
REVIEW ON THE PRODUCTION OF TEN MAJOR CROPS IN THE PURVANCHAL REGION OF UTTAR PRADESH, INDIA

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Abstract

The Purvanchal region of Uttar Pradesh is one of the most agriculturally significant zones of northern India. The region possesses fertile alluvial soils, abundant groundwater resources, and favorable climatic conditions that support diverse cropping systems. Agriculture remains the primary livelihood source for the majority of the rural population in districts such as Varanasi, Jaunpur, Azamgarh, Gorakhpur, Mau, Ballia, Deoria, Ghazipur, Bhadohi, and Ambedkar Nagar. The present review analyzes the production trends, economic significance, and cultivation characteristics of ten major crops cultivated in Purvanchal, namely rice, wheat, sugarcane, maize, barley, pulses, mustard, potato, lentil, and pigeon pea. The review further evaluates the challenges associated with declining soil fertility, climate variability, irrigation constraints, pest incidence, and market instability. Government interventions, technological advancements, and sustainable agricultural practices have also been discussed. The study highlights that rice–wheat cropping systems dominate the agricultural landscape of Purvanchal, while sugarcane and pulses contribute significantly to rural income generation and food security. Diversification toward oilseeds, pulses, and horticultural crops is gradually emerging as an important strategy for sustainable agricultural development in eastern Uttar Pradesh.

Keywords: Purvanchal, Uttar Pradesh, crop production, rice, wheat, sugarcane, pulses, agriculture, cropping pattern, food security.

1-Introduction-

Agriculture is the principal occupation and economic foundation of the Purvanchal region of Uttar Pradesh. Purvanchal, also known as Eastern Uttar Pradesh, comprises districts such as Varanasi, Jaunpur, Azamgarh, Mau, Ballia, Ghazipur, Gorakhpur, Kushinagar, Deoria, Maharajganj, Ambedkar Nagar, Sant Kabir Nagar, Siddharthnagar, and neighboring areas. The region forms an important part of the fertile Indo-Gangetic Plains, which are globally recognized for intensive agricultural productivity and food grain production. The fertile alluvial soils deposited by the Ganga, Ghaghara, Rapti, Gandak, and Gomti river systems support the cultivation of diverse crops throughout the year.

Agriculture in Purvanchal is characterized by high population dependence, small and fragmented landholdings, intensive cropping systems, and seasonal crop diversification¹. The majority of the rural population depends directly or indirectly on agriculture and allied sectors for livelihood and employment. Due to favorable climatic conditions, fertile soils, and extensive irrigation facilities through canals, tube wells, ponds, and rivers, the region supports the cultivation of cereals, pulses, oilseeds, sugarcane, vegetables, and horticultural crops. Rice and wheat dominate the agricultural landscape and constitute the backbone of the food grain economy of eastern Uttar Pradesh^{2,3}.

The Purvanchal region experiences a humid subtropical climate with hot summers, monsoon rainfall, and cool winters. Annual rainfall ranges from approximately 900 mm to 1300 mm, most of which is received during the southwest monsoon season. These climatic conditions favor Kharif crops such as rice, maize, pigeon pea, and sugarcane, while Rabi crops such as wheat, mustard, barley, lentil, and potato are

cultivated during winter⁴. The diversity in agro-climatic conditions enables farmers to adopt multiple cropping systems and crop rotations.

Among the major agricultural crops cultivated in Purvanchal, rice (*Oryza sativa*) occupies the largest area and serves as the staple food crop of the region. Traditional as well as high-yielding rice varieties are extensively cultivated in districts such as Gorakhpur, Siddharthnagar, Kushinagar, Ballia, and Mau. Special indigenous rice varieties such as Kalanamak rice have also gained national and international recognition because of their aroma, nutritional quality, and geographical identity⁵. Recent reports have identified Kalanamak rice as an important agricultural heritage crop and a significant contributor to rural economic development in Purvanchal.

