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"Governance Strategies For Agricultural Development And Climate Change Adaptation In India"

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Abstract

India faces a significant challenge of balancing its rapid economic growth with an urgent need to address the issue of climate change. India's economy is majorly associate to its natural resource, with climate-sensitive sectors like agriculture playing a crucial role. Climate change impacts on India's natural resources could be far-reaching, disrupting the distribution and quality of these assets and adversely affecting people's livelihoods. India's diverse agricultural landscape, comprising 15 Agro-climatic zones, supports various seasons, crops, and farming systems. For many Indians, agriculture is the primary source of livelihood, making it highly vulnerable to climate change. The sector's sensitivity to climate variability means any climate change will significantly impact Indian agriculture directly and indirectly.Central government has taken steps to support farmers, providing facilities like a dedicated television channel and call centres to educate and inform them about weather conditions, soil health, and the use of pesticides and chemical fertilizers. The Ministry of Agriculture and the National Action Plan for Climate Change play pivotal role in agricultural governance, ensuring gradual but steady growth in agricultural production. Sustainable agriculture holds great potential for meeting food security requirements while improving farmers' livelihoods by enhancing their net incomes and resource productivity. This paper highlights the potential for agricultural growth and adaptation to climate change and the process of agricultural governance in India.

Key Words: Climate Change (CC), Agriculture, Sustainable Development, NAPCC, Climate Variability.

Introduction:

India faces the dual challenge of sustaining rapid economic growth while addressing the issue of climate change, which threatens its natural resources and agriculture. With agriculture being the primary livelihood for many Indians, the sector's vulnerability to climate variability necessitates robust adaptation strategies. The Indian government has initiated measures like the National Action Plan for Climate Change and the National Mission for Sustainable Agriculture to develop climate-resilient crops and promote sustainable farming practices. Effective governance and collaboration are essential to mitigate climate change impacts and ensure sustainable agricultural development. Climate change is not a new phenomenon; it has been occurring naturally at its own pace since the Earth's evolution, four to five billion years ago. However, recent human activities have accelerated this process, leading to potentially severe impacts on biosphere as well as on human health on which we depend (Mitra:2009,1). Climate change and agriculture are interrelated, and over the next century, climate change may significantly affect crop productivity and food availability. The agricultural sector is particularly sensitive to global warming and associated climate changes, which could lead to future scarcities of food grains, water, land, and other essential resources (Sudhakarn:2011,18-19).

Given the global scale of climate change and agriculture, it is well established that developing countries like India, Nepal, Sri Lanka, etc will experience significantly adverse impacts on agriculture productivity (Sudhakarn:2011,19). A large proportion of India's population depends on agriculture, either directly or indirectly, making it highly vulnerable to climate change and potentially exacerbating poverty (Kumar:2018,25-26). Climate change is already a reality for many Indian farmers. While government plans to create adaptive capabilities are being developed, farmers have no choice but to adapt to various climate-related changes on their own. Though the Government of India is actively addressing climate change (Mishra:2010,8), it is crucial for farmers and the general population to take initiative as well.

Understanding credible estimates of climate change impacts on developing countries is important for grasping the distributional effects of climate change and the potential benefits of policies aimed at mitigating its effects or promoting adaptation(Raymond: 2007,1-2). Climate change could jeopardize food security and threaten the livelihoods of much of India's population. Projected impacts of climate change on agriculture include changes in temperature, precipitation, and glacial runoff (Agnihotri:2008,12), which can affect crop yields and the types of crops that can be grown in certain areas. These changes also influence agricultural inputs such as water for irrigation, solar radiation for plant growth, and pest prevalence(Geethalakshmi:2024,261-282).

This situation highlights the critical position of the agricultural sector and underscores the importance of government action in combating climate change and establishing governance processes for sustainable agriculture. This paper analyses the effect of climate change on agriculture and the role of governance in agricultural development in India.

