GSSCORE

An Institute for Civil Services

MAINS TEST SERIES 2023

GS MAINS Q&A

TOPICAL TEST - 39

(5 QUESTION)

GEOGRAPHY

Indian agriculture

GEOGRAPHY - 4

Time Allowed: 50 Mins. *Max. Marks: 75*

1. **Relief and climate are the two major determinants of the cropping pattern in India. Analyze.**
2. **Discuss the factors that make millets more sustainable as crops. Also, elucidate the challenges and strategies to increase production of these crops in India.**
3. **Present economic policies of India attempt to attain the twin objectives of market-oriented agricultural economy and trade-oriented industrial economy. Examine.**
4. **The dry zones of India need sustainable planning and efforts to ensure food and nutritional security. Elucidate.**
5. **Describe climate smart agriculture (CSA) and discuss a variety of measures adopted under the CSA in India and the world over.**

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GEOGRAPHY - 4

1. Relief and climate are the two major determinants of the cropping pattern in India. Analyze.

Approach

1. ***The demand of the question is to discuss the various factors associated with the cropping patterns in India.***
2. ***The perspective of the question is analytical and evolutionary.***
3. ***The intro part of the question should consist of a brief summary of the cropping patterns in India.***
4. ***Enlist the various determinants of cropping patterns including Relief and climate.***
5. ***Give a brief conclusion.***

Hints:

The different crops grown in an area at a given point of time is called the cropping pattern. The cropping pattern and crop diversification depends on many factors such as climatic conditions, nature of soil, irrigation facilities, expected benefits, size of land, labor availability, marketing and storage facilities etc. In addition, crop intensity also largely depends on the availability of seeds, fertilizers, irrigation, post-harvest processing, storage and marketing.

Relief factor in determining crop pattern

- Relief plays a major role in deciding the cropping pattern of an area. For example,
- Paddy is the main crop on irrigated hill terraces (terraced farming).
- Crops like tea and coffee can be grown only on well drained slopes where there is a good amount of rainfall.
- Apart from these, paddy and sugarcane are hot climate crops which can be grown only on well irrigated areas.
- Wheat can grow best in plains with moderate temperature and rainfall.

Climatic factors Deciding Crop Patterns

- Paddy in India is grown under widely varying conditions of altitude and climate like in Eastern Uttar Pradesh, Bihar, W. Bengal, an East coastal plain areas. Rice cultivation requires a hot and humid climate (21 and 37°C, 150-300 cm of rainfall), long hours of sunlight and an assured supply of water. It requires deep clayey and loamy soils.
- Wheat in Punjab, Haryana, and West UP - Wheat is primarily a mid-latitude grassland crop and requires a cool climate with moderate rainfall. Winter temperature between 10° to 15°C and summer temperature between 21°C to 26°C. Whereas the annual average rainfall should be around 75 cm. These conditions become available in Punjab, Haryana and Western UP.

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- Coarse cereals like jowar, bajra in Rajasthan - Jowar and Bajra are the most important millet which are used as food in drier parts of the country. It requires marginal rainfall, nearly 40-50 cm annually. The ideal temperature for its growth is 25°-30°C. Bright sunshine after light showers is very useful in early stages of its growth. All these factors are easily available in Rajasthan.
- Cash crop of sugarcane in Terai belt - Sugarcane belongs to the family of bamboo plants and is indigenous to India. It is the main source of sugar, jaggery and khandsari. It is a long duration crop and requires 10 to 15 and even 18 months to mature depending on the geographical conditions. It requires a hot and humid climate with an average temperature of 21°-27°C and 75-150 cm of rainfall. All these conditions are available in the Terai belt.

