International Journal of Advanced Research and Multidisciplinary Trends (IJARMT)
An International Open Access, Peer-Reviewed Refereed Journal
Impact Factor: 7.2 Website: https://ijarmt.com ISSN No.: 3048-9458

Land Ownership Patterns, Land Use Dynamics and Agricultural Practices in Mahendergarh District, Haryana: A Geographical Analysis

Dr. Hardeep Singh
Assistant Professor, In Geography, Hindu College Sonipat

Abstract
The present study examines the patterns of land ownership, land use classification and agricultural production systems in Mahendergarh district of Haryana. The study highlights the predominance of small and marginal land holdings, resulting primarily from inheritance-based land fragmentation, which significantly affects agricultural productivity and sustainability. It also explores the changing dynamics of urban and semi-urban land ownership driven by urbanization, infrastructure development and institutional land allocation. The research analyzes operational land holdings by size groups, land use patterns, irrigation practices, cropping systems and crop production trends in the district. Particular emphasis is placed on major cropping systems such as Cotton–Wheat, Pearl Millet–Mustard and Rice–Wheat, along with the production of pulses like gram and moong. The study further discusses the impact of legal frameworks, government policies and socio-economic factors on land management and agricultural development. The findings reveal that while smaller holdings dominate land distribution, challenges such as land disputes, soil degradation, water scarcity and declining cultivable land require sustainable land management strategies, land consolidation and improved agricultural practices to enhance productivity and ensure long-term environmental sustainability.

Keywords: Land Ownership, Operational Holdings, Land Use Pattern, Agricultural Productivity, Irrigation, Cropping Systems, Mahendergarh District, Haryana.

Introduction

The agricultural and urban land ownership landscape in Mahendergarh District, Haryana, is a vivid show of the multifaceted nature of land management and its implications for local communities. Small and marginal farmers hold a significant portion of the agricultural terrain, individuals who manage less than 2 hectares for either subsistence or small-scale commercial agriculture. This scenario is further complicated by the widespread fragmentation of land holdings, a direct consequence of inheritance traditions that distribute land across multiple heirs, leading to smaller and less economically viable plots. This fragmentation presents considerable challenges to agricultural productivity and sustainability. In contrast, the urban and semi-urban sectors of Mahendergarh are experiencing shifts due to ongoing urbanization and development, leading to increased commercial and residential projects. This growth is partly driven by government and institutional land ownership, earmarking significant parcels for public utilities, infrastructure projects and educational facilities, reflecting a deliberate effort to guide the district's development trajectory.

Legal frameworks and policies, notably land ceiling laws, aim to mitigate disparities in land ownership by limiting the amount of land that individuals or families can own. Meanwhile, initiatives to modernize land records seek to enhance transparency and efficiency

in land management, a crucial step towards resolving disputes and facilitating transactions. The economic landscape, too, plays a pivotal role in shaping land ownership patterns. The viability of farming, juxtaposed with the lure of alternative employment opportunities, influences decisions to sell or lease land, signaling a dynamic interplay between traditional livelihoods and emerging economic trends. Challenges such as disputes over land titles, inheritance conflicts and inaccuracies in land records underscore the complexities of land ownership in Mahendergarh. Navigating these challenges requires access to accurate and updated information, underscoring the importance of consulting with local government bodies like the District Collector's Office or the Land Records Department of Haryana and engaging with academic research for deeper insights into this evolving landscape. In Mahendergarh District of Haryana, India, the dynamics of land ownership and usage encapsulate a complex interplay of historical, legal and socioeconomic factors. The district's landscape is marked by diverse landholdings, ranging from small-scale agricultural plots to residential and commercial developments, alongside areas earmarked for governmental and institutional purposes. The agricultural sector, in particular, is dominated by small and marginal farmers managing plots often no larger than two hectares. This phenomenon is attributed to traditional inheritance customs that lead to the subdivision of land among heirs, further challenging agricultural productivity and economic viability. Urban and semi-urban areas within Mahendergarh reflect a blend of residential and commercial spaces guided by urban planning regulations. The government's role in land ownership is significant, with allocations for public utilities, educational institutions and administrative buildings that contribute to the district's infrastructure and development. Legislative measures such as the Land Ceiling Acts and tenancy laws, aim to ensure equitable land distribution and balance the interests of landowners and tenants, highlighting the government's intent to foster a fair and productive land use system.