Wheat (*Triticum aestivum*) is the second most important crop of the region and forms the basis of the rice–wheat cropping system, which is one of the largest agricultural production systems in the Indo-Gangetic Plains. The Green Revolution significantly increased wheat productivity in Uttar Pradesh through the adoption of improved seeds, irrigation facilities, fertilizers, and mechanization. Uttar Pradesh presently remains the leading wheat-producing state in India, contributing substantially to national food security⁶.

Sugarcane (*Saccharum officinarum*) is another economically important crop cultivated in eastern Uttar Pradesh. The crop supports sugar industries, jaggery production, ethanol manufacturing, and rural employment generation. Districts such as Kushinagar, Deoria, Gorakhpur, and Mau have historically been recognized as important sugarcane-growing belts. Expansion of sugarcane cultivation has contributed to commercialization of agriculture, although delayed payments, rising production costs, and water-intensive cultivation remain major concerns⁷.

Apart from cereals and sugarcane, pulse crops such as lentil (*Lens culinaris*), pigeon pea (*Cajanus cajan*), gram (*Cicer arietinum*), green gram, and black gram are extensively cultivated across Purvanchal. Pulses play a crucial role in nutritional security due to their high protein content and also improve soil fertility through biological nitrogen fixation. Oilseed crops such as mustard (*Brassica juncea*) are cultivated widely during the Rabi season and contribute to edible oil production and livestock feed industries⁸. Potato cultivation has also expanded significantly because of increasing market demand, cold storage facilities, and commercial profitability.

Climate change has emerged as another major challenge affecting crop production in eastern Uttar Pradesh. Erratic rainfall, floods, droughts, temperature fluctuations, and changing pest dynamics adversely affect agricultural productivity and farmer income. Flood-prone districts near the Ghaghara and Rapti river basins often experience severe crop damage during monsoon seasons, while drought conditions in some years reduce crop yields and water availability. These climatic uncertainties have increased the vulnerability of small and marginal farmers in Purvanchal.

Government initiatives such as the Pradhan Mantri Krishi Sinchai Yojana, National Food Security Mission, PM-KISAN, Soil Health Card Scheme, crop insurance programs, and promotion of Farmer Producer Organizations (FPOs) have attempted to improve agricultural productivity and farmer welfare in Uttar Pradesh. Modern agricultural technologies including micro-irrigation, improved seed distribution, soil testing, drone-based monitoring, and crop diversification programs are increasingly being promoted in the region.

Despite numerous constraints, agriculture in Purvanchal continues to contribute significantly to the economy of Uttar Pradesh and national food grain production. The region remains an important center for rice, wheat, sugarcane, pulses, and

oilseed cultivation. Sustainable agricultural practices, crop diversification, integrated nutrient management, organic farming, and climate-resilient technologies are becoming increasingly important for ensuring future agricultural sustainability and rural development.

Therefore, the present review aims to critically examine the production status, economic importance, cultivation trends, challenges, and future prospects of ten major crops cultivated in the Purvanchal region of Uttar Pradesh. The review also highlights the role of agriculture in food security, rural livelihoods, and sustainable development in eastern Uttar Pradesh.

2-Agro-Climatic Features of Purvanchal-

Purvanchal lies within the Middle and Eastern Gangetic plains of Uttar Pradesh. The region experiences a humid subtropical climate with three distinct seasons:

- Summer season (March–June)
- Monsoon season (July–September)
- Winter season (October–February)

The average annual rainfall ranges between 900–1,300 mm, most of which is received during the southwest monsoon. The soils are mainly alluvial, rich in potash and lime, but often deficient in nitrogen and organic matter.

