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Crop Pattern and Share of Agriculture in National Income: An Analysis of Punjab

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Abstract

Punjab, often referred to as the "Granary of India," witnessed a remarkable transformation in agriculture following the Green Revolution. The wheat–paddy cropping cycle significantly enhanced food production and strengthened national food security. However, the dominance of this monoculture system has led to serious challenges, including declining soil fertility, depletion of groundwater, soil degradation, environmental pollution, and increased financial vulnerability of farmers. In the current context, crop diversification emerges as a vital strategy for achieving sustainable agriculture and enhancing farmer incomes in Punjab. This paper evaluates the extent of crop diversification among farmers in the region and highlights how coordinated efforts by the government, agricultural universities, and farming communities can make agriculture both economically viable and environmentally sustainable.

Keywords: Cropping Pattern, Crop Diversification, Green Revolution, Groundwater, Agriculture, Punjab.

Introduction

India is an agricultural nation, and agriculture plays not only a critical role in economic development but also is the major source of livelihood for a big portion of the population. Agriculture has played a significant role in the Indian economy in the past. In this context, Punjab is known as the "Food Basket" of the country for its unique contribution in enhancing the food security of the country. Punjab has always been one of the top agricultural producing states owing to its fertile soil, favorable climate, well-developed irrigation system, and hardworking farmers.

Before the onset of the Green Revolution, Punjab's agri-structure was fairly diversified. Wheat, maize, pearl millet (bajra), sorghum (jowar), pulses, cotton, sugarcane, oilseeds, fodder and other crops were grown as per the requirements of the farmers. Such a diversified cropping system allowed the maintenance of soil fertility, limited the groundwater stress, and prevented farmers from depending on a single crop only. In addition, the diversification of crops helped to optimise the use of natural resources and the sustainability of agriculture in the long term. In the 1960s, the Green Revolution was introduced to overcome food shortages in the country. Under this initiative, high-yielding variety (HYV) seeds, chemical fertilisers, pesticides, tubewells, canal irrigation, and farm mechanisation were promoted on a large scale. Concurrently, the government's Minimum Support Price (MSP) and procurement policies incentivised farmers to adopt wheat and paddy cultivation extensively. Consequently, Punjab's cropping structure gradually became restricted to the wheat-paddy cycle. [2]

At first, this transformation resulted in a tremendous boost in production of food. Punjab became the first state in the country with maximum wheat and paddy production, and farmers' income increased significantly. This led to greater food security of the country and gave a new direction to Punjab's agrarian economy. But, in due course, the continued use of a consistent cropping rotation took a heavy toll. [3]

The continuous farming of wheat and paddy caused a marked drop in the groundwater levels, decreased soil fertility, pollution of the environment and health due to the excessive use of chemical fertilisers and pesticides and aggravated air pollution due to stubble burning. Also, increasing input prices, climate change, market constraints and monoculture farming negatively affected the economic livelihoods of farmers. This has posed a serious concern for sustainable agricultural development of Punjab. [4]

But, at present, it has been observed that diversification of cropping patterns is the need of the hour in Punjab as agricultural experts, policy makers and agricultural researchers have been stressing it. Switching to maize, pulses, oilseeds, horticulture, vegetables, fruit production, organic agriculture, natural farming and high value commercial crops can contribute to the preservation of natural resources and to better incomes for farmers, reduce agricultural risk, create new jobs and ensure sustainable agriculture[5] .Johl (1986), in his study on agricultural development in Punjab, noted that the Green Revolution contributed significantly to making Punjab the granary of India, though it increased reliance on a monocultural wheat-paddy cycle.[6]

Gill (1994) says that one of the keys to sustainable agriculture is to diversify crops. He pointed out that the continuous cultivation of a single crop renders the land infertile and puts at risk the farmers' incomes. [7]

In its report (2021), NITI Aayog highlighted crop diversification as a need in Punjab and emphasised enhancing marketing, processing and distribution networks. [8]

1.1 Shift in Farmers' Cropping Pattern in Punjab

The agricultural landscape of Punjab has undergone significant changes since the Green Revolution. Initially, the adoption of the wheat–paddy cycle ensured food security and boosted productivity. Over time, however, this monoculture practice has led to ecological stress, groundwater depletion, and reduced soil health. Farmers are now gradually exploring crop diversification as a sustainable alternative, aiming to balance economic gains with environmental stability.