Climate Change:

The concept of climate change is linked to inconsistencies in environmental balance and ongoing climate vulnerability & variability. It can manifest through gradual shifts in temperature, precipitation patterns, and rising sea levels, which steer to changes in the frequency patterns, intensity and period of extreme weather events. Global warming, a key indicator of climate change, signifies the Earth's increasing temperatures, resulting in ecological imbalances(Verma:2024,615-620). To achieve a sustainable development path that advances both economic and environmental objectives, the Indian government launched the 'National Action Plan for Climate Change' (NAPCC). This mission has following principles(PMCCC:2008,4):

- Protecting the susceptible sections of society with comprehensive and sustainable development policy that is vulnerable to climate change.

- Enhancing country growth objectives through qualitative changes that enhance ecological sustainability, thereby further mitigating greenhouse gas emissions.

- Developing efficient strategies for last mile Demand Side Management.

- Promote innovative ecosystem for market with regulatory and voluntary mechanisms.

These principles aim to foster agricultural research and education to improve life in rural areas.

Climate Change and Agriculture:

A healthy climate is essential for agricultural development. The agriculture sector is sensitive to short-term weather changes as well as seasonal, annual, and longer-term climate variations. While agriculture can tolerate moderate long-term climate variations, significant shifts pose challenges (Sudhakarn:2011,21). Rising temperatures due to increasing greenhouse gases are likely to affect crops differently across regions (Agnihotri:2008,12). As per UN Intergovernmental Panel on Climate Change (UNIPCC) report, 2022 indicates that a 1.5^{o}c increase in temperature could lead to intensity and/or amount of heavy precipitation events at the global scale, as well as an increased risk of drought in the Mediterranean region & almost 8% loss in farm-level net revenue(Ove Hoegh-Guldberg: 2022,177-282). Additionally, the UNIPCC estimates that GDP in developing countries could decline by 1.4-3.0% because of climate change(Mitra:2009,1-2).Even as per world economic forum, the largest impact of climate change is that it could wipe off up to 18% of GDP off the worldwide economy by 2050 if global temperatures rise by 3.2°C(Natalie Marchant:2021,1). Agriculture in India is also vulnerable to these climate change impacts.

climate change presents significant challenges to the agricultural sector, prompting considerable attention in climate change discourse, research, and policy action by the government for several reasons(Rachel:2007,7):

- Agricultural output is heavily dependent on climate conditions.

- Agriculture significantly contributes to global CO2 emissions as well as it has the potential to mitigate global warming.

- Agriculture plays a crucial role in mitigation & adaptation to climate change.

Climate change can affect agricultural yields in various ways, often reducing yields beyond certain temperature thresholds(Guntukula:2021,262-280). To address these issues, the central government is working to make agriculture and farming more resilient to climate change by developing hybrid crop and implementing diverse cropping patterns.

Indian Agriculture:

India is a developing agrarian country where the socio-cultural and economic fabric is deeply intertwined with agriculture. The nation boasts 15 Agro-climatic zones, each with diverse seasons, crops, and farming systems. For the majority of Indians, agriculture is the primary means of livelihood (Mishra:2010,9). In this predominantly agrarian economy, agriculture holds a strategic position, regarded as a 'way of life' that has shaped the thoughts, culture, and economic life of its people for centuries (Pathak:2023,195).The agricultural sector alone represents 16.6 percent of India's Gross Domestic Product (GDP) and plays a crucial role in the country's development, sustaining the livelihoods of nearly 52 percent of the population. Consequently, any significant global climate change will profoundly impact local agriculture, ultimately affecting the world food supply(Sudhakarn:2011,20). Given its high agricultural production compared to the rest of the world, India is recognized as an Agrarian Country.

However, agriculture is highly vulnerable & sensitive to climate change (CC) due to its inherent sensitivity to climate variability. Climate change will impact Indian agriculture in various direct and indirect ways, affecting the lives and livelihoods of millions(Kumari:2019,1-5). Approximately two-thirds of India's sown area is drought-prone, and around 40 million hectares are flood-prone. The poorest populations will be hardest hit by climate change and variability, as they rely heavily on climate-sensitive sectors such as rain-fed agriculture and fisheries. These populations are often located in geographically marginal areas, like flood plains or nutrient-poor soils, and have limited human, institutional, and financial capacity to respond to and cope with climate impacts and adapt to changing climate change hazards(Sahani:2023,5).In India, the impact of climate change on agriculture has garnered considerable attention due to its close ties to the nation's overall well-being and development.

