlands, good rainfall, flora and fauna, the people of this region have evolved as traditional tribal communities or clans with unique socio-cultural moorings deeply embedded in the forests, hills, rivers and local biodiversity. The region has always been known for the pioneers of organic farming and embracing diversity in cultivated crops.

14.2 Most policy and outreach initiatives that were launched in the country and quickly disseminated have, in general, been delayed in reaching these far-off areas because of their distance from the mainland. Thus, during the years of the Green Revolution, the penetration and effect of chemical agriculture practises remained relatively lower here than in the plains. In the discussion of chemical-free, sustainable agriculture, this area does present a tremendous potential to engage in extensive organic farming.

14.3 The North Eastern Region (NER) of India is renowned for its naturally and organically produced goods, although these products have not yet realized their full potential. By closing the gaps preventing the natural, conventional, and organic products of the NER from taking advantage of the global market, the area might see tremendous economic growth and job creation. The NER has the potential to develop into a centre of agribusiness and may fetch a premium price both in local and international markets due to its closeness to

[19] National Academy of Agricultural Sciences, Annual Report 2019-20

Southeast Asian markets and its abundance of unique and diversified fruit, spice, and orchid species.[20]

14.4 The Ministry of Agriculture and Farmer Welfare, Government of India has launched a Central Sector Scheme called "Mission Organic Value Chain Development for North Eastern Region (MOVCD)" in January 2017 for implementation in the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura during 2017. Realizing the potential of organic farming in the NER, the Ministry has undertaken various initiatives to develop the North-East as an organic agricultural hub The plan aims to develop certified organic production in a value chain mode to connect farmers with consumers and to support the growth of the entire value chain beginning with inputs, seeds, certification, and the creation of facilities for collection, aggregation, processing, marketing, and brand-building initiatives. For organic farming and value addition, NER currently has 177 active farmer-producing organisations (FPOs). Under the Paramparagat Krishi Vikas Yojana (PKVY) programme of the Ministry of Agriculture and Farmers' Welfare, several organic clusters have been created for farmers who have self-certified under the Participatory Guarantee System of India (PGS-India).

14.5 Mostly untouched by the Green Revolution, most farmers in the NER utilize traditional and natural farming methods and little to no chemical inputs. The development of nature-based farming in NER has been aided by the region's mountainous topography, rich plains, agro and forest biodiversity, wetlands, abundant rainfall, and soil fertility. The development of a natural farming package for the NER may be aided by effective resource recycling on-farm, the selection of seeds and varieties for desired traits, and the identification of locations with inherent advantages (high soil fertility, suitability for a particular crop, geographic indicators, niche crops, high market demand, premium prices, etc.) There is consensus that traditional varieties respond best to modest levels of soil-bound nutrients, and when bigger amounts are made accessible, they have a tendency to lodge, resulting in poor nutrient translocation that eventually reduces production.

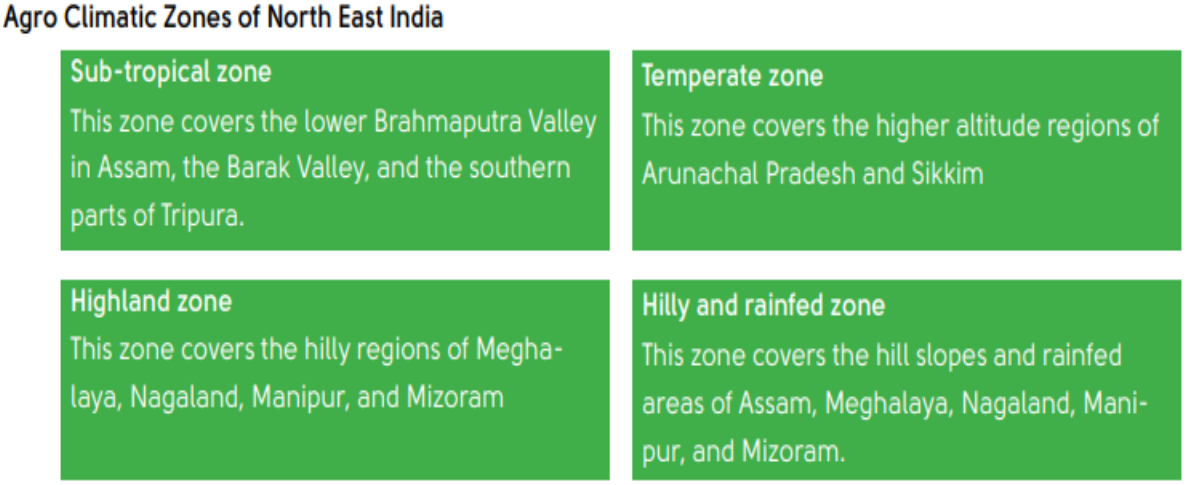
**Table 2: State-wise cultivated area under organic farming in NER (2020-21)**

