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Agricultural Productivity Is Essential for Contributing the Country's Gross Domestic Product (GDP)

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Abstract:
Agricultural Productivity refers to the **ratio of agricultural outputs to inputs**. It is measured by the production (crops, livestock) per unit of input (land, labour, fertilizer, seeds) used in agricultural production. It **measures** how intensively the agricultural land is used for crop production. The Green Revolution cropping pattern of rice-wheat-rice, MSP regime and open-ended procurement encourage the status quo towards the cropping pattern.

Keywords: Agricultural Productivity, Gross Domestic Product, ratio of agricultural outputs to inputs, cropping pattern.

Introduction:
Agricultural Productivity is the quantitative measurement of the capacity of land in relation to crop yield. Agricultural Productivity signifies the total output or production from a given piece of land. Productivity is not simply the physical quality of land to provide greater yield per hectare, it is the product of both physical and technological factors. However, the simplest method to measure productivity is per-ha yield. Per-ha yield of land depends on: Physical factors & Technological Factors. Thus, productivity is not only the measurement of the capacity of the soil and the agricultural ecology but also the degree of mechanization and use of modern inputs and technology.
Agricultural Efficiency is a synonymous term to Agricultural Productivity, but it is different from it. Agricultural Efficiency is defined as the input-output ratio in an agricultural operation. It reflects the impact of modern inputs and technology in production and is dependent upon the responsiveness of soil and the agricultural ecology. It measures the increase in output with a given increase in inputs, which leads to an increase in profits. This extra profit earned on agriculture is reflected by the Agricultural Efficiency.

Elements of Agriculture productivity:
- **Cropping Intensity** refers to the number of crops grown on the same field within a given agricultural year. It measures how intensively the agricultural land is used for crop production.
- **Gross Cropped Area (GCA)** refers to the total area planted with crops, including areas sown more than once within the same agricultural year.
- **Net sown area (NSA)** represents the total area sown with crops and orchards during an agricultural year, but unlike gross cropped area, it counts each piece of land only once, regardless of multiple sowings.

Reasons behind Low Agriculture Value

1. Lack of Crop Diversification:

The agriculture of Punjab and Haryana are predominantly focused on **rice** and **wheat** due to policy incentives by the state. Furthermore, **84% of the Gross Cropped Area** is dedicated to these two crops.

2. Minimum Support Prices (MSP) Driven Agriculture

- Government-promoted Green Revolution cropping pattern: The Green Revolution cropping pattern of rice-wheat-rice, MSP regime and open-ended procurement encourage the status quo towards the cropping pattern.
- Subsidy Dependency**:** Reliance on free power and subsidized fertilizers disincentivizes diversification and shifts to high-value agricultural practices.

3. Lack of Sustainable Agricultural practices:

- 76% of Punjab's blocks face over-exploitation of groundwater resources due to high GCA allocation to water-guzzling crops like rice. This results in increased salinity of soil, high usage of chemicals and increased climate stress on agriculture.
- Moreover, the same cropping pattern for years extracts the specific nutrients from the soil, resulting in **soil deficiency**.
- Furthermore, **Johl Committee Recommendations** advised crop diversification in 1986 and 2002, but they largely remain unheeded.

Crop diversification:

- Crop diversification refers to the traditional approach of **low input-based extensive and diversified agricultural practices**. It is a strategy applied to **grow more diverse crops** from shrinking land resources with an increase in productivity in the same arable land.
- It includes addition of new crop(s) as intercrop and / or predecessor or successor crops, changing numbers of the crop (multi-cropping), modified cropping system and adopting a new, integrated cropping pattern with changing agronomical practices.

Need for Crop Diversification:

1. Increase Income on Small Land Holding

- **Growing high value crops:** The declining landholding size (more than 70% farmers with < 2 hectare land), requires diversification in existing cropping patterns with high value crops such as maize, pulses, etc. to augment income.
- **Mera Pani – Meri Virasat Scheme:** The Government of Haryana is incentivizing farmers to switch to other alternate crops instead of paddy by paying Rs. 7000 per acre.

2. Increase resource-use efficiency:

- **Shift from Mono cropping practice:** Mono-cropping pattern reduces resource-use efficiency. Thus, there is a need to introduce diverse crops and cropping patterns to revive the soil health and increase resource-use efficiency.
- Traditional pattern of agriculture in India has wider crop diversity. In the Garhwal Himalayan region of India, **Brahmana** is a crop diversification system for cultivating 12 crops in a year and is the traditional heritage of the area.

3. Prevent Soil Health Degradation

- The repetitive rice-wheat cropping pattern depletes specific soil nutrients and diminishes the

macrofaunal population. This impacts the soil's self-sustaining capabilities and leads to nutrient deficiencies.

4. **Economic Stability**

- **Aligning production with consumer demands:** Crop diversification, including the adoption of high-value cash crops, can potentially increase farmers' incomes by aligning production with changing consumer demands, as observed in the increased production of fruits and vegetables in India.
- **Mitigate price fluctuation:** Crop diversification can better tolerate the ups and downs in price of various farm products and it may ensure economic stability of farming products.