Agricultural Governance:

Governance in India's agriculture sector is crucial, given the country's agro-based economy. The organizational setup for agricultural development at the government level has roots in the British era. In June 1871, the Department of Revenue and Commerce was established in the Government of India to address the improvement and development of the country's agricultural resources. Before this, agriculture-related work was managed by the Home Department (Govt. of India:2021,1-20).

After India's independence, In January 1951, the Ministry of Agriculture and the Ministry of Food merged and established Ministry of Food and Agriculture. Currently, the Ministry of Agriculture consists of three departments(Govt. of India:2021,1-20):

1. Department of Animal Husbandry and Dairying

2. Department of Agricultural Research and Education

3. Department of Agriculture and Cooperation

The Department of Agriculture and Cooperation is now organized into 24 divisions, with four attached offices and 20 subordinate offices. Additionally, there are two public sector undertakings, seven autonomous bodies, and eleven national-level cooperative organizations associated with the department (Govt. of India(GOI): 2021,1-20).During the 12th Five Year Plan (2012-2017), the Agriculture Department ,GOI achieved significant progress by maintaining an annual agricultural growth rate of around 4% through schemes like the National Food Security Mission and Rashtriya Krishi Vikas Yojana(National agriculture Development Scheme). The introduction of new initiatives, such as the Paramparagat Krishi Vikas Yojana (Traditional agriculture development scheme) for organic farming and Pradhan Mantri Krishi Sinchai Yojana for improved irrigation, supported these efforts. Technological advancements, including hybrid seeds and better pest management, alongside financial support through schemes like Pradhan Mantri Fasal Bima Yojana and Kisan Credit Cards, further enhanced productivity and farmer protection(Banita:2023,16-28). Market reforms were implemented via the National Agriculture Market (e-NAM), promoting a unified national market. Sustainability initiatives included increased green cover and renewable energy usage, while infrastructure development improved rural connectivity and storage facilities, reducing post-harvest losses (Debesh Roy:2022,107-117).

Indian Agriculture & Climate Change:

Research on the impacts of climate change and vulnerability on agriculture is a high priority in India, as these impacts are expected to be widespread and severe if predictions hold true. Developing the capability to accurately estimate these impacts is critically important (Sudhakarn:2011,19).

The widespread promotion of Green Revolution technologies during the 1960s significantly boosted agricultural yields for certain crops and farmers in India. This was achieved through the introduction of high-yielding varieties that depended on inputs such as irrigation, chemical fertilizers, and pesticides. In recent years, national and state agricultural policies have shifted focus toward decentralized and participatory natural resource management, particularly emphasizing practices like watershed development and agroforestry (Sanyal:1993,15-24).

Simultaneously, the rapid liberalization of the Indian economy has significantly impacted the structure of Indian agriculture. Since 1991, economic reforms have included the reduction and modification of import and export restrictions and tariffs, changes in access to agricultural credit, and reductions in production subsidies. Although the liberalization of agricultural trade has been more limited compared to other sectors of the Indian economy, India's potential participation in the WTO Agreement on Agriculture indicates that more substantial changes are on the horizon (Rajan:2002,87-100). It is anticipated that these economic shifts will have differing effects on different regions and farms. While some may benefit from market liberalization, new investment and technological inputs, others may have difficulties (Sudhakarn: 2011, 20)

Projected Climate in India:

The mean temperature in India is projected to increase up to 0.1-0.3 degrees Celsius during the Kharif (autumn) season and by 0.3-0.7 degrees Celsius during Rabi (spring) by 2010, which has remained almost constant up to 2024.By 2070, temperatures are expected to rise by 0.4-2.0 degrees Celsius during Kharif and 1.1-4.5 degrees Celsius during Rabi. Similarly, mean rainfall is projected to remain unchanged by 2010, which is again true till the 2024, but it is estimated that it would increase by up to 10% during both Rabi and Kharif by 2070. Additionally, the likelihood of climate extremes, such as variations in the onset of monsoons, intensities, and frequencies of droughts and floods, is expected to rise(Sudhakarn:2011,20-21).

