

Impact of Post-Green Revolution Agricultural Policies on Cropping Pattern Changes in Western Haryana

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ABSTRACT

The Green Revolution transformed Indian agriculture by introducing high-yielding varieties, assured irrigation, chemical fertilizers, mechanization, institutional credit, procurement support, and price incentives. Western Haryana became one of the important agricultural regions influenced by these policy-driven changes because of its semi-arid environment, expanding irrigation infrastructure, proximity to grain markets, and strong integration with state agricultural institutions. Post-Green Revolution agricultural policies significantly altered cropping patterns in the region by encouraging a shift from traditional mixed farming and coarse cereals toward wheat, paddy, cotton, mustard, and other market-oriented crops. These changes improved agricultural productivity and farm incomes in several areas, but they also produced spatial inequalities, ecological pressure, groundwater depletion, soil degradation, and declining crop diversity.

This research paper examines the impact of post-Green Revolution agricultural policies on cropping pattern changes in Western Haryana. The paper adopts a conceptual, analytical, and spatial perspective based on secondary sources such as agricultural census reports, state statistical abstracts, policy documents, scholarly studies, and geographical literature. It discusses how policies related to minimum support price, procurement, irrigation, fertilizer subsidy, farm mechanization, rural credit, extension services, and market development influenced farmers' crop choices. The analysis emphasizes that cropping pattern change did not occur uniformly across Western Haryana; it varied according to irrigation availability, groundwater depth, soil conditions, market access, farm size, and policy reach.

The paper argues that post-Green Revolution policies increased production orientation and commercial decision-making among farmers, but they also narrowed the ecological base of agriculture. Wheat, paddy, cotton, and mustard gained greater significance, while pulses, millets, fodder crops, and traditional crop combinations declined in several areas. The study concludes that future agricultural policy in Western Haryana must move beyond production maximization and support diversified, water-efficient, climate-resilient, and regionally suitable cropping systems.

Keywords-Green Revolution; Agricultural policy; Cropping pattern; Western Haryana; Rural transformation; Minimum support price; Irrigation development; Crop diversification; Groundwater depletion; Spatial analysis

1. INTRODUCTION

Agriculture has historically been the backbone of rural society in Haryana, shaping livelihood systems, land relations, settlement patterns, food security, and regional development. The Green Revolution, introduced in India during the mid-1960s, marked a decisive turning point in agricultural history. It promoted high-yielding varieties of wheat and rice, expansion of irrigation, intensive use of chemical fertilizers and pesticides, mechanization, institutional credit, and government procurement systems. These interventions were not merely technological; they were deeply connected with agricultural policy. Policies relating to input subsidy, price support, irrigation development, seed distribution, extension services, and rural infrastructure created a new production environment in which farmers increasingly responded to market signals and state incentives.

Haryana emerged as one of the most important states in the Green Revolution process. Although Punjab is often discussed as the leading example, Haryana also experienced rapid agricultural transformation after its formation as a separate state in 1966. Western Haryana, including districts such as Hisar, Sirsa, Fatehabad, Bhiwani, Jind, Rohtak, Charkhi Dadri and adjoining areas, presents a particularly significant case for geographical analysis. The region includes semi-arid tracts, canal-irrigated zones, tube-well-dependent villages, sandy soils, alluvial plains, and areas with varied access to markets and infrastructure. These conditions made the effects of post-Green Revolution policies spatially uneven and regionally differentiated.

Cropping pattern refers to the proportion of area under different crops at a given time and place. It reflects farmers' decisions regarding what to cultivate, how much land to allocate, and which crops to prioritize. These decisions are influenced by agro-climatic conditions, soil quality, irrigation availability, labour supply, input cost, market demand, risk perception, household consumption needs, and policy incentives. In a traditional

agrarian system, cropping patterns are usually diversified and closely tied to local ecology. However, after the Green Revolution, crop choices increasingly became linked to assured procurement, profitability, input availability, mechanization, and state-supported production systems.