Conclusion:

Thus we can identify different determinants of cropping patterns favouring different crops. It has been found that the crop selection decisions made by farmers and hence cropping patterns largely depend on the ecological or climatic conditions (rainfall, humidity and temperature) and relief patterns. For example, rice is cultivated on a large scale when the monsoon is good. But when the monsoon is weak, instead of rice, another crop like bajra is grown. Due to the highly favorable climatic and relief conditions for cultivation, cotton in Maharashtra, tea in Assam, bajra in Rajasthan and jute in West Bengal are the major crops.

2. Discuss the factors that make millets more sustainable as crops. Also, elucidate the challenges and strategies to increase production of these crops in India.

Approach

1. ***The question requires analysis of millet crop in the light of contemporary challenges***
2. ***Briefly introduce with the millet crop***
3. ***Discuss the factors making millet sustainable crop. Here mention environmental and health benefits among others. Challenges in increasing millet production***
4. ***Highlight the Initiatives by Government of India for Promoting Millets. Mention***
5. ***Conclude with the gist of the answer***

Hints:

Over the last couple of years, millennials have witnessed a shift in the proportion of cereals to coarse grains such as millets in their daily dietary plan. Traditionally, India has a history of high Millet consumption and cultivation. After the green revolution, once rice and wheat were introduced to our diets and promoted aggressively, Millet farming and its consumption dramatically fell. Maharashtra, Karnataka, Andhra Pradesh, and Tamil Nadu are among the key states cultivating millets.

Factors making millet sustainable crop

- Millets are considered as the superfoods owing to their nutritional value which is high when compared with rice and wheat. In addition millets are less expensive
- Millets are rich sources of calcium, magnesium and iron and among food grains finger millet accounts for the highest amount of calcium content. Its high iron content can help children and women of reproductive age overcome the high prevalence of anemia.
- Millets, which are gluten-free and have a low glycemic index, can assist with dietary problems and health issues such as obesity and diabetes
- Millets are mostly drought resistant crops with a short growing season of 70 to 100 days when compared to the growing season of paddy which is 120-150 days, the water requirement of millet crops is also less which is 350-500 mm.
- Millets have proven to be a sustainable revenue source for farmers because they require little investment for production.

Challenges in increasing millet production:

- **Shelf Life Augmentation:** Millets are extremely nutritious and are proven to have health benefits. However, millets have poor shelf life once processed due to its intrinsic enzyme activity (lipase activity, lipid oxidation etc.) that causes rapid development of rancidity and bitterness.
- **Marketing and Market Linkages:** Millet supply chain suffers from inconsistent supply and demand that prevents its commercial viability. While the lack of access to HYV seeds has led to low crop productivity, the lack of public awareness about nutritional benefits of millets has led to limited adoption of millets as a ready to cook cereal.
- **Decentralized Processing:** Processing of millets face several hurdles owing to variation in size of various millet types and low shelf life of the processed millets.
- **Processing Efficiency:** Processing converts the inedible grain into edible form and thereby enhancing its quality. Processing of millets plays significant role during its utilization as food. Longer shelf life, aesthetics of food and flavour and ease of cooking is what necessitates processing. However some millets require multiple processing for optimization of grain recovery and optimization of polishing to retain their nutrition value.
- **Increased demand for processed foods:** Consumer demands for ultra-processed and ready-to-eat foods which are high in sodium content, sugar, trans-fats, and even carcinogens have increased in India resulting in less interest towards millets and allied food grains.
- Because of growing demand of millets in the city, government is trying to focus on the supply which is less and that has led to the high prices of millets in the market.
- The main challenge of cultivating millets is preference for wheat, it might either be the farmers or consumers, they always tend to attract towards wheat cultivation