With the ongoing changes in climate, several sectors of agriculture are particularly vulnerable. Increasing climate variability could lead to significant seasonal and annual fluctuations in food production, affecting all agricultural commodities (Thornton:2014,3313-3328). In summary, climate change impacts Indian agriculture in the following ways:

1. Shift in climate and agricultural zones.

2. Reduced groundwater availability.

3. Impact on agricultural soil.

4. Effect on the organic and biological health of soil.

5. Salinization and alkalization.

6. Increased prevalence of pests, diseases, and weeds.

7. Negative effect on the botanical growth of plants.

8. Overall reduction in agricultural production.

Impact of Climate Change on Agriculture:

Food production in India is highly sensitive to climate changes, including variability in monsoon rainfall and temperature fluctuations within a season. Research by the Indian Agricultural Research Institute (IARI) and others indicate significant losses, particularly in the Rabi crop, with a 1°C rise in temperature potentially reducing wheat production by 4-5 million tonnes. Apart from that Global wheat production is estimated to fall by 6% for each °C of further temperature increase and become more variable over space and time(Asseng:2025,143-147). Even small changes in heat or temperature and rainfall can significantly affect the quality of fruits, vegetables, tea, coffee, aromatic and medicinal plants, and basmati rice (PMCCC:2008-4).By changing climate lead to variation in temperature which directly disturb production of Maharashtra Ratnagiri famous Alphonso Mango due to the flowering rhythm of the trees, causing them to flower repeatedly.

Increased frequencies of droughts, floods, storms, and cyclones are likely to heighten variability in agricultural production. Therefore, it is crucial to focus on both saving lives and sustaining

livelihoods(Agnihotri:2008,13-14). Agriculture is adversely affected not only by changes in the overall amount of rainfall but also by shifts in its timing. Any alteration in rainfall patterns poses a serious threat to agriculture, the economy, and food security. Rising temperatures due to increasing greenhouse gases are expected to affect crops differently across various regions. While climate change may increase arable land in high-latitude regions by reducing frozen lands, Indian agriculture, despite being a relatively minor contributor to greenhouse gas emissions, stands to suffer significantly from global temperature rises(Malhi:2021,1318).

To mitigate these effects, increasing forest areas by planting trees can help balance the ecosystem and reduce growing temperatures, contributing to a "Green World" that curtails climate change threats.

Over the past 100 years, there has been a 0.6℃ rise in temperature, manifested to increase by 3.5-5℃ by 2100. The carbon dioxide concentration is rising by 1.9 ppm annually and is expected to reach 550 ppm by 2050 and 700 ppm by 2100. Very extreme weather events such as heat waves, cold waves, droughts, and floods have become more frequent in the last decade. Additionally, sea levels have risen by 2.5 mm annually since 1950, and Himalayan glaciers are retreating, all symptoms of climate change (Valone:2021,84-135).

Some research has identified varying effect of climate change on Indian agriculture (Sudhakarn:2011,19-3):

1. A 1℃ increase in temperature may reduce yields of wheat, soybean, mustard, groundnut, and potato by 3-4%, with higher losses at higher temperatures.

2. A 2℃ rise in mean air temperature could decrease rice yield by about 0.75 tons/hectare in high-yield areas and by about 0.06 tons/hectare in low-yield coastal regions.

3. A 0.5℃ increase in winter temperature would shorten the wheat crop duration by seven days and reduce yield by 0.45 tons/hectare, translating into a 10% reduction in wheat production in high-yield states like Punjab, Haryana, and Uttar Pradesh.

4. Productivity of most crops is expected to decrease marginally by 2020 but by 10-40% by 2100.

5. Reduced frost damage could lessen losses in potato, mustard, and vegetables in north-western India.

6. Increased animal distress due to heat affects reproduction.

7. Milk production could drop by 1.5 million tons by 2020.Some studies indicated that India loses 1.8 million tons of milk production at present due to climatic stresses in various parts of the nation (Sreenivasaiah:2016,32).

8. In India, the impact of global warming are likely to be severe. A 2°C rise in temperature could reduce GDP by about 5%, and a 6℃ rise could reduce it by 15-16%.

9. There could be an imbalance in food trade, with positive impacts on Europe and North America but negative impacts on India and other Asian countries.

