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CHANGING PATTERNS OF AGRICULTURE LAND AND MAJOR CROP PRODUCTION IN UTTARKASHI DISTRICT

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ABSTRACT
This paper analyzes changes in cropping pattern, area, production, yield, and growth performance of major crops in Uttarkashi district over the period 2012–13 to 2021–22. Using secondary data, trends in total and irrigated area, crop-wise distribution, production, and yield were examined, along with annual growth rates and compound annual growth rates (CAGR) to assess both short-term variability and long-term structural change. The results reveal a gradual decline in total cultivated and irrigated area, indicating increasing pressure on land and water resources. Cereals, particularly paddy and wheat, continue to dominate production; however, their long-term growth remains stagnant or slightly negative. In contrast, pulses especially during the kharif season exhibit positive CAGR, reflecting a slow shift toward crop diversification. Yield improvements across crop groups are modest, suggesting limited technological advancement. High inter-annual fluctuations further highlight the vulnerability of agriculture to climatic variability. Overall, the findings indicate that agricultural transformation in Uttarkashi has been slow and uneven, underscoring the need for targeted interventions to enhance irrigation efficiency, promote climate-resilient technologies, and support diversification toward pulses and oilseeds for sustainable agricultural development.

KEYWORDS: *Area, Production, Agriculture, Uttarkashi, Yield.*

INTRODUCTION

Compared to other economic sectors, the agricultural sector is essential to the fight against poverty. Labor usually moves from agriculture to manufacturing and other non-farm occupations in developing economies during the early phases of structural change. Agriculture remains the main industry in Uttarakhand, directly or indirectly supporting a sizable portion of the population, despite recent growth in the manufacturing and service sectors. Through robust demand-supply relationships, growth in agriculture and related industries propels the growth of secondary and tertiary sectors. Since agriculture is a state subject, the state government bears a large portion of the responsibility for both its development and the welfare of those who depend on it. However, Uttarakhand faces unique challenges arising from its diverse geography and ecological conditions. Consequently, policy initiatives targeting agriculture and allied sectors are inherently growth-oriented and essential for the state's economic development.

The state treasury's budgetary contributions to the agricultural sector have decreased over time, despite its significance. This decrease could have a negative impact on long-term economic growth and endanger the livelihoods of those working in agriculture. As a result, it is crucial to emphasize how agriculture contributes to the state economy while simultaneously pointing out the factors that have limited its growth and its stakeholders' ability to earn a living. The 2011 Census found that 30.23 percent of Uttarakhand's population lives in urban areas, with the remaining population residing in rural areas. Of the state's total geographical area of 53,483 square kilometres, approximately 86 per cent is hilly terrain, and 63.42 per cent is covered by forests (38.12 lakh hectares during 2018–19). Due to the difficult terrain, agricultural activities are limited, resulting in a net sown area of just over 11 per cent of the total reported land area.

In recent years, the state has experienced a decline in both the net sown area and the area cultivated more than once annually. Uttarakhand has a predominantly rural population (69.77 per cent), with nearly 67.90 per cent residing in hill districts. Between Census 2001 and Census 2011, the population share of hill districts declined from 68.40 per cent to 65 per cent, indicating increasing out-migration.

METHODS AND METHODOLOGY

The Ministry of Agriculture and Farmers' Welfare, Government of India, and the Directorate of Statistics, Government of Uttarakhand, are two of the government agencies that provided the secondary data used in this paper. Cropping patterns, the area planted to various crops, average landholdings, and fertilizer use were all recorded. The following are the objectives of this paper:

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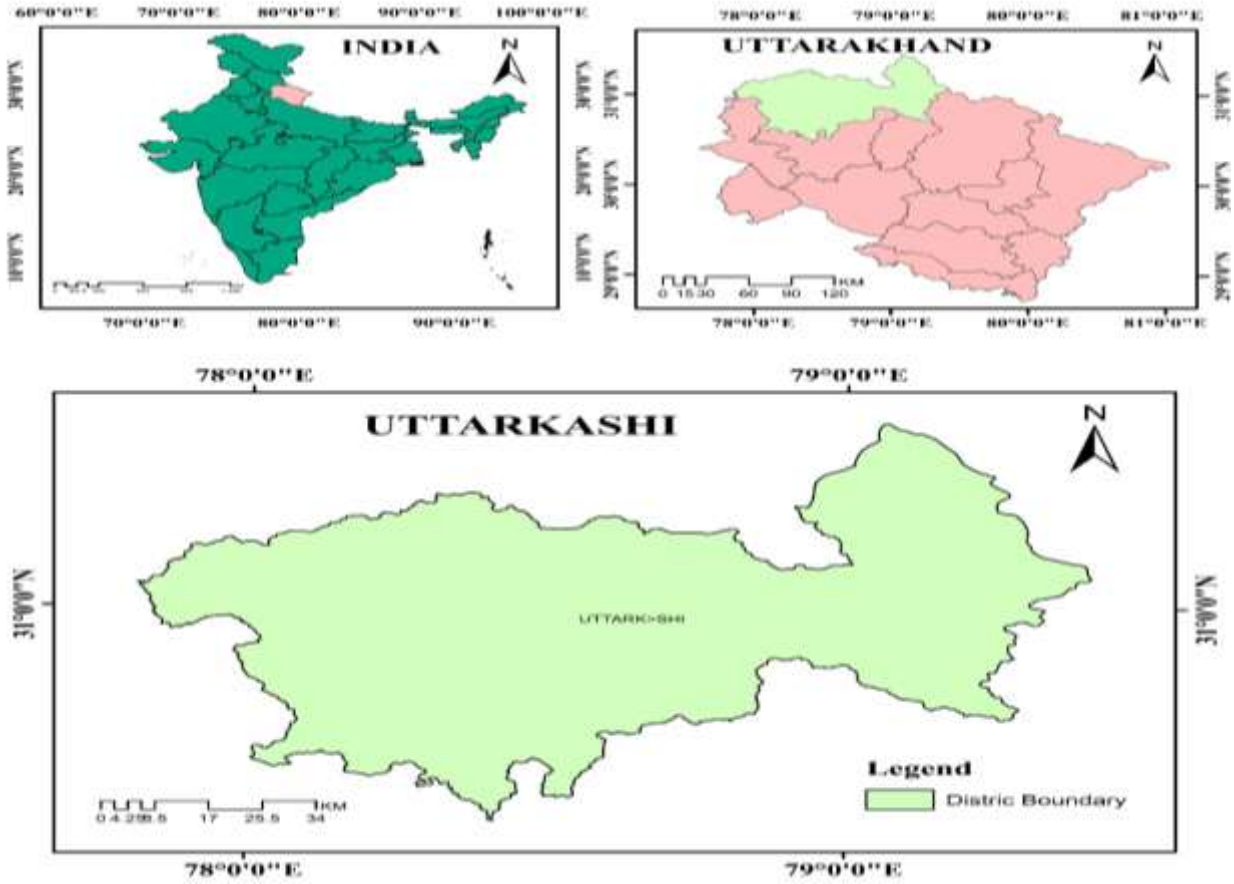
1. To analyse the changes in the land distribution under major crops in study area.
2. To analyse trends of major crop production in study area.

To achieve the objectives of the study, descriptive statistical techniques were employed to analyse changes in agricultural patterns in Uttarakhand from 2011-12 to 2021-22. Percentage growth rates were calculated, and the data were presented using bar diagrams, line graphs, and histograms. Microsoft Word and Excel were used for data processing and analysis.

The Uttarkashi district of Uttarakhand, which makes up approximately 14.98% of the state's total area and has a total area of 8,016 square kilometers, is the site of the current study. The district is roughly 144.84 km long and 90.12 km wide, and it is located between latitudes 30°28′N and 31°28′N and longitudes 73°51′E and 79°27′E. With an average elevation of roughly 1,158 meters above mean sea level, Uttarkashi is primarily a mountainous district. The district has 3,30,090 residents overall, with 1,68,600 men and 1,61,490 women, or a sex ratio of 958 women for every 1,000 men, according to the most recent census data from 2011. The population is largely rural in nature, with 3,05,781 persons residing in rural areas, while the urban population accounts for only 24,305 persons. The district has a low population density of 41 persons per sq. km, reflecting its rugged terrain and hilly topography. The overall literacy rate of Uttarkashi stands at 75.81 per cent, with male literacy at 83.14 per cent and female literacy at 57.81 per cent. Notably, the district has experienced a negative population growth rate of –11.89 per cent, indicating significant out-migration and demographic decline.

Figure 1: Locational Map of Uttarkashi District.