Operational Holdings of Land by Size Groups in Mahendergarh District, 2010-11

The operational holdings of land by size groups in Mahendergarh district provide critical insights into the agricultural land distribution pattern among farmers. These holdings are generally classified into different categories based on their size, such as marginal (less than 1 hectare), small (1-2 hectares), semi-medium (2-4 hectares), medium (4-10 hectares) and large (above 10 hectares). In Mahendergarh, like many other districts in Haryana, land fragmentation is a significant issue, with a predominant share of marginal and small landholders. This trend indicates a rise in subsistence farming, where farmers cultivate primarily for their consumption rather than large-scale commercial production. The district also exhibits a decline in large land holdings due to factors like population pressure, land inheritance patterns and urbanization. The distribution of operational holdings plays a crucial role in shaping agricultural productivity, mechanization feasibility and access to credit and government schemes. A higher concentration of small and marginal holdings often leads to difficulties in adopting advanced agricultural practices, impacting overall farm output and economic sustainability. Therefore, policies focused on land consolidation, cooperative farming and improved irrigation infrastructure are essential to enhance agricultural efficiency in Mahendergarh district.

International Journal of Advanced Research and Multidisciplinary Trends (IJARMT)
An International Open Access, Peer-Reviewed Refereed Journal
Impact Factor: 7.2 Website: https://ijarmt.com ISSN No.: 3048-9458

The operational holdings of land by size groups in Mahendergarh District for the year 2010-20 can be understood as a classification of agricultural land based on the area size controlled or managed by individuals or entities for farming purposes. In 2010-11, these holdings were likely categorized into various groups such as marginal, small, semi-medium, medium and large. The operational land holdings data is crucial for planning agricultural policies, implementing land reforms and ensuring equitable distribution of resources to promote sustainable agricultural development in Mahendergarh District.

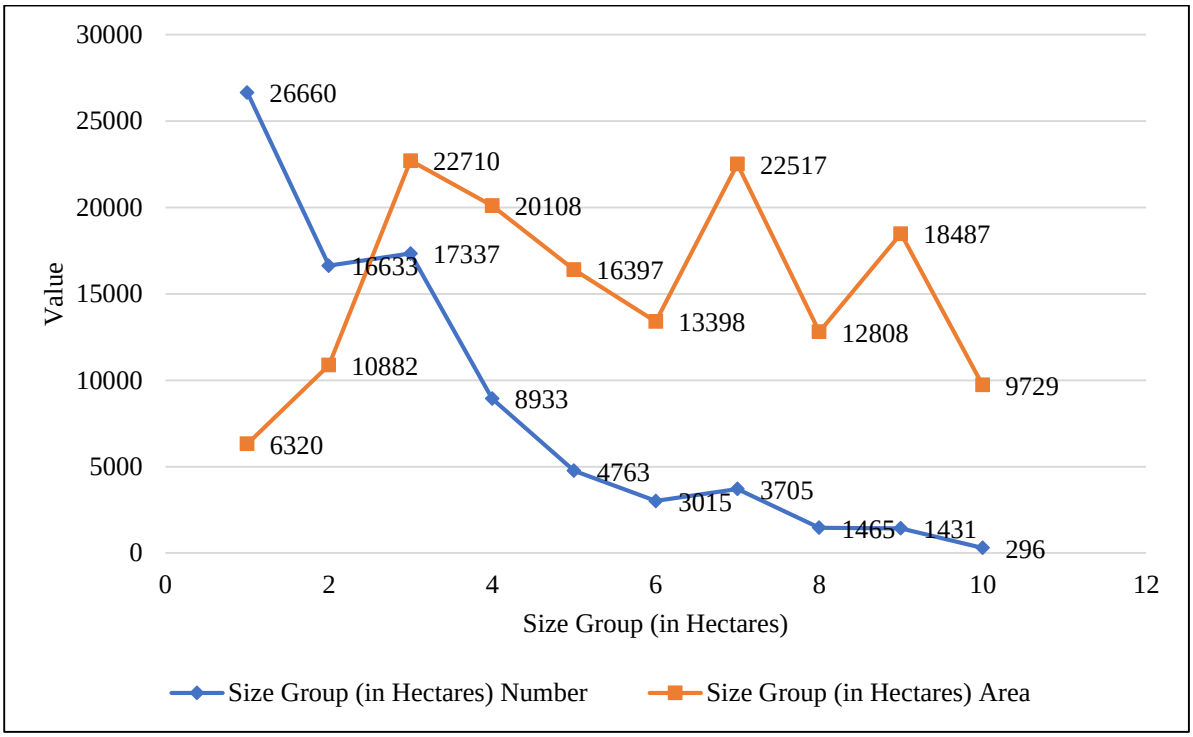
Table 1: *Group-Wise Number and Area of Operational Holdings in Mahendergarh District, 2010-11 (Area in Hectares)*