Estimates by Sinha S K and Swaminathan M S (1991) suggest that a 2°C increase in mean degree temperature could decrease rice yield by about 0.75 tons/hectare in high-yield areas and by about 0.06 tons/hectare in low-yield coastal regions. A 0.5°C increase in winter temperature would reduce the wheat crop duration by seven days, leading to a 10% reduction in wheat production in Punjab, Haryana, and Uttar Pradesh. According to the National Climate Centre in Pune, rainfall has decreased in July and increased in August in key crop-growing areas, with a westward shift in the monsoon pattern confining rainfall to certain pockets, potentially causing floods and food shortages(Mitra:2009,2-3).

National Action Plan on Climate Change and Agricultural Development:

National Action Plan for Climate Change(NAPCC) Launched in 2008, It outlines measures to advance India's development and climate change objectives. The plan encompasses eight missions, each targeting key areas such as sustainable habitat, water management, forest conservation, and sustainable agriculture. The National Mission for Sustainable Agriculture aims to develop climate-resilient crops, expand weather insurance mechanisms, and promote sustainable agricultural practices.

The eight missions are as follows(PMCCC:2008,19-37):

1. National Water Mission
2. National Mission for Sustaining the Himalayan Ecosystem
3. National Mission on Sustainable Habitat
4. National Solar Mission.
5. National Mission for Enhanced Energy Efficiency
6. Green India Mission
7. National Mission on Strategic Knowledge for Climate Change
8. National Mission for Sustainable Agriculture

National Mission for Sustainable Agriculture:

India faces a significant crisis in the sustainability of its agriculture, threatened at the biological and soil health levels as well as the economic level. To address this, the National Action Plan on Climate Change (NAPCC) aims to support climate adaptation in agriculture through the development of climate-resilient crops, expansion of weather insurance mechanisms, and improved agricultural practices. The mission will develop strategies to make Indian agriculture more resilient to climate change by identifying and developing new crop varieties, especially thermal-resistant crops, and alternative cropping patterns capable of withstanding extreme weather, long dry spells, flooding, and variable moisture availability(PMCCC:2008,7). The proposed national mission will focus on four important areas for agriculture in adapting to climate change such as,

a) Dryland Agriculture

India has 159 million hectares of arable land, of which approximately 141 million hectares are cultivated, and about 85 million hectares (60%) fall under the dryland/rain-fed zone. To realize the enormous agricultural growth potential of these drylands and secure farm-based livelihoods, it is essential to prevent declines in agricultural yields during climatic stress. Developing drought- and pest-resistant crop varieties, enhancing

soil and water conservation techniques, holding stakeholder consultations, training sessions, and demonstration exercises for farming communities to share and disseminate agroclimatic information, and offering financial support to farmers so they can invest in and adopt pertinent technologies to combat climate-related stresses are among the priority actions for dryland agriculture that are especially relevant to adaptation(PMCCC:2008-36).

b) Risk Management

Because agriculture depends so heavily on nature, it is susceptible to the dangers associated with extreme weather events. It is necessary to implement a variety of preventive actions in order to reduce these hazards. The development and validation of weather derivative models, the creation of connected to the internet services in regional languages for weather-based coverage facilitation, the advancement of GIS and remote-sensing methodologies for detailed soil resource mapping and land use planning at the watershed or river basin level are among the top priorities. Other important initiatives include strengthening the current agricultural and weather insurance mechanisms. Important actions include identifying pest and disease hotspots and susceptible ecoregions, as well as creating and executing region-specific contingency plans based on risk and vulnerability situations (PMCCC :2008-36).

c) Access to Information

Increasing the use of information technology and providing accurate information are critical to improving agriculture. Farmers have access to a multitude of information outlets, but none provide dynamic, need-based information. Customized information delivery can increase agricultural incomes and productivity. A few of the top priorities are creating regional databases of soil, weather, genotypes, land-use patterns, and water resources; keeping an eye on how changes in glaciers and ice masses affect soil erosion, water resources, and agricultural output in hilly areas; and disseminating data on livestock, agroforestry, off-season crops, greenhouse crops, aromatic and medicinal plants, pasture development, and agro-processing. Furthermore, it is imperative to gather and distribute block-level data on socioeconomic characteristics, land use, and agroclimatic factors in addition to creating state-level agro-climatic atlas(PMCCC:2008,37).