RESULTS AND DISCUSSION

This section of paper highlights the changes in area, production and yield of major crops in Uttarkashi. To examine the former the section divides into four sub-sections namely A. Area under Major Crop Production, B. Production of Major Crops, C. Average Yield of Major Crops, D. Growth rate of Production.

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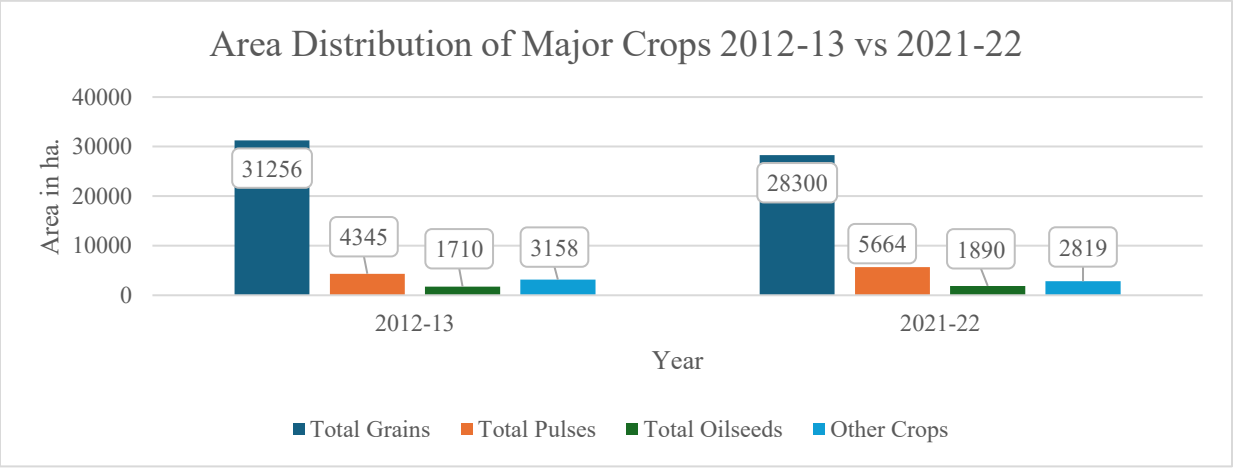
A. Area under Major Crop Production in Uttarkashi District

Figure 2: Change in area of different crops from 2012 to 2022 in Uttarkashi District.



Source: Statistical handbooks, Directorate of Economics and Statistics Office, Government of Uttarakhand

The comparison of area distribution under major crops between 2012–13 and 2021–22 reveals a substantial decline in the area under total grains, which decreased from 31,256 ha to 28,300 ha, indicating a contraction in staple crop cultivation over the decade. In contrast, the area under pulses increased notably from 4,345 ha to 5,664 ha, suggesting a diversification toward pulses, possibly driven by dietary demand, policy support, or soil fertility considerations. Oilseeds show a marginal increase from 1,710 ha to 1,890 ha, reflecting relative stability with slight expansion, while the area under other crops declined from 3,158 ha to 2,819 ha. Overall, the shift in area allocation points to a gradual diversification away from grains toward pulses and oilseeds, which may have implications for nutritional security, cropping patterns, and resource use efficiency.

B. Production of Major Crops in Uttarkashi District

Table 2: Trends in Major Crop Production

Crops	2012-13	2014-15	2016-17	2018-19	2021-22
Paddy (Kharif)	18604	16499	17888	16552	17416
Maize (Kharif)	609	1064	701	544	1348
Ragi (Kharif)	10212	9233	8112	6225	8183
Sanwan	3577	3415	3745	3445	3544
Ramdana	1135	1083	2078	2407	2345
Tur (Arhar)	316	279	262	244	424
Urad (Kharif)	930	680	646	1055	1134
Gahat/Kulthi	623	868	800	668	991
Soyabean (Bhatt)	267	195	295	164	225
Rajma			1613	2291	2140
Wheat	18387	13643	18905	18191	16878
Barley (Jau)	387	272	282	443	471
Gram (Chana)	0	2	1	5	18
Peas	540	499	368	201	409
Masur	154	236	110	227	284
Sesame (Till)	218	157	227	212	190
Soyabean	176	169	217	76	271
Mustard/Lahi	436	742	262	461	590
Onion	150	172	301	834	867
Ginger	129	18	103	73	92
Garlic	97	43	73	40	54