Table 1. Agro-climatic Characteristics of Purvanchal Region

Parameter	Characteristics
Climate	Humid subtropical
Average rainfall	900–1300 mm
Major soil type	Alluvial soil
Major irrigation sources	Tube wells, canals, ponds
Dominant cropping pattern	Rice–wheat
Cropping seasons	Kharif, Rabi, Zaid

3-Major Crops of Purvanchal Region-

3.1-Rice (*Oryza sativa*)

Rice is the most important and extensively cultivated crop of the Purvanchal region. It is the principal Kharif crop and serves as the staple food for the majority of the population. The humid subtropical climate, fertile alluvial soils, and abundant monsoon rainfall create favorable conditions for paddy cultivation. Major rice-producing districts include Gorakhpur, Kushinagar, Siddharthnagar, allia, Mau, Azamgarh, and Jaunpur. Farmers cultivate both traditional and high-yielding varieties such as Sarju-52, MTU-7029, and Pusa Basmati. Aromatic varieties like Kalanamak rice are also famous in eastern Uttar Pradesh for their nutritional and commercial value. Rice cultivation contributes significantly to food security, employment generation, and the rural economy of Purvanchal. However, challenges such as flood damage, excessive water requirement, pest infestation, and declining soil fertility affect rice productivity in the region.

3.2-Wheat (*Triticum aestivum*)

Wheat is the second most important crop of Purvanchal and dominates the Rabi season. The rice–wheat cropping system forms the backbone of agricultural production in eastern Uttar Pradesh. Wheat is cultivated extensively in districts such as Jaunpur, Ghazipur, Varanasi, Ballia, Azamgarh, and Ambedkar Nagar. The introduction of improved irrigation systems, high-yielding varieties, fertilizers, and mechanization during the Green Revolution greatly enhanced wheat productivity in the region. Wheat serves as a major source of carbohydrates and contributes substantially to national food grain reserves. Despite its high production, wheat cultivation faces problems including rising input costs, terminal heat stress due to

climate change, and gradual depletion of soil nutrients caused by continuous cereal cultivation.

3.3-Sugarcane (*Saccharum officinarum*)

Sugarcane is an important commercial crop cultivated widely in the Purvanchal region, especially in districts like Kushinagar, Deoria, Gorakhpur, Maharajganj, and Mau. The crop requires fertile soils, warm temperatures, and sufficient irrigation facilities for optimum growth. Sugarcane supports sugar mills, jaggery industries, ethanol production, and rural employment opportunities. It is considered a high-income cash crop and contributes significantly to the agricultural economy of Uttar Pradesh. The by-products of sugarcane such as bagasse and molasses are also economically valuable. However, sugarcane cultivation is highly water-intensive and often affected by delayed payments from sugar industries, pest attacks, and increasing cultivation costs.

3.4-Maize (*Zea mays*)

Maize is another important cereal crop grown in Purvanchal during both Kharif and Rabi seasons. It is cultivated mainly in Gorakhpur, Maharajganj, Siddharthnagar, and neighboring districts. Maize is used as food, animal feed, poultry feed, and industrial raw material for starch and biofuel production. Due to its short duration and adaptability to different climatic conditions, maize is gaining popularity among farmers. Hybrid maize varieties have improved productivity and profitability in recent years. However, irregular rainfall, pest incidence, and inadequate post-harvest storage facilities remain major constraints affecting maize production in eastern Uttar Pradesh.

3.5-Barley (*Hordeum vulgare*)

Barley is cultivated as a Rabi crop in relatively dry and low-input agricultural lands of Purvanchal. The crop is mainly grown in areas where irrigation facilities are limited and soil fertility is comparatively low. Barley is important for animal feed, malt industries, and traditional food preparations. Compared to wheat, barley is more tolerant to drought and adverse environmental conditions. Although the area under barley cultivation has declined over the years due to expansion of wheat farming, it still remains significant for marginal farmers in the region. The crop requires fewer agricultural inputs and can be cultivated successfully under rainfed conditions.