Size Group (in Hectares)	**Mahendergarh District**	
	Number	**Area**
Below 0.5	26,660	6,320
0.5—1.0	16,633	10882
1.0—2.0	17337	22710
2.0—3.0	8933	20108
3.0—4.0	4763	16397
4.0—5.0	3015	13398
5.0—7.5	3705	22517
7.5—10.0	1465	12808
10.0—20.0	1431	18487
20.0 and above	296	9729
Total	**84238**	**153336**

Source: Statistical Abstract of Haryana

International Journal of Advanced Research and Multidisciplinary Trends (IJARMT)
An International Open Access, Peer-Reviewed Refereed Journal
Impact Factor: 7.2 Website: https://ijarmt.com ISSN No.: 3048-9458

Figure 1: *Group-Wise Number and Area of Operational Holdings in Mahendergarh District, 2010-11*



Source: Based on table 1

Table 1 shows the number and area of operational holdings in Mahendergarh District in hectares for 2010-11. The size groups show agricultural properties' distribution and extent. Among the 26,660 property below 0.5 hectares, 6,320 hectares are covered. This indicates many tiny farms. Number of holdings and total area covered by each category alter as holdings grow. 0.5–1.0 hectare holdings total 16,633 and cover 10,882 hectares. A decline in holdings occurs as size increases, however the total area covered grows for larger holdings up to the 5.0-7.5 hectares group, which includes 3,705 holdings spanning 22,517 hectares. Beyond this category, the number of holdings and their area decline, yet 1,431 holdings covering 10.0 to 20.0 hectares encompass 18,487 hectares. There are 296 holdings of 20.0 hectares or more, although they cover 9,729 hectares. This Table shows Mahendergarh District's agricultural land allocation, with smaller holdings dominating and bigger operational holdings managing broad regions.

Land Use Pattern

Land use patterns represent the way land is organized and utilized within a specific area, influenced by a mix of geographical, economic, socio political and environmental factors. This organization is crucial for urban planning, sustainable development, environmental conservation and resource management, reflecting the allocation of land for diverse functions such as residential, commercial, industrial, agricultural, recreational and conservation purposes. Residential areas are dedicated to housing, varying from dense urban neighbourhoods to sparse rural settings. Commercial zones focus on business and trade, hosting a variety of shops, offices and services. Industrial areas are earmarked for the

International Journal of Advanced Research and Multidisciplinary Trends (IJARMT)
An International Open Access, Peer-Reviewed Refereed Journal
Impact Factor: 7.2 Website: https://ijarmt.com ISSN No.: 3048-9458

production and distribution of goods, ranging from light to heavy industrial uses. Agricultural lands, on the other hand, are utilized for farming activities including both crop production and livestock raising. Recreational spaces such as parks and sports facilities, offer leisure and social opportunities, while conservation areas are protected for their environmental, historical, or cultural value. The careful planning and management of these land use patterns are essential for creating balanced, sustainable environments that meet the needs of their populations while preserving natural resources and ecosystems.