| Sl.No. | State Name | Organic Area (in ha) | Conversion area (in ha) | Total area (in ha) |
|---|---|---|---|---|
| 1 | **Sikkim** | 74647.31 | 1082.34 | 75729.66 |
| 2 | **Meghalaya** | 34816.30 | 3560.09 | 38376.39 |
| 3 | **Assam** | 6719.27 | 11751.57 | 18470.84 |
| 4 | **Nagaland** | 7384.96 | 7405.42 | 14790.38 |

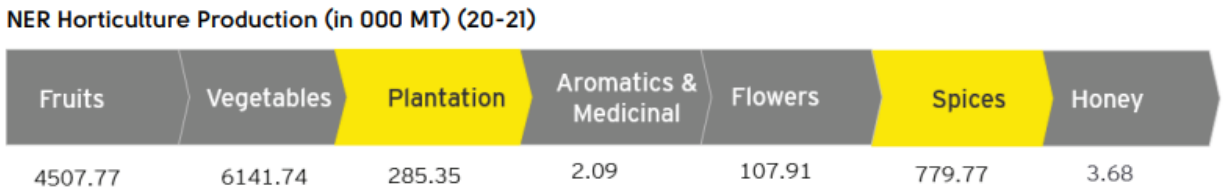
[20] Natural and organic farming: Agribusiness potential of Northeast India (2022) ICAR

| Sl.No. | State Name | Organic Area (in ha) | Conversion area (in ha) | Total area (in ha) |
|---|---|---|---|---|
| 5 | **Manipur** | 4419.25 | 8305.67 | 12724.92 |
| 6 | **Arunachal Pradesh** | 265.37 | 12848.74 | 13114.12 |
| 7 | **Mizoram** | 40.45 | 12998.44 | 13038.89 |
| 8 | **Tripura** | 203.56 | 6317.75 | 6521.31 |

Source: ICAR




Source: Ministry of Development of North Eastern region




Source: Ministry of Development of North Eastern region

## 15. Crops cultivated in the North Eastern states:

15.1 A variety of natural/traditional crops, including tea (Camellia sinensis (L.) O. Kuntze), Joha rice, Karbianglong ginger, and lemon (Citrus sp) in Assam, large cardamom (Amomum subulatum Roxb.) and ginger (Zingiber officinale Roscoe) in Sikkim, king chillis (Naga chilli) & kholar bean (rajma) from Nagaland, Tree bean (Parkia roxburghii), rice bean

(Vigna umbellata), black rice in Manipur, bird's eye chili, sugarcane, cowpea and paddy in Mizoram, breakfast rice (Jasulia), ginger, turmeric (Curcuma longa L.), cashew (Annacardium occidentale L.) and khasi mandarin (Citrus reticulata) in Meghalaya and pineapple [Ananas comosus (L.)Merr.], aromatic rice and jackfruits in Tripura are grown in this part of India. A diversity of pulses like rice bean, rajmash/kholar bean/butter bean/French bean (Phaseolus vulgaris L.), faba bean (Vicia faba), Sem (Dolichos lablab), Sweet gourd (Momordica Cochinchinensis), spine gourd (Momordica dioica Roxb), buckwheat (Fagopyrum esculenlum Moench), medicinal rice, Khasi mandarin, Jampui orange, Sikkim orange, Dalle chilli and passion fruits are the other niche crops of the region[21].


15.2 A large diversity and high quality bananas (Musa spp) like Jahaji from Assam and Sabri (Martaman) from Tripura are also famous in the region which may have high demand in metros. "Naga tree tomato", "Arunachal orange", Sikkim's "large cardamom", "Mizo bird eye chilli", Assam's "Karbi Anglong ginger", Tripura's "queen pineapple", Tezpur litchi, Meghalaya's "Khasi mandarin" and "mamang narang" and Manipur's "kachai lemon" are the 10 agri-items of the NER that have GI tags.