d) Use of Biotechnology

In order to create disease-resistant plants, biotechnology is essential to produce bio pesticides and fertilizers. Its uses in agriculture include better yields, improved tolerance to diseases and pests, drought resilience, and taking advantage of rising CO2 levels. Important areas of priority consist of:

- Transforming C-3 crops through genetic engineering into more carbon-responsive C-4 crops, improving photosynthetic efficiency, yield at increased atmospheric CO2 concentrations, and resistance to heat stress.
- Creating crops that are more resilient to salinity, drought, and submersion while also using less water and nitrogen, which will lower greenhouse gas emissions.

- Developing dietary plans to control heat stress in dairy cows and avoid nutrient shortages, which lower productivity and milk yield (PMCCC:2008-37).

Role of NABARD in Sustainable Agriculture:

The 'National Bank for Agriculture and Rural Development' (NABARD) established in India in 1982 based on the recommendations of the Committee set up by the Reserve Bank of India (RBI) under the chairmanship of Shri B. Shivaraman. NABARD plays a vital role in promoting sustainable agriculture in India by providing financial support and credit facilities for eco-friendly farming practices, watershed development, and organic farming initiatives. It supports climate-resilient agriculture through projects focusing on climate adaptation and mitigation, such as drought-resistant crops and renewable energy use. NABARD also conducts capacity-building programs to educate farmers on sustainable practices and funds rural infrastructure development, including warehouses and roads, to reduce post-harvest losses. Additionally, it promotes Farmer Producer Organizations (FPOs) to help small and marginal farmers collectively access resources and markets(Mitra:2009,4).

Conclusion:

India is a large developing country where nearly two-thirds of the population relies directly on climate-sensitive sectors such as agriculture, fisheries, and forests. The projected climate change under various scenarios is likely to impact food production, water supply, biodiversity, and livelihoods. In particular, the agricultural sector is expected to see reduced yields of most crops in both the short and long term.

In the short term, several strategies can help mitigate these negative impacts, including technology transfer, its adoption, appropriate policies, and improved land and water management. However, sound policy and robust governance are essential to minimize long-term impacts.

To address climate change, it is crucial to provide training and education to farmers and farm workers, conduct agricultural research to develop new crop varieties, identify current vulnerabilities of agricultural systems, and implement food and social security programs to provide insurance against supply changes. Additionally, enhancing transportation, distribution, and market integration will ensure infrastructure support during crop shortfalls. These actions can significantly improve the adaptive capacity of agriculture.

It is imperative for the Indian government and society to collaborate in combating the critical issues of climate change and promoting sustainable agriculture. Now, more than ever, there is a need to embrace Mahatma Gandhi's philosophy of development. Gandhi, a strong advocate for sustainable development, promoted a harmonious existence between mankind and nature, based on equity and justice. His wise dictum, "The earth has enough resources to meet people's needs, but will never have enough to satisfy people's greed," must guide our approach. We should not only promote sustainable production processes but also prevent the misuse or overuse of pesticides, fertilizers, and harmful chemicals to reduce pollution and protect the climate. India faces the dual challenge of sustaining rapid economic growth while addressing climate change, which threatens its natural resources and agricultural sector. Climate change could significantly impact India's

agriculture, a crucial sector for the livelihoods of many, necessitating robust adaptation and governance strategies. The Indian government's initiatives, such as the National Action Plan for Climate Change and the National Mission for Sustainable Agriculture, aim to promote climate-resilient crops and sustainable farming practices to mitigate these challenges.