Table 1.1: Percentage Distribution of Area Under Major Crops in Punjab

Year	Whet	Rice	Cotton /softness	Corn	Pulses	Gardening and more
1950-1951	27.3%	2.9%	5.4%	6.3%	23.8%	34.3%
1960-1961	29.6%	4.8%	9.5%	6.9%	19.1%	30.1%
1970-1971	40.5%	6.9%	7.0%	9.8%	7.3%	28.5%
1980-1981	43.5%	17.5%	9.6%	4.9%	5.0%	19.5%

1990-1991	43.6%	26.9%	9.3%	2.5%	1.9%	15.8%
2000-2001	44.0%	33.8%	6.0%	2.1%	0.7%	13.4%
2010-2011	44.5%	35.7%	6.7%	1.7%	0.3%	11.1%
2024-2025	44.9%	40.1%	2.2%	1.4%	0.4%	11.0%

Source: Statistical Abstract of Punjab, Economic and Statistical Organisation, Government of Punjab.

Table 1.1 highlights the transformation in Punjab's cropping pattern over the last seven decades. In 1950–51, the distribution of cultivated area reflected a diversified agricultural system: wheat occupied 27.3% of the total cropped area, paddy was limited to 2.9%, while pulses, millet, and other crops together accounted for 34.3%. This composition demonstrates that farmers in Punjab practised crop diversification during this period, cultivating a variety of crops rather than relying on a single crop cycle.

The cropping pattern in Punjab shifted markedly during the Green Revolution, particularly between 1960–61 and 1980–81. Wheat acreage expanded to 43.5%, while paddy rose to 17.5%, driven by factors such as high-yielding seed varieties, improved irrigation infrastructure, chemical fertiliser use, and the introduction of MSP policies. This wheat–paddy system became further entrenched between 1990–91 and 2010–11, with wheat stabilising around 44% of the cultivated area and paddy increasing from 26.9% to 35.7%. In contrast, traditional crops like cotton, maize, pulses, and others steadily declined, reflecting reduced crop diversity and growing dependence on the wheat–paddy cycle.

By 2024–25, wheat and paddy together dominate Punjab's agriculture, accounting for 44.9% and 40.1% of the cropped area, respectively. Meanwhile, cotton (2.2%), maize (1.4%), pulses (0.4%), and millet/other crops (11.0%) have been reduced to marginal shares. This overwhelming reliance on two crops has intensified pressure on natural resources, particularly groundwater, and has exacerbated environmental challenges, making Punjab's agriculture highly vulnerable

Table 1.1 illustrates the gradual transition of Punjab's agriculture from a diversified cropping system to a wheat–paddy dominated structure. While this shift enhanced productive capacity and strengthened national food security, it also created serious challenges such as groundwater over-exploitation, soil fertility decline, excessive reliance on chemical inputs, stubble management issues, and threats to

long-term sustainability. Therefore, the adoption of policies that promote crop diversification, efficient water use, soil health management, and cultivation of alternative crops is essential to ensure a more resilient and sustainable agricultural future for Punjab.

1.2 Share of Agriculture in National / State Income

Agriculture has historically been the backbone of India's economy, contributing significantly to both national and state income. In Punjab, the sector has played a pivotal role in driving growth, especially after the Green Revolution, when wheat and paddy cultivation surged. Over time, however, the relative share of agriculture in overall income has declined due to the expansion of industry and services. Despite this decline, agriculture remains crucial for Punjab's economy, providing livelihoods to a large portion of the population and shaping rural development.

Table 1.2: Share of Agriculture in GSDP/GDP and Dependent Population

Years	Agriculture's Share in GDP	Population dependent on Agriculture
1950-1951	51.8%	72.20%
1960-1961	42.5%	69.5%
1970-1971	37.0%	67.0%
1980-1981	32.5%	60.5%
1990-1991	29.5%	59.0%
2000-2001	22.3%	56.5%
2011-2012	17.9%	54.6%
2020-2021	20.2%	45.5%
2024-2025	17.9%	42.3%

Source: Compiled from Statistical Abstract of Punjab (Various Issues), Government of Punjab

Table 1.2 highlights the gradual decline in agriculture's contribution to Punjab's Gross State Domestic Product (GSDP), while showing its continued importance for employment. In 1950–51, agriculture

accounted for 51.8% of GSDP, with nearly 72.2% of the population directly or indirectly dependent on farming for their livelihood.

During the Green Revolution (1960–61 to 1980–81), agricultural production rose sharply, supported by high-yielding seeds, irrigation expansion, and policy support. Despite this growth, the share of agriculture in GSDP fell from 42.5% to 32.5% as the industrial and service sectors expanded. Nevertheless, a majority of the population continued to rely on agriculture, reflecting a gradual shift in the economic base.