Source: Statistical handbooks, Directorate of Economics and Statistics Office, Government of Uttarakhand

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The production trends of major crops in Uttarkashi from 2012–13 to 2021–22 indicate the continued dominance of cereal crops, particularly paddy (kharif) and wheat, which consistently record the highest production levels despite inter-year fluctuations. Paddy production shows moderate variability with peaks around 2016–17 and 2021–22, reflecting sensitivity to monsoon conditions, while wheat production remains relatively stable with slight declines toward the end of the period. Among millets, ragi maintains a significant contribution but exhibits a gradual reduction over time, suggesting a declining emphasis on traditional coarse cereals. Pulse crops such as urad, gram, and tur display low but variable production, indicating limited area and productivity gains, whereas oilseeds like mustard and sesame remain marginal contributors. Overall, the pattern highlights a cereal-centric production system with modest diversification, underscoring the need for productivity enhancement and balanced crop diversification to improve resilience and nutritional outcomes in the region.

Table 3: Changes in Production of Major Crop Groups between 2012–13 and 2021–22

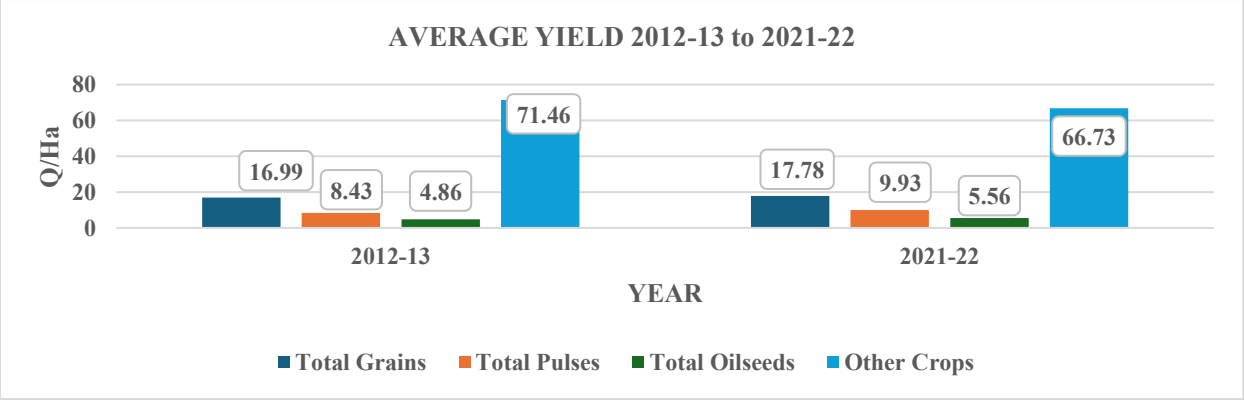
Crops	2012-13	2021-22
Total Grains (Kharif)	34318	32970
Total Pulses (Kharif)	2967	4914
Total Grains (Rabi)	18774	17349
Total Pulses (Rabi)	694	711
Total Oilseeds (Kh.)	395	461
Total Oilseeds (Rabi)	436	590
Other Crops	26831	28300

Source: Statistical handbooks, Directorate of Economics and Statistics Office, Government of Uttarakhand

The table presents a comparative analysis of the production of major crop groups between 2012–13 and 2021–22, reflecting structural changes in agricultural output over time. The production of Total Grains (Kharif) declined slightly from 34,318 to 32,970, while Total Grains (Rabi) also decreased from 18,774 to 17,349, indicating a modest reduction in cereal output. In contrast, Total Pulses (Kharif) recorded a substantial increase in production from 2,967 to 4,914, suggesting improved productivity and growing emphasis on pulse cultivation. Total Pulses (Rabi) remained relatively stable, rising marginally from 694 to 711. Both Kharif and Rabi oilseeds showed moderate growth, with production increasing from 395 to 461 and from 436 to 590, respectively. Furthermore, the output of Other Crops increased from 26,831 to 28,300, indicating diversification and expansion in non-traditional crop production. Overall, the data reveal a gradual shift from cereal-dominated production towards pulses, oilseeds, and diversified crops during the study period.