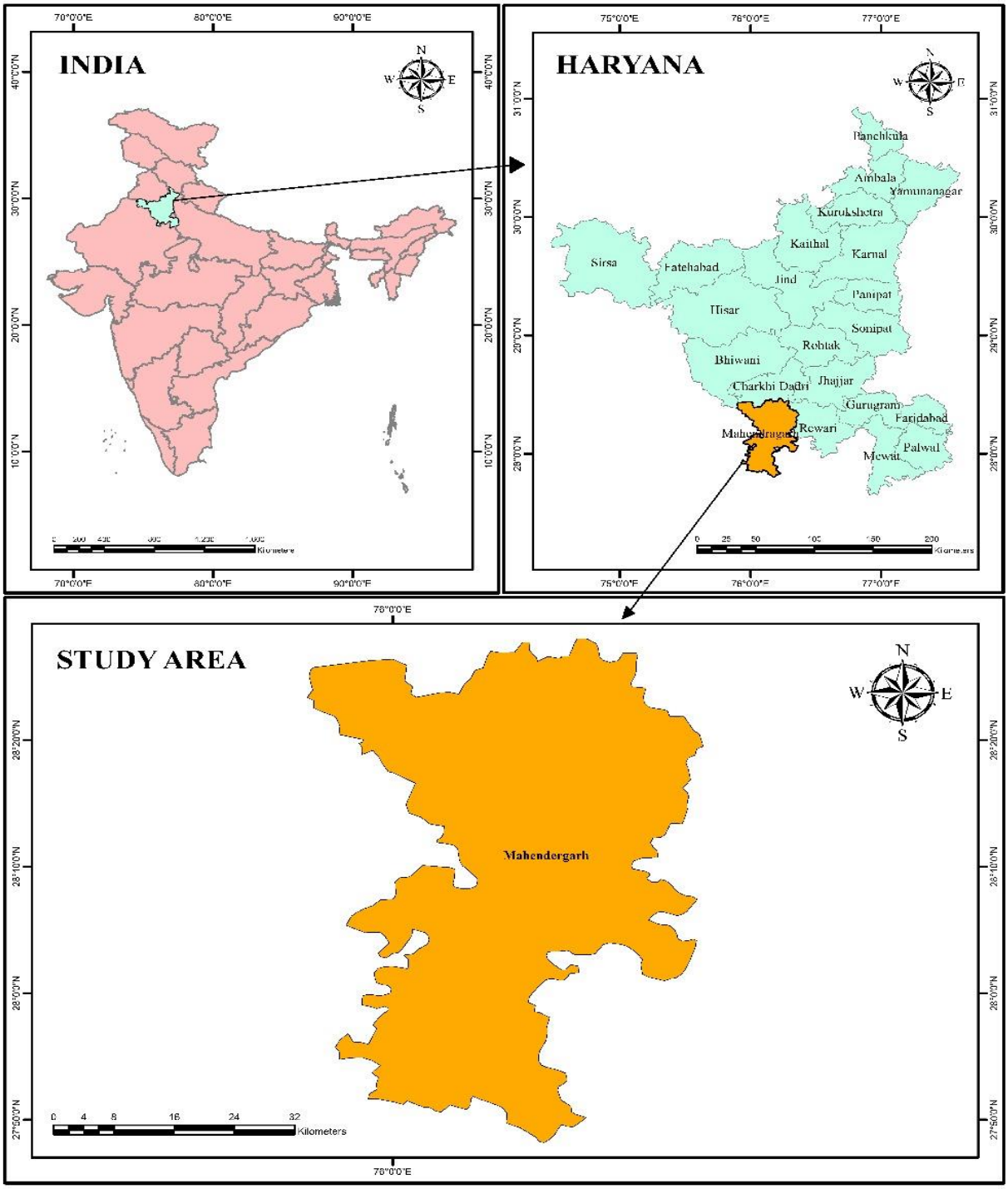
The total irrigated area refers to the sum of all land that is supplied with water through artificial means to support crop growth. This encompasses various methods of irrigation such as surface irrigation (including flood or furrow irrigation), sprinkler irrigation, drip or trickle irrigation and sub-irrigation, among others. The purpose of irrigation is to ensure adequate moisture is available for crops to thrive, especially in regions where rainfall is insufficient or unevenly distributed throughout the growing season. The total irrigated area is a crucial metric in agriculture and water resource management, as it directly impacts food security, agricultural productivity and the sustainability of water resources. It indicates the extent to which agricultural land can be cultivated more reliably and with higher productivity, contributing significantly to the overall agricultural output of a region or country. The term irrigated area refers to land that receives water through artificial means to support plant growth, particularly in agriculture. This includes a wide range of irrigation techniques such as drip irrigation, which delivers water directly to the plant roots; sprinkler irrigation, which simulates rainfall; surface irrigation, where water is applied to the soil surface and allowed to soak in; and sub-surface irrigation, where water is supplied below the soil surface. Irrigation is essential for maintaining crops, especially in areas with insufficient rainfall, drought conditions, or during periods of the year when rainfall does not meet crop water needs. By providing a reliable water source, irrigation enhances plant growth, helps to stabilize yield and can significantly increase agricultural productivity, making it a critical component in food production and water management strategies worldwide.