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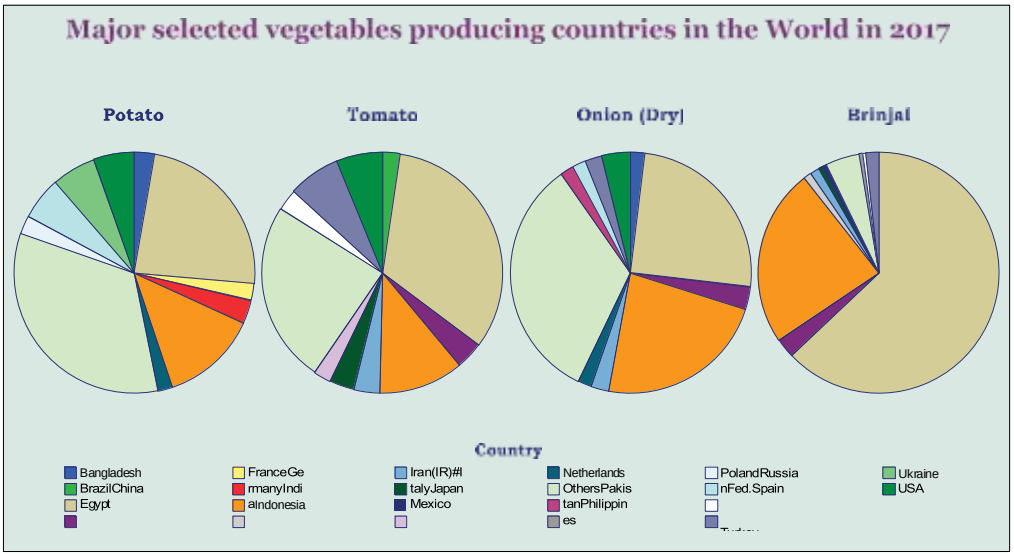
Table8.10:MajorselectedvegetablesproducingcountriesintheWorldin2017

(Area:millionha,Production:milliont, Yield: t/ha)

Country	Potato			Country	Tomato		
	Area	Production	Yield		Area	Production	Yield
China	4.86	88.48	18.21	**China**	1.02	59.49	58.04
India	**2.18**	**48.61**	**22.31**	**India**	**0.80**	**20.71**	**25.98**
Ukraine	1.32	22.21	16.78	**Turkey**	0.19	12.75	67.68
RussianFed.	1.34	21.71	16.25	**USA**	0.13	11.14	88.66
USA	0.42	20.45	48.39	**Egypt**	0.17	6.73	40.49
Germany	0.25	11.72	46.79	**Iran (IR)#**	0.16	6.23	40.19
Bangladesh	0.50	10.22	20.44	**Italy**	0.10	6.02	60.31
Poland	0.33	9.17	27.85	**Spain**	0.06	5.16	84.85
France	0.19	8.55	44.05	**Mexico**	0.09	4.24	45.63
Netherlands	0.16	7.39	45.97	**Brazil**	0.06	4.23	68.81
Others	6.07	125.27	20.64	**Others**	2.07	44.25	21.33
World	**17.62**	**373.77**	**21.21**	**World**	**4.85**	**180.95**	**37.33**

Country	Onion(Dry)			Country	Brinjal		
	Area	Production	Yield		Area	Production	Yield
China	1.10	24.31	22.02	**China**	0.80	33.05	41.41
India	**1.31**	**22.43**	**17.17**	**India**	**0.73**	**12.51**	**17.07**
USA	0.06	3.74	60.95	**Egypt**	0.05	1.38	28.96
Egypt	0.08	2.97	36.41	**Turkey**	0.03	0.88	34.56
Iran (IR)#	0.06	2.38	38.62	**Iran (IR)#**	0.02	0.66	30.67
Turkey	0.07	2.18	32.15	**Indonesia**	0.04	0.54	12.20
Bangladesh	0.19	1.87	10.05	**Japan**	0.01	0.31	33.60
Pakistan	0.14	1.83	13.30	**Italy**	0.01	0.29	30.32
RussianFed.	0.06	1.79	29.24	**Philippines**	0.02	0.24	11.28
Netherlands	0.03	1.78	51.80	**Spain**	0.00	0.23	63.10
Others	1.90	32.22	16.92	**Others**	0.15	2.42	16.37
World	**5.01**	**97.48**	**19.48**	**World**	**1.86**	**52.49**	**28.21**