In Western Haryana, the post-Green Revolution period witnessed a marked shift from subsistence-oriented and mixed cropping systems toward commercial and policy-supported crop combinations. Wheat became a dominant rabi crop due to high-yielding varieties, assured irrigation, fertilizers, and minimum support price. Paddy expanded in several irrigated pockets despite the semi-arid nature of the region because procurement policies and assured prices made it economically attractive. Cotton became important in southwestern districts due to climatic suitability and market demand. Mustard also gained importance in relatively drier areas because of its lower water requirement and suitability for semi-arid conditions. At the same time, traditional coarse cereals, pulses, and mixed crops declined in many areas because they received weaker policy support and lower market incentives.

The transformation of cropping patterns brought both benefits and challenges. On the positive side, it increased agricultural output, strengthened food grain supply, enhanced farm incomes, encouraged mechanization, and linked rural areas with wider markets. It also changed rural aspirations, consumption patterns, and investment behaviour. On the negative side, the dominance of a few crops reduced biodiversity and increased dependence on external inputs. Excessive irrigation and the spread of water-intensive crops contributed to groundwater decline in several areas. Fertilizer and pesticide use affected soil and environmental quality. Policy-supported specialization also made farmers vulnerable to market fluctuations, pest attacks, and climate variability.

The present research paper focuses on the impact of post-Green Revolution agricultural policies on cropping pattern changes in Western Haryana. It examines how policy instruments shaped farmers' choices and how those choices produced spatially differentiated rural transformation. The topic is important because cropping pattern change is not only an agricultural issue but also a geographical, ecological, economic, and social question. Understanding these changes can help design more balanced policies for sustainable agriculture, crop diversification, water conservation, and rural development in Western Haryana.

2. REVIEW OF LITERATURE

The literature on the Green Revolution in India emphasizes that agricultural transformation was driven by a combination of technology, state policy, and regional resource conditions. Early studies highlighted the success of high-yielding varieties, irrigation, fertilizers, and institutional support in increasing wheat and rice production. These studies regarded the Green Revolution as a major achievement in overcoming food shortages and improving national food security. However, later scholarship also examined its regional inequalities, ecological consequences, and social implications.

Several researchers have argued that the Green Revolution did not spread uniformly across India. It benefited regions with better irrigation, fertile soils, market access, credit facilities, and administrative support. Haryana, Punjab, and western Uttar Pradesh became major beneficiaries because they possessed relatively favourable physical and institutional conditions. Within Haryana also, regional variations emerged because canal irrigation, groundwater availability, soil texture, and farm size differed from one district to another. This makes spatial analysis essential for understanding agricultural change.

Studies on cropping pattern change show that farmers respond strongly to profitability, risk reduction, and policy signals. Minimum support price, procurement assurance, subsidized inputs, and extension services encouraged farmers to adopt wheat and paddy in areas where irrigation was available. These crops became preferred not only because of yield advantages but also because their marketing was less uncertain compared with crops such as pulses, oilseeds, and coarse cereals. Thus, policy support shaped cropping decisions by reducing market risk for selected crops.

Research on Haryana's agriculture has shown a major transition from traditional crops to wheat-rice, wheat-cotton, wheat-mustard, and other commercial rotations. In eastern and central irrigated areas, paddy expanded significantly. In western and southwestern Haryana, cotton, mustard, wheat, and gram-based patterns remained important depending on irrigation and soil conditions. However, even in semi-arid regions, farmers increasingly moved toward market-oriented cropping because of improved roads, mandis, mechanization, and institutional credit.

Environmental studies have raised concerns about the long-term sustainability of post-Green Revolution cropping systems. The expansion of water-intensive crops in water-stressed areas has contributed to groundwater depletion. Excessive fertilizer and pesticide use has affected soil health, while monocropping tendencies have reduced agro-biodiversity. These concerns are particularly relevant to Western Haryana, where rainfall is limited and groundwater extraction has increased in several pockets. Literature therefore suggests that production gains must be evaluated alongside ecological costs.

Another important strand of literature focuses on crop diversification. Scholars argue that diversification toward pulses, oilseeds, fodder crops, horticulture, and less water-intensive crops is necessary to reduce ecological stress and improve farm resilience. However, diversification remains limited where procurement, price

assurance, processing facilities, and market infrastructure are weak. Farmers often prefer policy-protected crops even when they are ecologically unsuitable because they provide more predictable returns. This creates a policy contradiction between sustainability goals and existing incentive structures.