Initiatives by Government of India for Promoting Millets

- The year 2018 was considered as the national year of millets since the millets were given the name nutri cereals due to their nutritional value and the anti diabetic properties.
- Increased MSP: The government has announced an increased minimum support price to encourage farmers to cultivate millets.
- In order to increase marketability of millet, the government supplied seeds and inputs to farmers through farmer producer organizations (FPO'S).
- To promote shipment of nutri-cereals, the Ministry of Commerce and Industry through its apex agricultural export promotion body, Agricultural and Processed Food Products Export Development Authority (APEDA) has prepared a comprehensive strategy to promote Indian millets exports across the globe commencing December 2022.
- The millets export promotion programme also comes at the backdrop of the proposal of India that was supported by 72 countries which lead to the United Nations' General Assembly (UNGA) declaring 2023 as International Year of Millets (IYoM) on March 5, 2021.
- Millets are being promoted through technology dissemination, quality seeds through millet seed hubs, awareness generation, minimum support price and inclusion in PDS.
- Efforts are now being done to include the nutrient-rich smaller millets in the mid-day meal schemes in government and government-aided schools in Karnataka and Telangana.

Suggestion to increase production of millet crops in India

- Brimming with potential, millets can act as a vital cog in the country's sustainable development wheel if backed by policies that promote their production, incentivize farmers and strengthen market linkages.

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- Farming of millets deserves encouragement especially in view of their climate resilience, short cropping duration and ability to grow on poor soils, hilly terrains and with little rain.
- Grassroots workers like the anganwadi and ASHA workers must be further involved as nutrition ambassadors and entrepreneurs in the millet revolution.
- Because of their accessibility to the poor, they can play an essential role in providing nourishment to people across all income categories and supporting climate adaptation of rainfed farming systems.
- The need of the hour is dedicated programmes with proper training and capacity-building initiatives that urge farmers to move away from loss-making crops toward diversification via millets.

Conclusion:

Declaring 2023 as International Millet Year will help in popularising millets which would benefit future generations of farmers as well as consumers Awareness of millets is low among consumers, policy makers, industry and R&D sector. So there is an urgent need to promote the nutritional and ecological benefit of millets to consumers, producers, and decision-makers, to improve production efficiencies, research, and development investments and food sector linkages.

3. Present economic policies of India attempt to attain the twin objectives of market-oriented agricultural economy and trade-oriented industrial economy. Examine.

Approach

1. ***The question focuses on the importance of economic policies of India and the need to attempt to attain the twin objectives of market-oriented agricultural economy and trade-oriented industrial economy.***
2. ***The tone of the question is critical as it suggests the key objective of present economic policies of India.***
3. ***The introduction should clearly sum up basic information about market-oriented agricultural economy and trade-oriented industrial economy.***
4. ***Further elaborate your answer with a holistic explanation of challenges associated with the development of these twin objectives and also suggest some reforms that are required.***
5. ***Conclude the answer by explaining the importance of economic policies in India for the growth and development of Market as well as agriculture.***

Hints:

The Indian economy holds immense potential to become a strong exporter on the world stage. To realize this potential, it is crucial that India turns to its states and union territories and makes them active participants in the country's export efforts.

- In market-oriented farming **the farm is run as a business buying inputs, using them to produce agricultural products, marketing those products and selling them for cash**. The main goal is increased profits – where profit is the difference between income and costs.
- **Trade-oriented industrial economy** is **a trade and economic policy aiming to speed up the industrialization process of a country by exporting goods for which the nation has a comparative advantage**.

Challenges associated with present economic policies of India:

- **Lack of Market Information:** The poor and illiterate farmers have no access to methods of gathering information about the market for their agricultural goods.
- **Inelastic demand:** The demand for agricultural goods is not influenced by a fall or rise in their price. Thus, the producer suffers on account of fall in the price during bumper harvest.