From 1990–91 to 2011–12, rapid liberalisation, industrialization, and urbanization further reduced agriculture's share in GSDP. Dependency on agriculture also declined, from 59.0% to 54.6%, indicating the growing dominance of non-agricultural sectors in Punjab's economy.

Interestingly, in 2020–21, agriculture's contribution rose to 20.2% due to its resilience during the COVID-19 pandemic, when other sectors slowed down. This underscores the sector's stability and capacity to support the economy in times of crisis.

By 2024–25, however, agriculture's share in GSDP declined again to 17.9%, with 42.3% of the population still dependent on farming. This trend reaffirms the strong growth of the industrial and service sectors, while also highlighting that agriculture continues to remain vital for livelihoods in Punjab.

Issues Arising from the Shift in Cropping Pattern in Punjab

1. Excessive Groundwater Extraction:

The over-reliance on the wheat–paddy cycle has led to unsustainable levels of groundwater extraction. Continuous depletion of aquifers has now become a critical constraint on long-term agricultural productivity and sustainability in Punjab.

2. Loss of Soil Fertility:

Repeated monoculture practices combined with intensive use of chemical fertilisers have reduced soil fertility. This decline in soil health has negatively impacted land productivity and threatens the ecological balance of the region.

3. Overuse of Chemical Fertilisers and Pesticides:

The drive for higher yields has encouraged excessive application of fertilisers and pesticides. This not only contaminates the environment but also disrupts biodiversity and poses health risks to the population.

4. Stubble Burning:

The wheat–paddy rotation generates large amounts of crop residue. Farmers often resort to stubble burning as a quick disposal method, which contributes to severe air pollution, soil degradation, and public health hazards.

5. Farmers' Economic Insecurity:

Dependence on a narrow set of crops makes farmers vulnerable to market fluctuations, climate variability, and rising input costs. This has resulted in widespread economic insecurity, mounting debt levels, and financial distress among farming households.

Prospects for Cropping Pattern Shift

1. Promotion of Crop Diversification:

Encouraging farmers to cultivate crops such as maize, pulses, oilseeds, vegetables, fruits, and fodder alongside wheat and paddy can help conserve water resources and restore soil health. Diversification reduces ecological stress while improving farm incomes.

2. Development of Horticulture:

Punjab has strong potential for commercial cultivation of kinnow, guava, litchi, vegetables, and flowers. These crops require less water compared to paddy and offer higher profitability, making horticulture a sustainable alternative.

3. Promotion of Organic Farming:

Reducing dependence on chemical fertilisers and pesticides enhances soil fertility, improves produce quality, and ensures healthier yields. Organic farming also aligns with growing consumer demand for safe and eco-friendly food.

4. Value Addition and Agro-Processing:

Establishing agro-industries for processing and packaging maize, fruits, and vegetables can provide farmers with better prices and generate employment opportunities in rural areas. Value addition strengthens the agricultural supply chain and boosts profitability.

5. Government Support and Policy:

Effective policies are essential to popularise diversification. Measures such as Minimum Support Price (MSP) for alternative crops, crop insurance, access to credit, market support, and technical guidance can encourage farmers to adopt sustainable practices.

Recommendations

1. Promote the cultivation of maize, pulses, oilseeds, horticulture, and other crops as an alternative to wheat-paddy to reduce the level of dependency on wheat-paddy.

2. Develop an alternate procurement system and Minimum Support Price (MSP) for other crops so that farmers get good prices for their produce.

3. Ensure active participation of government, agricultural universities, scientists, farmers, and other agencies to achieve the goal effectively.

Conclusion

Punjab's agriculture has played a pivotal role in ensuring national food security since the Green Revolution. The wheat–paddy cropping system boosted production and farmer incomes, but it also placed immense pressure on groundwater and disrupted soil balance. Over time, the excessive use of fertilisers, pesticides, and other chemical inputs has harmed the environment and reduced the quality of produce.

In this context, crop diversification has emerged as a crucial strategy to conserve natural resources and sustain agricultural growth. Promoting alternative crops such as maize, horticultural products, and organic farming can help preserve Punjab's ecological base while enhancing profitability for farmers.

Although shifts in cropping patterns require time and adaptation, effective government policies, active participation of farmers, and scientific guidance are essential. With coordinated efforts, Punjab can

transform its agriculture into a system that is both economically viable and environmentally sustainable for the future.

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