5. **Food and Nutritional Security:**

- **Improve nutritional security:** Crop Diversification can help in improving the socio economic status by adding quality to the food basket and addressing malnutrition, anemia, etc.
- **National Food Security Mission:** The Government of India is promoting increase in area under pulses and oilseeds through NFSM.

6. **Conservation:**

- **Reduction in usage of chemicals**: Adoption of crop diversification helps in reduced application of **pesticides and insecticides**.
- For example, introduction of legume in the rice-wheat cropping system has the ability to fix atmospheric Nitrogen to help sustain soil fertility.

Steps Taken to Promote Crop Diversification

1. **Crop Diversification Programme (CDP):**

- The Department of Agriculture & Farmers Welfare is implementing the Crop Diversification Programme (CDP), a sub-scheme of Rastriya Krishi Vikas Yojana (RKVY) in Haryana, Punjab & Western Uttar Pradesh since 2013-14 to divert the area of water intensive paddy crop to alternative crops like pulses, oilseeds, coarse cereals, nutri cereals, cotton etc.

2. **Support to State government:**

- Government of India is also supplementing the efforts of state governments to encourage diversified production of crops under **National Food Security Mission (NFSM)** and Mission for **Integrated Development of Horticulture (MIDH).**

3. **Public-Private Partnerships (PPP):**

- Encouraging partnerships between the government, private sector, and NGOs to promote research, provide financial support, and improve market access for diversified crops.

4. **Extension Services:**

- Financial assistance is being provided to the State Governments, Krishi Vigyan Kendras (KVKs), Indian Council of Agricultural Research (ICAR) Institutions, Central Government Institutions, Public Sector Undertakings (PSUs) etc. for Information, Education and Communication (IEC) activities for creating awareness on crop residue management and crop diversification.

5. **Crop Insurance Schemes:**

- Implementation of National Agriculture Insurance Scheme, which covers food crops, oilseeds and yearly commercial and horticulture crops.

Challenges to Crop Diversification

1. **Economic Challenges:**

- **Lack of Financial Support**: Small-scale farmers often lack the capital needed to invest in new crops, which can include the cost of seeds, new farming equipment, and technology.
- **Market Accessibility**: There's a significant challenge in accessing markets for non-traditional crops, including transportation logistics and finding buyers willing to pay fair prices.
- **Price Volatility:** New crops may be subject to high price volatility, deterring farmers from diversifying due to the risk of financial loss.

2. **Social and Cultural Challenges**

- **Resistance to Change:** Many farming communities have a deep-rooted tradition in cultivating specific crops, making them resistant to changing long standing agricultural practices.
- **Knowledge and Skills:** There's often a lack of knowledge and skills required to cultivate new crops, including understanding their specific needs and best practices for cultivation.

3. **Ecological Challenges**

- **Water Availability:** Water scarcity in many parts of India limits the ability to diversify crops, especially those that are water-intensive.
- **Climate Adaptability:** With the impact of climate change, crops that were once suitable for certain areas may no longer thrive, making diversification a moving target.

4. **Policy and Institutional Challenges**

- **Lack of Supportive Policies:** There's often a lack of government policies that actively support and incentivize crop diversification, including subsidies, insurance, and technical support.
- **Infrastructure Deficiencies**: Poor rural infrastructure, including roads and storage facilities, can hamper the distribution and sale of diversified crops.

Suggestions to Increase Agricultural Productivity in India

1. **Embracing Agroforestry:**

- Agroforestry combines trees, crops, and/or livestock, optimizing ecological and economic benefits through resource-efficient utilization.
- It produces a diverse range of products such as food, feed, fiber, fuel, etc., enhances food and nutritional security and supports livelihoods and fosters resilient agricultural environments.

2. **Government Support:**

- Policies that encourage market access, provide subsidies for diverse crops, and invest in infrastructure can incentivize diversification.
- **Pradhan Mantri Fasal Bima Yojana (PMFBY):** Central government scheme to provide aid and financial surety to the farmer.
- **Seed Crop Insurance:** The government has launched a pilot program for seed crop insurance, which covers the risk factors associated with the production of seeds.

3. **Research and Development:**

- Breeding programs and the development of climate-resilient crop varieties can reduce risks and improve the economics of diversified agriculture.

4. **Collaboration and Knowledge Sharing:**

- Farmers' networks and cooperatives can support knowledge exchange, market access, and collective bargaining, making diversification more viable.

- **National Mission for Sustainable Agriculture:** In 2014-15, the NMSA was launched to improve the efficiency of farming, the use of water, and soil health management. It also aims to synergize resource conservation across all parts of the country.

5. **Building Market Linkages:**

- Facilitating connections between farmers and reliable buyers, including supermarkets, restaurants, and direct-to-consumer channels, can improve market access and price stability.

6. **Investment in Infrastructure:**

- Strengthening cold storage, transportation facilities, and processing plants is crucial to ensure efficient and cost-effective management of diverse crops.

7. **Gramin Bhandaray Yojana:** A program created in 2001 to provide storage facilities for agricultural products in rural India and to promote grading, standardization, testing, and quality control to make the products more marketable.

Conclusion:

The path towards revitalizing Indian agriculture and boosting farmers' incomes requires moving beyond traditional staples. Punjab and Haryana need to embrace a demand-driven high-value agricultural system and need to shed the mindset of an MSP-based cropping system.

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