Rural transformation literature links cropping pattern change with broader changes in livelihoods, income distribution, technology use, labour relations, and migration. In Western Haryana, mechanization reduced dependence on manual labour in several operations, while commercialization increased cash needs and market dependence. Changes in cropping patterns also affected demand for irrigation, credit, storage, transport, and agro-input services. Thus, cropping pattern change became a central indicator of rural transformation.

Overall, the existing literature shows that post-Green Revolution agricultural policies deeply influenced cropping patterns in Haryana. However, there is a need for focused spatial discussion on Western Haryana because the region combines semi-arid ecology with strong agricultural policy influence. This paper addresses that need by examining policy-driven cropping changes, regional differentiation, and sustainability challenges.

3. OBJECTIVES OF THE STUDY

The study is guided by the following objectives:

1. To examine the role of post-Green Revolution agricultural policies in shaping cropping pattern changes in Western Haryana.
2. To analyze the influence of minimum support price, procurement, irrigation, subsidies, credit, and extension services on farmers' crop choices.
3. To study the major shifts from traditional crops to wheat, paddy, cotton, mustard, and other commercial crops in Western Haryana.
4. To understand the spatial variation in cropping pattern changes across different ecological and irrigation zones of Western Haryana.
5. To identify the environmental and socio-economic consequences of policy-driven crop specialization.
6. To suggest policy measures for sustainable crop diversification and regionally suitable agricultural planning.

4. RESEARCH METHODOLOGY

The present research paper is conceptual, descriptive, analytical, and spatial in nature. It is based primarily on secondary sources of information related to agricultural policy, cropping patterns, rural transformation, and regional agricultural development in Haryana. The study uses a qualitative and interpretive approach to understand how post-Green Revolution agricultural policies influenced the cropping decisions of farmers in Western Haryana. Since the focus of the paper is to provide a research-based analytical discussion, it does not depend on primary field survey data; rather, it synthesizes available literature and policy evidence.

The secondary data sources include agricultural census reports, state statistical abstracts, district-level agricultural records, government policy documents, reports of the Ministry of Agriculture and Farmers Welfare, Haryana agricultural development reports, journal articles, books, theses, and research papers related to the Green Revolution, crop diversification, irrigation development, and rural change. These sources help identify long-term trends in cropping pattern change and provide a basis for interpreting the policy context behind those trends.

The geographical focus of the paper is Western Haryana. The region is treated as a spatial unit with internal diversity rather than as a uniform agricultural landscape. Differences in rainfall, canal irrigation, tube-well irrigation, soil type, groundwater depth, market access, and farm size are considered important explanatory variables. The study therefore adopts a spatial analytical perspective, examining why certain crops became dominant in some areas while other crops remained important in relatively dry or less irrigated zones.

The method of analysis is thematic and comparative. The thematic component examines major policy instruments such as minimum support price, procurement, irrigation expansion, fertilizer subsidy, mechanization, rural credit, and agricultural extension. The comparative component evaluates how these policy factors affected different crop groups, including wheat, paddy, cotton, mustard, pulses, coarse cereals, and fodder crops. The analysis also compares productivity-oriented benefits with ecological and socio-economic challenges.

The study has certain limitations. It is based on secondary data and conceptual interpretation, so it does not provide village-level empirical measurement. Cropping pattern changes may vary from one block or village to another, and such micro-level differences require detailed field investigation. Despite this limitation, the paper provides a useful analytical foundation for understanding the broad policy-driven transformation of cropping patterns in Western Haryana.

Post-Green Revolution Agricultural Policies: Conceptual Background

Post-Green Revolution agricultural policies were designed to increase food grain production, reduce dependence on imports, stabilize farm incomes, and strengthen national food security. These policies included the promotion of high-yielding varieties, expansion of irrigation, subsidy on fertilizers and electricity, provision of institutional

credit, public investment in research and extension, rural road development, regulated markets, and price support through minimum support price. Together, these measures changed the economic logic of farming. Farmers began to choose crops not only according to climate and soil but also according to assured returns, input access, and government support.

The minimum support price system played a crucial role in influencing cropping choices. When a crop is supported by an assured price and public procurement, farmers face lower marketing risk. Wheat benefited significantly from this system in Haryana. Paddy also expanded in many irrigated areas because procurement made it economically secure despite high water requirement. In contrast, crops such as pulses, millets, and certain oilseeds received weaker procurement support for long periods, making them less attractive even when they were ecologically suitable. This policy imbalance contributed to the narrowing of crop diversity.