India'sPositioninWorldAgriculture

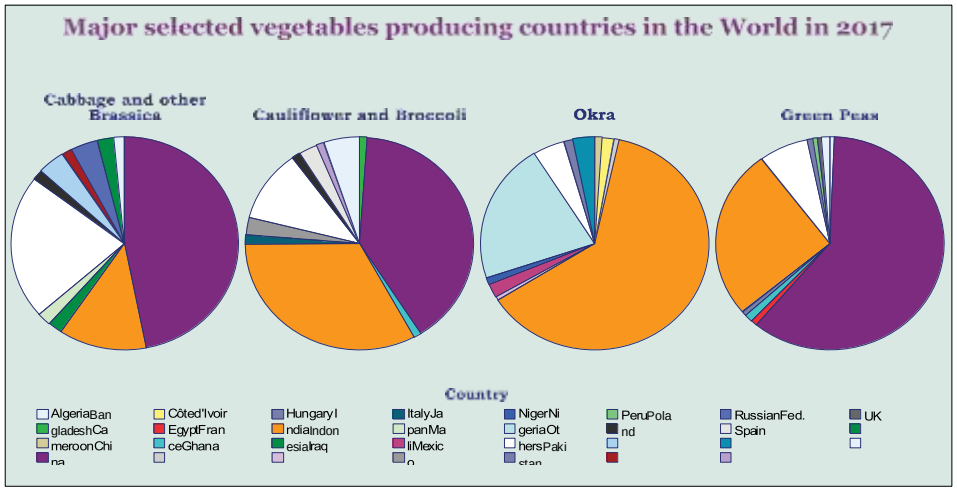
(Area:millionha,Production:milliont, Yield:t/ha)

Country	Cabbageandother Brassica			Country	Cauliflowerand Broccoli		
	Area	Production	Yield		Area	Production	Yield
China	0.97	33.07	34.25	**China**	0.53	10.41	19.66
India	**0.40**	**8.81**	**22.30**	**India**	**0.45**	**8.56**	**18.85**
Rep. ofKorea	0.04	2.73	69.43	**USA**	0.07	1.34	18.93
RussianFed.	0.08	2.69	35.63	**Spain**	0.04	0.69	17.51
Ukraine	0.06	1.67	25.90	**Mexico**	0.04	0.69	17.69
Indonesia	0.09	1.44	15.88	**Italy**	0.02	0.37	23.29
Japan	0.03	1.43	41.03	**Poland**	0.01	0.32	22.21
Poland	0.02	1.08	44.33	**France**	0.02	0.29	15.35
USA	0.02	1.08	44.07	**Bangladesh**	0.02	0.28	14.07
Romania	0.05	1.03	22.21	**Turkey**	0.01	0.27	22.79
Others	0.68	15.43	22.81	**Others**	0.19	2.87	15.04
World	**2.44**	**70.45**	**28.91**	**World**	**1.40**	**26.08**	**18.58**

Country	Okra			Country	Green Peas		
	Area	Production	Yield		Area	Production	Yield
India	**0.51**	**6.00**	**11.84**	**China**	1.57	12.57	8.02
Nigeria	1.11	2.04	1.83	**India**	**0.53**	**5.35**	**10.08**
Sudan	0.03	0.30	10.57	**France**	0.04	0.25	6.45
Mali	0.02	0.20	10.79	**USA**	0.05	0.24	5.03
Côte d'Ivoire	0.06	0.16	2.77	**Egypt**	0.02	0.20	10.08
Pakistan	0.02	0.12	7.75	**Pakistan**	0.03	0.17	6.51
Niger	0.11	0.10	0.92	**Algeria**	0.03	0.13	3.83
Cameroon	0.04	0.10	2.84	**Peru**	0.03	0.13	3.91
Ghana	0.00	0.07	21.10	**Hungary**	0.02	0.13	5.61
Iraq	0.01	0.06	5.59	**UK**	0.03	0.12	3.60
Others	0.06	0.43	7.67	**Others**	0.32	1.47	4.60
World	**1.95**	**9.58**	**4.90**	**World**	**2.68**	**20.76**	**7.76**

Note : #:Iran(IslamicRepublic of).

Source: FAOSTATwebsiteason29.05.2020(http://www.fao.org/faostat/en/#data).



* Estimated and projected figure for 2017

** Figures relate to 2017

Source: ICAR-Indian Agricultural Statistics Research Institute