The total area sown refers to the cumulative land area on which seeds have been planted or crops have been sown over a specific period, typically within a particular agricultural season or year. This measure encompasses all types of crops including cereals, fruits, vegetables, fodder and other agricultural products, across different sowing cycles. It's an important indicator in agriculture as it provides insight into the extent of land utilization for crop production. The total area sown can vary from one season to another, influenced by factors such as weather conditions, water availability, market demand and changes in farming practices. This metric is crucial for understanding agricultural productivity, planning resource allocation and assessing food security. The total area sown represents the overall land area where seeds have been planted or crops have been cultivated within a specific timeframe, usually within an agricultural season or an entire year. This measure includes all types of crops, ranging from staple cereals like wheat and rice to fruits, vegetables, fodder and other agricultural products. It accounts for both single and multiple sowing cycles, meaning that if a piece of land is used for more than one crop in a year, it is counted separately for each cycle.

International Journal of Advanced Research and Multidisciplinary Trends (IJARMT)
An International Open Access, Peer-Reviewed Refereed Journal
Impact Factor: 7.2 Website: https://ijarmt.com ISSN No.: 3048-9458

This metric is crucial for understanding agricultural productivity, land utilization patterns and food security. It helps in analyzing farming trends, assessing the impact of climatic conditions and formulating policies for sustainable agricultural development. The total area sown serves as an essential indicator of a region's agricultural potential and economic dependence on farming activities.

Map 1: *Location of the Study Area*



Source: Prepared by Research Scholar with the helped ARC-GIS

International Journal of Advanced Research and Multidisciplinary Trends (IJARMT)
An International Open Access, Peer-Reviewed Refereed Journal
Impact Factor: 7.2 Website: https://ijarmt.com ISSN No.: 3048-9458

The district administration has implemented several programs in order to encourage entrepreneurial endeavors and to provide assistance for the development of these enterprises. In the same way that many other places in India are vulnerable to natural catastrophes like earthquakes, floods and droughts, the Mahendergarh district is also prone to these dangers. In an effort to lessen the severity of the effects of these catastrophes and to give assistance to individuals who have been impacted, the district administration has implemented a number of initiatives. The district administration is responsible for maintaining a network of flood shelters and relief camps in the event of floods. These shelters and camps are stocked with basic supplies such as food, water and medical services. A well-established disaster management system is also in place within the district. This system includes early warning systems, evacuation strategies, as well as rescue and relief activities. During times of drought, the administration of the district takes a number of different actions, including the distribution of drinking water, the supply of food and water for animals and the conservation of water and the recharging of groundwater. For the purpose of providing emergency relief, rescue and rehabilitation operations, as well as assessing and mitigating damages to infrastructure, the district administration collaborates closely with the state and central government agencies in the case of earthquakes.