Irrigation policy was another major factor. Canal systems, tube wells, rural electrification, and subsidized power increased the capacity of farmers to cultivate high-yielding and water-demanding crops. In Western Haryana, canal-irrigated areas and tube-well-accessible villages could adopt wheat, paddy, cotton, and high-input crop combinations more easily. However, areas with limited irrigation remained dependent on mustard, gram, bajra, and other drought-tolerant crops. This created spatial differentiation in cropping patterns.

Input subsidies further encouraged the adoption of Green Revolution crops. Fertilizer subsidy, improved seed distribution, pesticide availability, and mechanization support reduced the immediate cost of intensive farming. As farmers adopted high-yielding varieties, the demand for chemical inputs increased. Tractors, threshers, harvesters, pump sets, and other machines also became part of the new agricultural system. These changes favoured crops that could be cultivated at larger scale and marketed commercially.

Agricultural extension and research institutions also influenced cropping changes. Farmers received information about improved varieties, fertilizer doses, pest control, and cropping schedules. Universities, Krishi Vigyan Kendras, agriculture departments, and input dealers promoted modern practices. While these efforts improved production, they often emphasized yield maximization rather than ecological balance. As a result, policy and knowledge systems together encouraged crop specialization in several parts of Western Haryana.

Cropping Pattern Changes in Western Haryana

The cropping pattern of Western Haryana has undergone significant changes since the Green Revolution. Before the spread of modern agricultural technology, the region was characterized by mixed farming, rain-fed crops, coarse cereals, pulses, oilseeds, and fodder crops. Crop choices were closely linked with rainfall uncertainty, soil moisture, livestock needs, and household consumption. Bajra, gram, barley, jowar, pulses, mustard, and fodder crops formed important components of traditional agriculture. With the arrival of irrigation, improved seeds, fertilizers, and policy support, farmers gradually shifted toward more productive and market-oriented crops.

Wheat became the most important rabi crop in large parts of Western Haryana. Its expansion was supported by high-yielding varieties, irrigation, fertilizer responsiveness, mechanized harvesting, procurement facilities, and assured price. Wheat suited the winter season and responded well to controlled irrigation, making it a reliable crop for farmers. The combination of productivity and policy assurance made wheat a central element of post-Green Revolution cropping systems.

Paddy expansion is one of the most debated changes. Haryana is not naturally a high-rainfall rice-growing state, and Western Haryana is even more water-stressed than eastern parts. Yet paddy expanded in some irrigated pockets because of procurement assurance, market security, and profitability. Farmers adopted paddy where canal irrigation or groundwater extraction made it possible. This shift illustrates how policy incentives can encourage crops beyond their natural agro-ecological suitability. It also shows the tension between economic rationality and environmental sustainability.

Cotton became important in districts such as Sirsa, Fatehabad, and Hisar due to climatic suitability, sandy loam soils, and market demand. Cotton cultivation linked farmers with commercial agriculture and agro-processing networks. However, cotton also exposed farmers to pest attacks, pesticide use, price volatility, and input risks. The rise and fluctuation of cotton cultivation reveal how cropping patterns are influenced by both policy and market conditions.

Mustard gained importance in relatively dry parts of Western Haryana because it requires less water than paddy and is suitable for semi-arid conditions. It became a significant rabi crop in areas where irrigation was limited or where farmers sought an alternative to wheat. However, the level of policy support and procurement confidence for mustard has often been weaker than wheat and paddy, limiting its expansion potential despite its ecological suitability.

The decline of coarse cereals and pulses is another major feature of cropping pattern change. Bajra, gram, and pulses are important for nutrition, soil fertility, and dryland resilience, but their area declined in several regions due to lower profitability, weaker procurement, labour changes, and the attraction of high-yielding cereals. This decline has implications for dietary diversity, fodder availability, soil health, and climate resilience. It shows that production-centered policy can unintentionally reduce the diversity of traditional agricultural systems.

Role of Minimum Support Price, Procurement and Market Incentives

Minimum support price and procurement systems have been among the most powerful instruments shaping cropping patterns in Western Haryana. Farmers tend to prefer crops for which price risk is low and market absorption is relatively assured. Wheat and paddy benefited from strong procurement networks, government purchase mechanisms, and mandi-based marketing. This created confidence among farmers that their produce would be sold at a remunerative price. As a result, these crops expanded even in areas where ecological conditions were not always ideal.