- **Defective Weights and Scales:** One of the biggest defects of agricultural marketing arises due to weights and scales. Usually, in rural areas bricks, etc. are used as weights and in urban markets also defective weights are found. Thus, the grain of the farmer is weighed by a heavier weight for their own gain. Most of the traders keep separate weights for purchase and sale of grain.
- **Corrupt Policies of the 'Mandis':** Middlemen and the traders jointly make the innocent farmers fool. There are corrupt practices in the mandis. The farmers are paid low price, as they lack appropriate knowledge about market prices, their fluctuations, government policies etc. Thus, by keeping the rates secret, the farmers are cheated.
- **Rising government support** across a range of industrial sectors, and that current trade rules on industrial subsidies are not able to effectively tackle this support and that new rules are needed to ensure a level playing field.
- **Infrastructural Setbacks:** Due to inadequate upgraded export infrastructure such as ports, warehouses and supply chains, the average turnaround time for ships in India is about three days while the world average is 24 hours.
- **Crisis of MSMEs:** With a contribution of about 29% to the GDP and 40% to international trade, MSMEs are the key players in achieving the ambitious export targets. However, the surge in input and fuel costs are hitting the bottom lines of MSMEs.

Reforms needed in Economic policies of India:

- Address the underlying issues: address structural issues — HRC, skills, research and development (R&D), land management and institutional capacity.
- Attract large investment in manufacturing and advanced service: enhanced public sector outlay to 8% of GDP for education, skill development and public health, is another first step.
- Technology readiness: The reports (by McKinsey and the World Economic Forum) suggest that Industry 4.0 will be defined by new technologies such as robotics, 3-D printing, artificial intelligence (AI), the Internet of things (IoT).
- Build the capacity of public institutions: as per Nobel laureate (1993) Douglass C. North, it is necessary to build the capacity of public institutions. Policy reforms should promote a business-centric approach to create a friendly ecosystem and for efficient internal supply chain management.

Conclusion:

Innovations based on digital technology provide some hope for improving the financing of India's firms but regulations will have to catch up quickly and make sure that this can happen without introducing new kind of risk. In the final analysis, the new set of economic reforms being introduced with urgency by India's national government is barely scratching the surface of what needs to be done for the economy to sustain growth at rates that will once again start lifting millions out of poverty.

4. The dry zones of India need sustainable planning and efforts to ensure food and nutritional security. Elucidate.

Approach

1. ***The question focuses on the need sustainable planning and efforts to ensure food and nutritional security in dry zones of India.***
2. ***The tone of the question is to explain in detail. It points out the need for sustainable planning.***
3. ***The introduction should include the basic definition of dry zones along with some facts associated with the dry regions in India.***
4. ***Further elaborate your answer with a holistic explanation constituting why there is a need for need sustainable planning and also highlight the impact in the dry zones of India.***
5. ***Conclude on the lines that the drylands have to be targeted to increase productivity of food-grains through sustainable agriculture.***

Hints:

Dry regions are **economically fragile regions** which are highly vulnerable to environmental stress and shocks. Degraded soils with low water holding capacities along with multiple nutrient deficiencies and depleting ground water table contributes to low crop yields and further leading to land degradation.

Facts related to dry zones in India:

- According to the Government's data recently presented to the United Nations Convention to Combat Desertification (UNCCD), India lost 31%, or 5.65 million hectares (mha), of grassland area in a decade.
- The extent of degraded land in India is over 105 million hectares or about 32% of India's areas. India has witnessed an increase in the level of desertification in 26 of 29 states between 2003-05 and 2011-13.
- More than 80% of the country's degraded land lies in just nine states.

Category	Number of districts	
	2020	2019
Extremely wet	38	35
Moderately wet	71	70
Moderately dry	44	47
Extremely dry	14	15

Impact of dry zones in India:

- About 42 per cent of India is 'abnormally dry', according to the Drought Early Warning System (DEWS). This is around 6 per cent more than last year.
  - For example: The scarcity of water throughout April, May and June across Kashmir, led to a drought-like situation. This triggered panic among the farmers since they could not irrigate their fields and transplant the paddy saplings. Orchardists, predominantly apple growers, also faced problems in the absence of irrigation water.
- In an update released by the real-time drought watcher on May 28, the percentage of 'abnormally dry' area increased to 42.61 per cent from 42.18 per cent a week before (May 21). The increase is 0.45 per cent from April 28 when it was 42.16 per cent.
- The dry index has worsened over the last year when 36.74 per cent of the area in India was abnormally dry on May 28, 2018. There is an increase in the area under the 'severely dry' category from 15.93 per cent a week ago to 16.18 per cent on May 28.
- Little less than 6 per cent of the area is under the 'exceptionally dry' category. The area under exceptionally dry category went up from 0.68 per cent last year to 5.66 per cent this year.
- Some of the worst affected areas are in Telangana, Andhra Pradesh, Karnataka, Maharashtra, Gujarat and Rajasthan.
- The adverse weather conditions that have affected the main crops of the valley (apple and paddy) are expected to impact the food security of the region. The farmers are advised to pursue alternate crops but they expect support from the government in terms of crop insurance.

Need for sustainable planning in dry zones of India:

- **Technology Development:** Government can develop new seeds and improve the technology which will help to fix the problem of grain storage, improve irrigation coverage, make more effective use of fertiliser and manage soil better.

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- **Sustainable Food Systems:** Sustainability has to be achieved in production, value chains, and consumption. Climate-resilient cropping patterns have to be promoted. Instead of giving input subsidies, cash transfers can be given to farmers for sustainable agriculture.
- **Multi-Pronged Approach for Tackling Climate-Hunger Crisis:** Creating resilient livelihoods and food security solutions by protecting and improving the livelihood of vulnerable communities.
- **Adaptation Finance:** The recent pledges made by the developed countries on enhancing climate finance to support adaptation in developing countries is a welcome gesture. However, the current climate finance for adaptation and base of stakeholders remains insufficient to respond to worsening climate change impacts.

Conclusion:

The drylands have to be targeted to increase productivity of food-grains through sustainable agriculture, if India has to succeed in a second green revolution, without creating serious negative consequences to natural environment. Sustainable agriculture will certainly play the major role in this revolution. But there are some constraints for lower yield from Indian dry lands related to water.

5. Describe climate smart agriculture (CSA) and discuss a variety of measures adopted under the CSA in India and the world over.

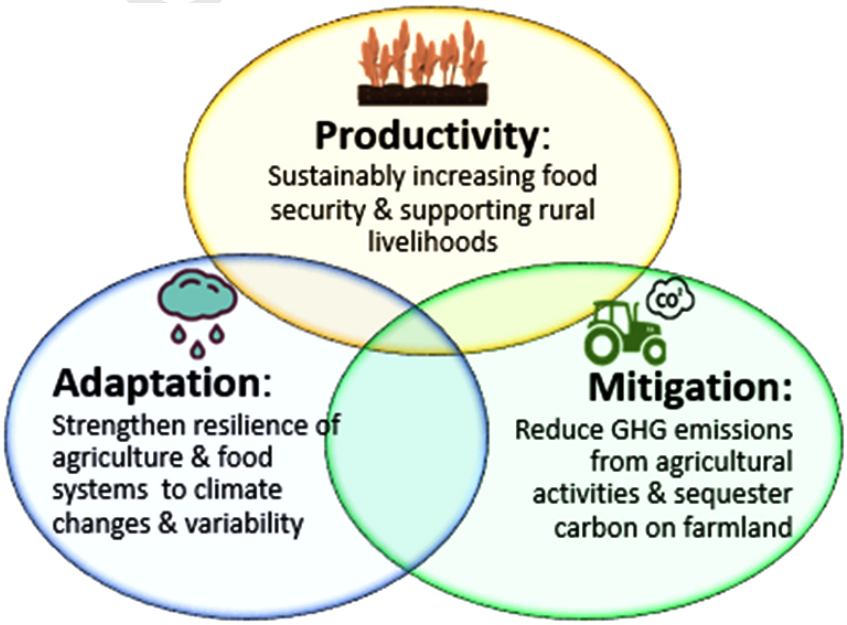
Approach

1. ***The question demands a demonstration of knowledge about CSA and the measures that India and countries across the world have adopted.***
2. ***Introduction: define climate smart agriculture (CSA)***
3. ***Describe features of CSA***
4. ***Describe the measures adopted by India and the world***
5. ***Conclude by reiterating the role of agriculture in climate change and its vulnerability and how the measures will help***