[21] Natural and organic farming: Agribusiness potential of Northeast India (2022) ICAR

Arecanut (Areca catechu) is also grown widely in the region mostly with natural fertility which has high demand in national and international markets. The region is a hot spot biodiversity zone for natural orchids in the world which have very high national and internal markets.

15.3 About 900 species (nearly 69% of India's total species) of orchids are reported from NER. Orchids were known for their medicinal value in older days, but in recent years they are in great demand in national and international market due to their ornamental value (Ninawe and Swapna, 2017).

**Table 3: Important natural agri-products from North East India**

| State | Natural Agri Products |
|---|---|
| **Assam** | Joha rice, Ketakirice, Karbiaglong ginger, and lemon Tezpurlitchi, Arecanut, Tea |
| **Arunachal Pradesh** | Orange, Banana, Passion fruits, Jhum rice |
| **Meghalaya** | Breakfast rice (Jasulia), Ginger, turmeric (Curcuma longa L.), Cashew (Annacardiumoccidentale L.) and Khasi mandarin |
| **Manipur** | Tree bean (Parkia roxburghii), Rice bean (Vigna umbellata), Black rice, Purple rice, Kachai lemon |
| **Nagaland** | King chillis (Naga chilli) & Kholar bean (rajma), Naga tree tomato |
| **Mizoram** | Bird's eye chilli, Sugarcane, cowpea Chowchow Banana and paddy |
| **Sikkim** | Large cardamom, Ginger, Dallechilli, Buckwheat, Chowchow, Sikkim mendarin, turmeric, tree tomato |
| **Tripura** | Aromatick rice (Harynarayana, Kalikhasa, Binnidhan) Queen pineapple [Ananas comosus (L.) Merr.], aromatic rice and jackfruits, Banana, Jampui orange, Arecanut, Tea |

Source: Das et al., 2022

15.4 Most of these traditional and natural agricultural regions might be transformed into organic farming areas with little effort. The area contains a variety of soil types and climatic conditions that allow it to produce a wide range of crops and animals, as well as much-needed organic sources of nutrients such as crop residues, plant biomass, animal waste, leaf manure, and others (Das et al. 2017). Sikkim's success story is widely recognized. It is the first state in India to become 100 per cent organic.

*North East Region has the potential to do away from the ill effects of the Green Revolution and pave the way for healthy and sustainable agriculture leading to enhanced farmer's income through the "Organic Evergreen Revolution"*

## 16. Model for North East India:

16.1 The following strategies may promote natural farming and improve farmers' income:

(i) Identification of potential districts, locations, and products.
(ii) Capacity building of stakeholders for production, processing, and marketing.
(iii) Developing protocols for natural farming.
(iv) Credit and marketing support to producers and marketing agencies

16.2 The agriculture model in the region of North East has to be built on the following pillars[22]-

(i) **Seed sovereignty**: Cultivating independence and biodiversity for sustainable food futures.

(ii) **Indigenous seeds:** Sustaining traditions, ecosystems, and resilience in agriculture.

(iii) **Organic Farming:** Nurturing the Earth's bounty naturally for a healthier, sustainable tomorrow.

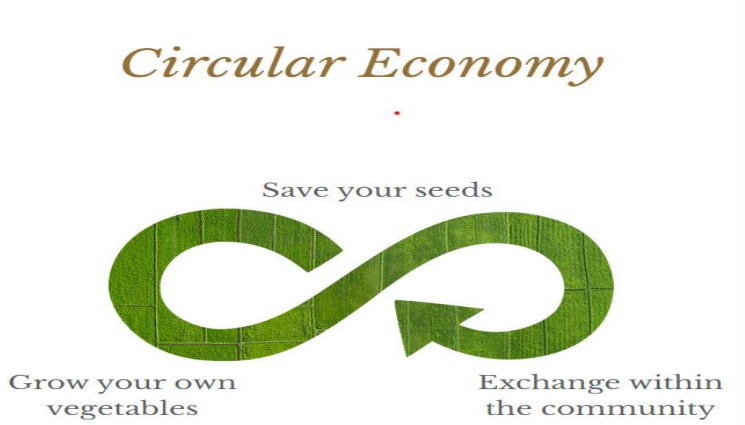
(iv) **Heirloom seeds:** Guardians of history, fostering biodiversity and connecting generations.

16.3The most important input in farming is seed. Organic seed must be used in organic farming. NER has the potential to generate regionally adapted, climate-resilient, high-yielding organic seeds. In terms of yield, size, flavour, nutrition, and diversity, such seeds may compete with F1 hybrid seeds.