The attraction of MSP-supported crops is not limited to price alone. It also includes the assurance of timely sale, standard grading, familiar marketing channels, availability of commission agents, storage support, and credit linkages. In many villages, the cropping decisions of farmers are influenced by the local mandi system and by expectations regarding government procurement. Crops that do not receive similar market support are often considered risky, even if they are suitable for the local environment.

The policy preference for wheat and paddy created a skewed incentive structure. Farmers received a clear economic signal to produce these crops, while pulses, millets, and diversified crops remained comparatively less attractive. Crop diversification campaigns often face difficulty because farmers compare alternative crops with the assured returns of wheat and paddy. Unless diversification crops receive reliable procurement, processing, storage, and price assurance, farmers may be reluctant to shift.

Market incentives also affected cotton and mustard. Cotton is linked with private trade, ginning units, textile demand, and export conditions. Its profitability fluctuates with market prices and pest pressure. Mustard is influenced by edible oil demand, oilseed markets, and procurement intervention. These crops show that farmers in Western Haryana are not simply policy-dependent; they also respond to market opportunities. However, when market uncertainty is high, policy-backed crops become more attractive.

Thus, MSP and procurement policies have had a decisive influence on cropping pattern change. They improved food grain production and supported farmer income, but they also reduced the relative attractiveness of ecologically suitable but weakly supported crops. A balanced future policy must therefore redesign incentives so that water-saving and nutrient-rich crops become economically competitive.

Irrigation Development and Spatial Differentiation

Irrigation development has been central to post-Green Revolution agricultural change in Western Haryana. The region receives relatively low and variable rainfall, making irrigation a key determinant of crop choice. Canal irrigation, tube wells, pump sets, and rural electrification enabled farmers to reduce dependence on monsoon rainfall and adopt high-yielding varieties. Where irrigation became reliable, the cropping pattern shifted more strongly toward wheat, paddy, cotton, and other commercial crops.

Spatial differentiation is clearly visible in Western Haryana. Canal-command areas show different cropping behaviour from groundwater-dependent or rain-fed areas. Villages with assured canal water have greater capacity to cultivate water-demanding crops and maintain multiple cropping intensity. Areas dependent on deep or declining groundwater face higher irrigation costs and greater risk. In such areas, farmers may prefer mustard, bajra, gram, fodder crops, or less water-intensive rotations, though economic pressure sometimes still pushes them toward high-value crops.

The spread of tube wells changed the relationship between farmers and water. Groundwater allowed farmers greater control over irrigation timing, but it also led to over-extraction in many pockets. Subsidized electricity and pump technology made groundwater use economically attractive in the short term. However, declining water tables increased long-term vulnerability. The expansion of paddy in unsuitable or marginally suitable areas intensified this concern because paddy requires large quantities of water.

Soil type also interacts with irrigation. Sandy and sandy-loam soils in parts of Western Haryana have different water-retention capacities compared with heavier alluvial soils. Crops such as cotton and mustard may perform better in certain semi-arid conditions, while paddy requires more sustained water availability. Therefore, cropping pattern change cannot be explained by policy alone; it must be understood through the interaction of policy, irrigation, soil, and farmer decision-making.

The spatial impact of irrigation policy is therefore two-sided. It enabled agricultural intensification and increased productivity, but it also deepened regional differences and ecological stress. Future planning must adopt micro-regional approaches rather than uniform recommendations. Water availability, groundwater status, soil type, and climate risk should guide crop planning in Western Haryana.

Socio-Economic Effects of Cropping Pattern Change

Cropping pattern changes in Western Haryana have produced major socio-economic effects. The shift toward wheat, paddy, cotton, and other market-oriented crops increased cash income for many farmers. Higher productivity allowed households to invest in tractors, tube wells, education, housing, consumer goods, and non-

farm activities. Rural markets expanded as demand increased for seeds, fertilizers, pesticides, machines, transport, repair services, and credit institutions.