3.6-Pulses (*Cicer arietinum*)

Pulse crops occupy an important place in the agricultural system of Purvanchal because they are rich sources of plant protein and improve soil fertility through biological nitrogen fixation. Major pulses cultivated in the region include gram (*Cicer arietinum*), lentil (*Lens culinaris*), pigeon pea (*Cajanus cajan*), green gram (*Vigna radiata*), and black gram (*Vigna mungo*). Pulses are generally grown under rainfed or low-irrigation conditions and require comparatively less water than cereal crops. Districts such as Jaunpur, Azamgarh, Ambedkar Nagar, Ballia, and Mau are important pulse-producing areas. Pulses play a major role in nutritional security and sustainable agriculture. However, low productivity, pest attacks, and market price fluctuations often discourage farmers from expanding pulse cultivation.

3.7-Mustard (*Brassica juncea*)

Mustard is the major oilseed crop cultivated during the Rabi season in Purvanchal. It is widely grown in districts such as Ballia, Ghazipur, Jaunpur, and Azamgarh. The crop is valued for edible oil production and the oil cake obtained after extraction is used as livestock feed. Mustard requires cool climatic conditions and moderate

irrigation for proper growth. In recent years, cultivation of mustard has increased because of rising demand for edible oils and government encouragement toward oilseed production. Nevertheless, the crop is susceptible to aphid infestation, fungal diseases, and temperature fluctuations during flowering and seed formation stages.

3.8-Potato (*Solanum tuberosum*)

Potato is an important commercial vegetable crop cultivated extensively in several districts of eastern Uttar Pradesh including Jaunpur, Ghazipur, and Varanasi. The crop is highly profitable due to increasing market demand, availability of cold storage facilities, and widespread consumer preference. Potato is used as a staple vegetable and also serves as a raw material for food processing industries such as chips and starch manufacturing. Improved varieties and scientific cultivation practices have increased potato productivity in the region. However, farmers often face challenges related to fluctuating market prices, high storage costs, and disease outbreaks such as late blight.

3.9-Lentil (*Lens culinaris*)

Lentil is an important winter pulse crop cultivated widely in Purvanchal under residual soil moisture conditions. It is particularly important in districts with medium to low irrigation facilities. Lentil is rich in protein, minerals, and dietary fiber, making it a valuable component of the regional diet. The crop improves soil fertility by fixing atmospheric nitrogen and therefore plays a significant role in sustainable farming systems. Lentil cultivation requires relatively low agricultural inputs and can be successfully grown after rice harvesting. Despite its importance, productivity remains low because of poor seed quality, disease incidence, and limited adoption of improved agricultural technologies.

3.10-Pigeon Pea (*Cajanus cajan*)

Pigeon pea, locally known as arhar, is a major pulse crop cultivated during the Kharif season in rainfed areas of Purvanchal. The crop is commonly grown in Ballia, Mau, Azamgarh, and neighboring districts. Pigeon pea is highly valued for its protein-rich seeds and drought tolerance. It is often cultivated in mixed cropping systems along with cereals and oilseeds. Deep root systems of pigeon pea improve soil structure and fertility, making it an ecologically beneficial crop. The crop contributes significantly to nutritional security and income generation for small farmers. However, yield losses due to insect pests, wilt disease, and erratic rainfall remain major production constraints.

4- Comparative Analysis of Major Crops-

Table 2. Major Crops and Their Characteristics^{9,10}

Crop	Season	Major Districts	Economic Importance
Rice	Kharif	Gorakhpur, Ballia, Mau	Staple food
Wheat	Rabi	Jaunpur, Ghazipur	Food security
Sugarcane	Annual	Kushinagar, Deoria	Sugar industry
Maize	Kharif/Rabi	Maharajganj	Feed and food
Barley	Rabi	Azamgarh	Malt industry
Pulses	Rabi/Kharif	Jaunpur, Ambedkar Nagar	Protein source
Mustard	Rabi	Ballia, Ghazipur	Oil production
Potato	Rabi	Varanasi, Jaunpur	Commercial vegetable
Lentil	Rabi	Azamgarh	Soil fertility
Pigeon pea	Kharif	Mau, Ballia	Pulse production