Hints:

The Food and Agriculture Organisation (FAO) first presented Climate Smart Agriculture (CSA) at the Hague Conference on Agriculture, Food Security and Climate Change. FAO defines CSA as an approach that guides actions to transform agricultural systems towards green and climate resilient practices.

CSA has 3 objectives: (can be depicted as a simple diagram in exam)



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Features of CSA:

1. Integrating climate change in the planning and development of agricultural systems
2. Multiple goals are integrated and trade-offs managed in CSA
3. CSA attempts to prevent the degradation of these ecosystem services like Maintenance of ecosystem services like food, water, regulation of bio-geo-chemical processes, habitat due to agricultural activities
4. Context specificity is ensured by CSA that is flexible based on the local climatic and soil conditions
5. Marginalised and vulnerable sections are included and considered like women, tribals, disabled who are more vulnerable to climate impacts
6. CSA has multiple entry points at different levels and is not a rigid set of practices, technologies, or methodologies- it is only a concept amenable to adaptation

Measures adopted under CSA in India:

1. **Policy:** National Mission for Sustainable Agriculture is a key mission of the 8 missions under India's National Action Plan for Climate Change which demonstrates a commitment towards including climate change considerations in agriculture management
2. **Finance:** National Adaptation Fund for Climate Change (NAFCC) supports climate adaptation and mitigation activities. Agricultural projects have been made eligible for funding under NAFCC
3. **Research and Development:** National Innovations on Climate Resilient Agriculture (NICRA) by ICAR to improve knowledge and awareness of farmers and other stakeholders in climate smart agriculture
4. National Institute on Rural Development and Panchayati Raj launched a project that introduced 25 CSA techniques in Bihar and MP where agriculture is particularly vulnerable to climate change
5. National Bank for Agricultural and Rural Development is the National Implementing Entity of the Kyoto Protocol in India and works to improve capabilities in climate adaptation and mitigation especially in agriculture
6. Zero Budget Natural Farming and promotion of Organic Farming like Paramparagat Krishi VikasYojna is dedicated to reduce the climate impacts of agriculture
7. Other schemes like PM KUSUM and PM Krishi Sinchayee Yojna aims to reduce the carbon footprint of agriculture by ensure sustainable water management for agriculture

Measures adopted across the world for CSA:

1. Global Alliance for Climate Smart Agriculture by FAO is an inclusive, voluntary and action-oriented multi-stakeholder platform on CSA
2. Koronivia Joint Work on Agriculture under UNFCCC recognises the key role played by Agriculture in tackling climate change
3. Nationally appropriate Mitigation actions (emerged from Bali 2007 COP) under UNFCCC has agriculture as one of the priority areas
4. World Bank's finance for agriculture also targets climate change adaptation and mitigation
5. Scaling up Climate Ambition in Land Use and Agriculture (SCALA) by FAO and UNDP encourages private sector in climate smart agriculture
6. Climate Shot announced at Glasgow COP 26 by Government of UK and CGIAR to improve investment in climate smart agriculture

7. In AIM 4 Climate Initiative, 30 countries -including Morocco and the UAE- have committed to increasing investments in technology, innovations, and public-private partnerships (PPPs) to enhance climate-smart agriculture and sustainable food systems

Conclusion:

Agriculture is not just a sector that is highly vulnerable to climate change; it also contributes to over 20% of the global carbon emissions thus being a cause of climate change. Measures advancing climate smart agriculture in India and across the world are thus a step in the right direction to improve resilience of agricultural systems.

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