Farm mechanization increased significantly with the spread of Green Revolution crops. Tractors, harvesters, threshers, sprayers, and irrigation pumps reduced manual labour requirements in several operations. This changed rural labour relations and created new forms of dependency on machines and fuel. Large and medium farmers benefited more easily from mechanization, while small farmers often depended on rental services. Thus, cropping change contributed to both productivity growth and class-based differentiation.

The commercialization of agriculture increased farmers' dependence on markets and credit. High-input crops require investment in seeds, fertilizers, pesticides, irrigation, machinery, and labour. Farmers therefore became more linked with banks, cooperative societies, moneylenders, commission agents, and input dealers. While institutional credit helped support modern agriculture, rising input costs also increased financial risk, especially when crops failed due to pests, weather variability, or market fluctuations.

Livestock and fodder systems were also affected. Traditional mixed farming maintained a close link between crops and livestock. The decline of certain fodder crops and coarse cereals affected fodder availability in some areas. At the same time, increased crop residues from wheat and paddy changed feeding practices. The transformation of cropping patterns therefore influenced not only crop production but also the broader rural economy.

Social aspirations also changed. Agricultural success after the Green Revolution encouraged education, mobility, land investment, and diversification into non-farm occupations. However, benefits were not equally distributed. Farmers with larger landholdings, better irrigation access, and capital resources adopted new crops and technologies more effectively. Marginal farmers faced greater constraints and risks. Thus, policy-driven cropping change contributed to rural transformation but also created new inequalities.

Environmental Consequences and Sustainability Concerns

The environmental consequences of post-Green Revolution cropping pattern change are now among the most serious concerns in Western Haryana. Intensive agriculture increased food production, but it also placed pressure on water, soil, biodiversity, and the rural ecological system. The expansion of water-demanding crops in a semi-arid region is particularly problematic. Groundwater depletion has become a major issue in several areas where extraction exceeds recharge.

The dominance of wheat-paddy or wheat-based rotations can affect soil health. Continuous cultivation of similar crops reduces nutrient balance and may increase the need for chemical fertilizers. Excessive use of nitrogenous fertilizers can degrade soil quality and contribute to environmental pollution. Pesticide use, especially in cotton-growing areas, has also raised concerns about ecological toxicity, pest resistance, and health risks.

Reduced crop diversity is another sustainability challenge. Traditional crops such as millets, pulses, gram, and mixed fodder crops contributed to ecological balance, nutrition, and resilience under uncertain rainfall. Their decline has reduced agro-biodiversity and increased dependence on a narrow set of crops. Narrow cropping systems are more vulnerable to climate shocks, pest outbreaks, market instability, and input price increases.

The rise of mechanized and input-intensive agriculture also affects energy use. Pumping groundwater, operating machines, transporting produce, and producing fertilizers require substantial energy. This links cropping pattern change with broader concerns of carbon emissions and climate change. While the Green Revolution was successful in increasing production, the next phase of agricultural development must integrate energy efficiency, water conservation, and ecological restoration.

Sustainability concerns do not mean that modern agriculture should be rejected. Rather, they indicate that the policy framework must be redesigned. Cropping patterns should be aligned with agro-ecological suitability. Water-efficient crops, pulses, oilseeds, horticulture, agroforestry, and integrated farming systems need stronger support. Without such changes, Western Haryana may face increasing stress on natural resources and declining long-term agricultural viability.

5. CHALLENGES AND BARRIERS TO CROP DIVERSIFICATION

Crop diversification is widely recommended for Western Haryana, but several barriers limit its adoption. The first barrier is economic risk. Farmers are reluctant to shift away from wheat and paddy because these crops provide relatively predictable returns due to MSP and procurement. Alternative crops may be ecologically suitable but economically uncertain. Without assured markets, farmers perceive diversification as risky.

The second barrier is weak processing and value-chain infrastructure. Pulses, oilseeds, fruits, vegetables, and medicinal crops require storage, grading, processing, transport, and timely marketing. If these facilities are unavailable or poorly developed, farmers may suffer losses despite good production. Cropping pattern change therefore requires not only crop advice but also market-system development.

The third barrier is knowledge and extension limitation. Many farmers are familiar with wheat, paddy, cotton, and mustard production practices, but they may lack technical knowledge about alternative crops. New crops

require information about seed, sowing time, pest management, irrigation schedule, post-harvest handling, and market requirements. Extension systems must therefore support diversification with practical training.