Fig-1 Some important crop of the Purvanchal region

5-Challenges in Crop Production in the Purvanchal Region-

5.1-Climate Change and Irregular Weather Conditions

One of the major challenges affecting crop production in the Purvanchal region is climate change and increasing weather irregularities. Agriculture in eastern Uttar Pradesh is highly dependent on monsoon rainfall, and variations in rainfall patterns directly influence crop productivity. Delayed monsoon onset, excessive rainfall, prolonged drought, and sudden temperature fluctuations frequently damage crops such as rice, wheat, pulses, and mustard. Flood-prone districts located near rivers such as Ghaghara, Rapti, and Gandak experience severe waterlogging during heavy monsoon seasons, leading to destruction of standing crops and soil erosion. Similarly, rising temperatures during the wheat grain-filling stage reduce grain quality and yield. Climate variability has therefore increased the vulnerability of small and marginal farmers in Purvanchal.

5.2-Small and Fragmented Land Holdings

The majority of farmers in Purvanchal possess small and fragmented agricultural landholdings. Due to continuous division of ancestral property, average farm sizes have decreased considerably over the years. Small landholdings limit the adoption

of modern agricultural technologies such as tractors, combine harvesters, sprinkler irrigation, and precision farming techniques. Fragmented fields also increase production costs and reduce overall efficiency. Because of limited land resources, farmers often practice intensive cultivation without adequate soil restoration, which negatively affects long-term agricultural sustainability and productivity.

5.3-Declining Soil Fertility

Continuous cultivation of rice–wheat cropping systems and excessive use of chemical fertilizers have resulted in gradual deterioration of soil fertility in the Purvanchal region. Deficiency of essential nutrients such as nitrogen, phosphorus, zinc, and organic carbon has become increasingly common in agricultural soils. Excessive dependence on urea and chemical inputs without proper organic manure application has reduced soil microbial activity and soil health. Soil erosion caused by floods and improper land management further contributes to nutrient depletion. Declining soil fertility reduces crop yield, increases input requirements, and affects the sustainability of agricultural production systems.

5.5-Poor Storage and Transportation Facilities

Inadequate storage and transportation infrastructure is another major challenge in crop production. Many villages lack scientific warehouses, cold storage units, and efficient transport systems. Perishable crops such as vegetables and potato often suffer heavy post-harvest losses due to poor storage conditions. In rural areas, damaged roads and insufficient transportation facilities delay market access and increase transportation costs. Post-harvest losses reduce farmer profits and contribute to food wastage.

5.6-Limited Crop Diversification

Agriculture in Purvanchal is heavily dominated by rice and wheat cultivation. Excessive dependence on cereal-based cropping systems has reduced biodiversity and increased pressure on soil and water resources. Farmers are often reluctant to adopt alternative crops such as oilseeds, pulses, medicinal plants, and horticultural crops due to uncertain market demand and lack of technical support. Limited crop diversification restricts income opportunities and reduces resilience against climatic and economic risks.

6-Government Initiatives and Agricultural Developmen-

Several schemes are helping improve agricultural productivity:

- Pradhan Mantri Krishi Sinchai Yojana
- PM-KISAN
- Soil Health Card Scheme
- National Food Security Mission
- Pulse Self-Reliance Mission

Government support for pulses, oilseeds, irrigation, and MSP procurement has increased agricultural growth in Uttar Pradesh.

7- Conclusion-

The Purvanchal region of Uttar Pradesh plays a crucial role in the agricultural economy of India. Rice and wheat dominate the cropping system, while sugarcane, pulses, maize, mustard, and potato contribute significantly to rural livelihoods and food security. Despite fertile soils and favorable climatic conditions, agriculture in the region faces multiple challenges including climate variability, declining soil fertility, fragmented landholdings, and market instability.

Modern agricultural technologies, improved irrigation, crop diversification, government support programs, and sustainable farming approaches can significantly enhance productivity and farmer income. Greater emphasis on pulses, oilseeds, and climate-resilient crops will help ensure sustainable agricultural development in Purvanchal.

8-References-

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