District of Mahendergarh located in the state of Haryana in India to be specific. The districts of Rewari, Jhajjar and Bhiwani are all included within the boundaries of this district. It is possible to split the Mahendergarh district into a number of different subdivisions, such as Narnaul, Mahendergarh and Kanina. The Mahendergarh district has a historic history that is both rich and diverse, with influences coming from a variety of different time periods and civilizations.

Classification of Land in Mahendergarh

Land Not Available for Cultivation refers to the portion of land that cannot be used for agricultural activities due to various natural and human-induced factors. This category encompasses land that is either barren and unculturable or allocated for non-agricultural purposes. Barren and unculturable land includes areas with rocky, desert, or hilly terrains that are not suitable for farming due to their infertile soil, extreme climatic conditions, or topographical constraints. These lands remain largely unproductive and are often left unused for agricultural activities. These lands contribute to urbanization and economic growth, supporting human habitation, transportation networks and industrial expansion. The conversion of natural or agricultural land for non-agricultural purposes plays a crucial role in societal development, supporting urbanization, industrialization and infrastructure expansion. However, such transformations must be carefully managed to ensure environmental sustainability and long-term agricultural viability.

In semi-arid districts like Mahendergarh, where water resources are limited and irrigation options are constrained, the availability of cultivable land is significantly affected by multiple factors. Soil degradation, driven by overuse, salinity and nutrient depletion, can render agricultural land less productive or even unusable over time. Urban expansion and industrial growth further reduce farmland, limiting the scope for agricultural activities and increasing

International Journal of Advanced Research and Multidisciplinary Trends (IJARMT)
An International Open Access, Peer-Reviewed Refereed Journal
Impact Factor: 7.2 Website: https://ijarmt.com ISSN No.: 3048-9458

pressure on existing resources. Additionally, environmental challenges such as desertification, deforestation and excessive soil erosion accelerate land degradation, making it imperative to adopt sustainable land management practices. Strategic planning, including afforestation, soil conservation techniques and efficient land-use policies, is essential to balance development with environmental protection, ensuring that agricultural productivity and ecological stability are maintained for future generations.

Government policies related to land-use planning and conservation efforts play a crucial role in managing this category, ensuring sustainable land utilization while balancing developmental needs. The state of Haryana, known for its agricultural prominence, utilizes a well-defined classification system to categorize its agricultural land. The classification includes parameters such as the net area sown, culturable area, area sown more than once and total cropped area. This categorization aids in understanding the agricultural practices, planning resource allocation and analyzing temporal changes across districts. The data presented below highlights year-wise trends and district-wise distribution, providing insights into the agricultural dynamics of the state.

Production of Crops

The majority of the people living in Haryana are employed in agricultural activities, making it a predominantly agricultural state. Grains such as wheat, rice, maize and bajra are the most important grains that are grown in the state. The harvesting of crops in Haryana can be broadly classified into two distinct seasons- Rabi and Kharif. Sugarcane, groundnuts, maize and paddy are the primary crops that are grown during the Kharif season in the state. Chilies, bajra, jawar, pulses and vegetables are the minor crops that are grown during the Kharif season. In each of the three ecologies that make up the state, the cotton–wheat cropping system (CWCS), the pearl millet–mustard cropping system (PMCS) and the rice–wheat cropping system (RWCS) are the primary cropping systems that are utilized. Crop production with Pearl millet-Mustard and Cluster bean-Wheat, dairy farming and the cultivation of vegetable crops such as Cucurbits, Okra, Tomato, Brinjal, Chilly, Onion, Carrot and Radish are the primary agricultural methods that are utilized in Mahendergarh. In addition, the district is home to orchards that contain citrus and guava plants. Bajra, cotton, guar, wheat, gram, barley and mustard are some of the most important crops that are grown in this district. In addition, the district is highly productive in terms of the production of fruits and vegetables.