The fourth barrier is farm-size constraint. Small and marginal farmers often cannot experiment easily because crop failure can threaten household income. They may prefer established crops even when returns are moderate because risk is lower. Crop diversification policy must therefore include insurance, credit support, buy-back arrangements, and farmer producer organizations.

The fifth barrier is policy contradiction. While governments promote diversification and water conservation, strong procurement incentives continue to support wheat and paddy. Farmers respond rationally to the strongest incentive available. Therefore, real diversification requires policy alignment, not only awareness campaigns.

6. SUGGESTIONS AND POLICY IMPLICATIONS

Agricultural policy in Western Haryana should move from production-centered planning to sustainability-centered regional planning. The first requirement is to design region-specific cropping strategies. Areas with severe groundwater stress should be encouraged to shift away from water-intensive crops through incentives, technical support, and assured markets for alternatives. Areas suitable for mustard, pulses, millets, fodder, horticulture, and agroforestry should receive targeted support.

Minimum support price and procurement systems should be broadened and made more effective for diversified crops. Farmers will adopt alternative crops only when they are confident about price and market access. Procurement of pulses, oilseeds, and millets should be strengthened where these crops are suitable. Price deficiency payment systems, contract farming safeguards, and farmer producer organizations can help reduce market risk.

Water governance should become central to cropping policy. Groundwater mapping, micro-irrigation, canal water management, rainwater harvesting, and water budgeting should guide crop planning. Subsidies should promote water-saving technologies such as drip irrigation, sprinkler systems, laser land levelling, and direct seeded rice where appropriate. Electricity and irrigation incentives should be aligned with conservation objectives.

Extension services should promote climate-smart and resource-efficient agriculture. Farmers need practical knowledge about crop rotation, soil health cards, integrated nutrient management, integrated pest management, residue management, and diversified farming systems. Demonstration plots and village-level training can help reduce hesitation toward new crops.

Agro-processing and rural value chains must be developed. Diversification cannot succeed without cold storage, warehouses, grading centres, processing units, transport facilities, and market linkages. Public-private partnerships and cooperative models can support value addition. This would create rural employment and reduce dependence on a few major crops.

Finally, policy should recognize the social dimension of cropping pattern change. Small farmers require special support through credit, insurance, group farming, custom hiring centres, and guaranteed market channels. Sustainable transformation will be possible only when ecological goals are combined with farmer income security.

7. CONCLUSION

Post-Green Revolution agricultural policies have had a deep and lasting impact on cropping pattern changes in Western Haryana. Policies related to high-yielding varieties, irrigation, fertilizer subsidy, institutional credit, mechanization, minimum support price, procurement, and agricultural extension encouraged farmers to move from traditional mixed cropping systems toward more commercial and policy-supported crops. Wheat became the dominant rabi crop, paddy expanded in irrigated pockets, cotton gained importance in southwestern districts, and mustard remained significant in relatively dry areas. At the same time, coarse cereals, pulses, and traditional mixed crops declined in several parts of the region.

The analysis shows that cropping pattern change in Western Haryana was not merely a result of farmer preference or technological progress. It was shaped by policy incentives, market assurance, irrigation access, input availability, and spatial differences in natural resources. The same policies produced different outcomes in different locations depending on groundwater, canal irrigation, soil type, farm size, and market connectivity. Therefore, the agricultural transformation of Western Haryana must be understood through a spatial and policy-based perspective.

The benefits of these changes are significant. Agricultural productivity increased, farm incomes improved, rural markets expanded, mechanization developed, and the region became more integrated with national food systems. However, the costs are also serious. Groundwater depletion, soil degradation, reduced crop diversity, chemical dependence, and vulnerability to climate risk have become major concerns. The production-oriented model that worked during the food-scarcity phase is no longer sufficient for the present sustainability challenges.

In conclusion, future agricultural policy in Western Haryana must encourage diversified, water-efficient, climate-resilient, and regionally suitable cropping systems. Crop diversification will succeed only when farmers receive reliable price support, market infrastructure, technical guidance, irrigation reforms, and risk protection. The goal should not be to reverse agricultural modernization but to make it ecologically balanced and socially sustainable. A spatially sensitive policy approach can help Western Haryana move toward a more resilient rural future.

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