[22] Pabhoi Greens, Neelam Dutta https://www.pabhoigreens.com/

16.4 Indian seed villages can be created in the North East. The availability of heritage replicable seeds is an essential first step in preparing farmers for long-term expansion. The goal is to reduce waste and increase efficiency with all-encompassing technology support from seeding through storage.

16.5 Farmers retain the freedom to market these seeds at fair trade prices. This interweaves a tapestry of shared wealth and self-sustenance by fusing agricultural ingenuity with environmental care. This creates the framework for the development of seed villages.




16.6 The preservation of indigenous seeds is the main target. The North East (NE) area of India needs to build seed banks and produce organic seeds in order to complete this aim. The goal is to spread the best adaptable seed types in the area, provide every farmer with locally adapted seeds, and educate local populations about organic farming methods, integrated farming systems, and seed breeding techniques. This journey is intended to safeguard India's agricultural legacy while promoting sustainable development throughout the country, not only in the Northeast.

16.7 The use of regenerative farming methods can help farmers become self-sufficient and build a local market for indigenous seeds while preserving the sovereignty of these seeds. They would have their naturally grown produce while improving their income and maintaining the local ecological balance.

16.8 Benefits[23]:

- High-quality, reliable seeds. Doing away with imported HYVs.
- Locally produced
- For the farmer, by the farmer
- Climate Resilient
- Being Ethical
- Using non-GMO (non-genetically-edited) seeds
- Using and protecting Organic Heirloom seeds
- Setting the benchmark in sustainable seed production not only in India but globally.

16.9 The objective is to establish the first organic seed development centre/hub in North East India and a pioneering organic seed project in India, where the seeds' custodians—the farmers—produce the seeds themselves. The farmers receive these seeds so they may reproduce them year after year without having to spend on fresh seeds every year.

16.10 The primary objective of this paper is to preserve the ancient indigenous seed types that were lost as a result of the Green Revolution and the introduction of F1 hybrids into the Indian market and to return them to the farmers. Farmers lost those indigenous seeds, along with their flavour, colour, and nutritional value. Small and marginal farmers are the ones who support our country, and it is their right to have their own seeds and pass them down through the generations.

16.11 In order to make agriculture sustainable, lucrative, and accessible to all, our objective for the North East is to provide organic, climate-resilient seeds that are available to all farmers throughout India.

## 17. Conclusion:

17.1 Organic farming has a lot of potential in India's north-eastern area. Firstly, the region uses very little inorganic fertilisers and chemicals.

[23] Pabhoi Greens, Neelam Dutta https://www.pabhoigreens.com/

17.2 Second, the low input, low risk, low yield agricultural method in the hills prevented the farmers there from reaping the rewards of the green revolution, and the average yield of the majority of crops remained far below average. It is believed that the output gap caused by the adoption of organic farming would be minimal; rather, there is room to increase productivity with appropriate organic management, and the organic premiums will increase the income of the hill farmers.

17.3 Thirdly, it is an advantage that every household has animals (such as pigs, chickens, cattle, goats, etc.), which produce a enough amount of on-farm manure that may be effectively used for organic farming.

17.4 Additionally, the northeastern states, which are home to a large amount of biodiversity, get extremely high rainfall (between 2000 and 11000 mm annually), which encourages the growth of a wide variety of biomass, including weeds, shrubs, and herbs. Some of these species could function well in organic farming. Some speciality crops, such Assam lemons (kazi lemons), Joha rice, Medicinal rice, and passion fruits, are grown in the North Eastern Region. The area is also well-known for its high-quality ginger, turmeric, huge cardamom, tea, orange, and pineapple, honey among other foods.

17.5 Both local and foreign markets are projected to have strong demand for organic products. The benchmark survey to identify potential areas, research requirements for appropriate technology development, human resource development in organic input production, assistance to farmers in post-harvest handling, processing, and value addition, reduction of certification cost, creation of infrastructure, and marketing of organic produce are the primary challenges to the promotion of organic farming in the region.

17.6 In view of the above, aligned with the vision of the Hon'ble Prime Minister the North Eastern Region of Bharat can be developed as the Organic agriculture hub of not only India but of the world, which would double up as the reservoir of knowledge and practice of ancient, climate resilient crops and seeds. A second ever-lasting Green and healthy revolution should have its genesis in the northeast of Bharat.

*"Amrit Dhara" in the Amrit Kaal should truly flow from the Astha Laxmi of Bharat.*