The Cotton–Wheat Cropping System (CWCS) is a widely practiced agricultural system in regions with semi-arid and irrigated conditions, particularly in North-Western India, including Punjab, Haryana and Rajasthan. In this system, cotton is grown during the kharif (monsoon) season**,** while wheat is cultivated in the rabi (winter) season. Cotton, being a cash crop, requires warm temperatures and a long growing period, whereas wheat is a staple food crop that thrives in cooler conditions. This cropping system benefits from the complementary nature of the two crops, as cotton depletes soil nutrients, but wheat helps restore soil fertility when supplemented with proper fertilization. However, challenges such as water scarcity, pest attacks (especially on cotton) and soil degradation due to intensive cultivation require the

adoption of sustainable practices like crop rotation, integrated pest management and efficient water-use techniques.

The Pearl Millet–Mustard Cropping System (PMCS) is predominantly followed in arid and semi-arid regions, such as Rajasthan, Haryana and Gujarat, where rainfall is low and drought resistance is essential for crop survival. Pearl millet (Bajra) is a hardy crop grown in the kharif season**,** well-suited to sandy soils and limited water availability. Mustard, a crucial oilseed crop, is cultivated in the rabi season**,** taking advantage of residual soil moisture left by pearl millet. This system is highly beneficial for dryland agriculture, as both crops are relatively tolerant to harsh conditions and require minimum irrigation. However, low soil fertility and erratic rainfall can affect yields. Improved agronomic practices, such as intercropping, use of drought-resistant varieties and efficient fertilizer application, can enhance productivity and ensure food and income security for farmers in water-scarce regions.

The Rice–Wheat Cropping System (RWCS) is one of the most dominant and widespread cropping systems in India, especially in the Indo-Gangetic Plains, covering states like Punjab, Haryana, Uttar Pradesh and Bihar. In this system, rice is grown in the kharif season, requiring substantial water for submerged cultivation, followed by wheat in the rabi season, which thrives in cooler temperatures. While RWCS has contributed significantly to food security in India, it faces major sustainability concerns, including groundwater depletion due to excessive irrigation, declining soil fertility and increased dependency on chemical fertilizers. Additionally, the burning of rice stubble after harvest leads to severe air pollution. To address these issues, conservation agriculture practices such as direct-seeded rice (DSR), zero tillage for wheat, crop residue management and diversification with alternative crops are being promoted to enhance soil health and water efficiency while maintaining high productivity.

Production of Gram and Moong in Mahendergarh District in 2022-23

In Mahendergarh District, the production of gram (chickpea) and moong (green gram) plays a notable role in the region's pulse cultivation. Gram, typically grown as a rabi crop, is sown in the cooler months of the year and harvested in the spring. It is favored for its drought tolerance and its ability to thrive in the less fertile soils prevalent in Mahendergarh. Moong, on the other hand, is usually cultivated during the kharif season but can also be grown as a summer crop due to its short growing cycle. It requires relatively little water compared to other crops, making it suitable for the semi-arid conditions of the district. Both crops are integral to the dietary habits of the local population and contribute to the agricultural diversity and sustainability of the region.

In the Mahendergarh district, the 2022-23 agricultural season marked a significant period for the cultivation of gram and moong, showcasing the adaptability and resilience of these crops in response to evolving agricultural practices and environmental conditions. The production of gram, a crucial rabi crop, likely saw enhancements through the adoption of improved seed varieties and better water management techniques, aiming to increase yield while conserving resources. Moong, a preferred kharif season legume, might have benefited from advancements in sustainable farming practices such as crop rotation and integrated pest

management, highlighting its role in enhancing biodiversity and soil health. These efforts in cultivating gram and moong not only underscored the district's commitment to sustainable agriculture and food security but also reflected a broader trend towards optimizing crop production to meet the changing dietary needs and environmental challenges of the region.

References:

1. Bhatt, R., Kukal, S. S., Arora, S., Busari, M. A., & Yadav, M. (2016). Sustainability issues on rice–wheat cropping system. *International Soil and Water Conservation Research, 4*(1), 64–74. (pp. 64–74)
2. Central Ground Water Board. (2011). *Mahendragarh district groundwater profile* (pp. 1–22). Ministry of Water Resources, Government of India.
3. Central Ground Water Board. (n.d.). *Aquifer mapping and management plan: Mahendragarh district, Haryana* (pp. 1–85). Ministry of Jal Shakti, Government of India.
4. Choudhary, M., Rana, K. S., Bana, R. S., Pooniya, V., Dass, A., & Pooniya, A. K. (2017). Energy budgeting and carbon footprint of pearl millet–mustard cropping system under semi-arid conditions. *Energy, 141*, 1052–1058. (pp. 1052–1058)
5. Coventry, D. R., Poswal, R. S., Yadav, A., Gupta, R. K., Gill, S. C., Chhokar, R. S., Kumar, V., Sharma, R. K., Kumar, A., Mehta, A., Kleemann, S. G. L., & Cummins, J. A. (2011). Effect of tillage and nutrient management on wheat productivity and quality in Haryana, India. *Field Crops Research, 123*(3), 234–240. (pp. 234–240)
6. Das, T. K., Saharawat, Y. S., & Bhattacharyya, R. (2014). Conservation agriculture in cotton–wheat cropping system of western Indo-Gangetic Plains. *Field Crops Research, 156*, 107–115. (pp. 107–115)
7. Department of Agriculture & Cooperation. (2012). *Agriculture census 2010–11: All India report on number and area of operational holdings* (pp. 45–72). Ministry of Agriculture, Government of India.
8. Department of Agriculture & Farmers Welfare. (2014). *Agriculture census 2010–11: Table reports* (pp. 1–96). Ministry of Agriculture & Farmers Welfare, Government of India.
9. Department of Agriculture & Farmers Welfare. (2023). *Land use statistics at a glance (2010–11 to 2019–20)* (pp. 23–68). Government of India.
10. Department of Economic and Statistical Analysis, Haryana. (2011). *Economic survey of Haryana 2010–11* (pp. 112–148). Government of Haryana.
11. Department of Economic and Statistical Analysis, Haryana. (2012). *Statistical abstract of Haryana 2010–11* (pp. 210–245). Government of Haryana.
12. Government of Haryana. (1972). *The Haryana Ceiling on Land Holdings Act, 1972* (pp. 1–38). Government of Haryana.
13. Government of Haryana. (1948). *The East Punjab Holdings (Consolidation and Prevention of Fragmentation) Act, 1948* (pp. 1–26). Government of Haryana.
14. Government of Haryana, Revenue Department. (n.d.). *Jamabandi: Haryana land records information system*. Haryana State Electronics Development Corporation. (2026). *Web-HALRIS: Land record management system*.

15. Niroula, G. S., & Thapa, G. B. (2005). Impacts and causes of land fragmentation and lessons learned from land consolidation in South Asia. *Land Use Policy*, *22*(4), 358–372. (pp. 358–372)
16. Office of the Registrar General & Census Commissioner, India. (2011). *District census handbook: Mahendragarh (Haryana)* (pp. 15–180). Government of India.
17. Parihar, C. M., Jat, S. L., Singh, A. K., Kumar, B., Yadav, O. P., & Jat, M. L. (2010). Nutrient management in pearl millet–mustard cropping system. *Indian Journal of Agronomy*, *55*(2), 98–104. (pp. 98–104)
18. Planning Commission. (2013). *State development report: Haryana* (pp. 54–97). Government of India.
19. Singh, G., & Sharma, P. (2014). Agricultural development and land use changes in Haryana. *Indian Journal of Agricultural Economics*, *69*(3), 345–357. (pp. 345–357)