C. Average Yield of Major Crops in Uttarkashi District

Figure 3: Average yield and growth rate



Source: Statistical handbooks, Directorate of Economics and Statistics Office, Government of Uttarakhand

The comparison of average yields between 2012–13 and 2021–22 shows modest improvements across most crop groups, indicating gradual gains in productivity. Total grains recorded a slight increase in yield from 16.99 q/ha to 17.78 q/ha, suggesting incremental technological or management improvements. Pulses also improved from 8.43 q/ha to 9.93 q/ha, reflecting better varietal adoption or agronomic practices, while oilseeds increased from 4.86 q/ha to 5.56 q/ha, though remaining comparatively low. In contrast, the yield of other crops declined from 71.46 q/ha to 66.73 q/ha, possibly due to shifts toward less input-intensive crops or increased climatic stress. Overall, the results indicate slow but positive productivity growth in grains, pulses, and oilseeds, highlighting the need for targeted interventions to enhance yield gains, particularly for oilseeds and high-value crops.

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Table 5: Trends in Yield of Major Crop Groups from 2013–14 to 2021–22

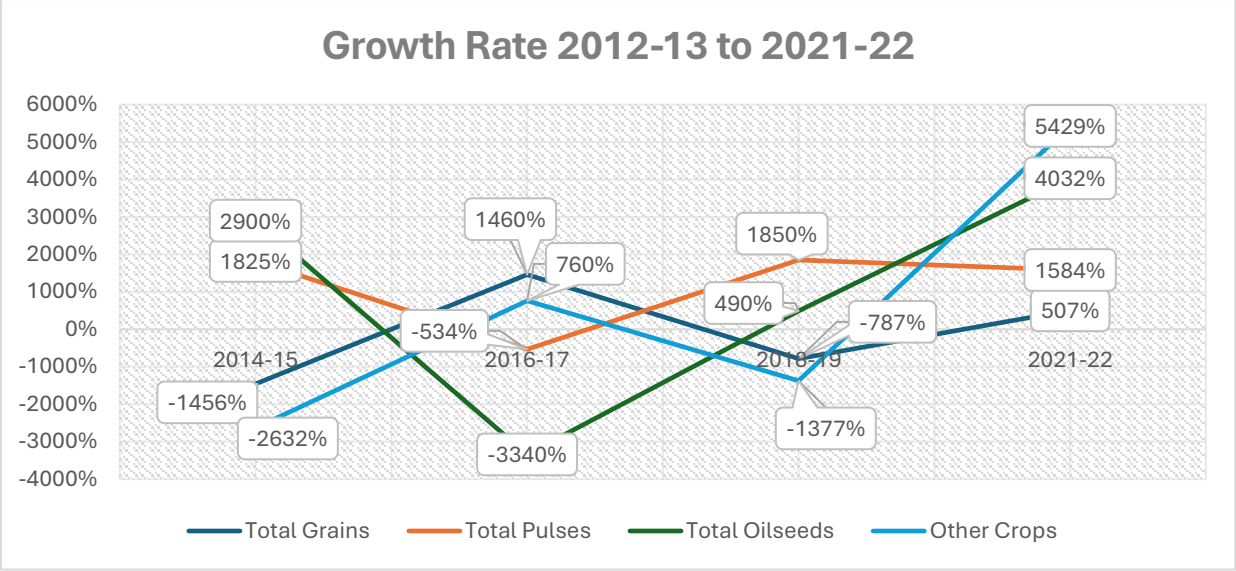
	2013-14	2014-15	2016-17	2018-19	2021-22
Total Grains (Kharif)	16.8	15.55	16.7	14.7	17.618
Total Pulses (Kharif)	8.94	9.05	8.59	9.09	10.662
Total Grains (Rabi)	17.34	13.67	16.96	18.89	18.098
Total Pulses (Rabi)	6.76	7.11	6.44	6.05	6.739
Total Oilseeds (Kh.)	4.29	4.65	5.08	4.13	4.812
Total Oilseeds (Rabi)	5.52	7.53	3.54	5.21	6.33

Source: Statistical handbooks, Directorate of Economics and Statistics Office, Government of Uttarakhand

The table presents trends in the yield performance of major crop groups during the period from 2013–14 to 2021–22, highlighting variations across seasons and crop types. The yield of Total Grains (Kharif) showed moderate fluctuations, declining from 16.8 in 2013–14 to 14.7 in 2018–19 before improving to 17.618 in 2021–22. Total Pulses (Kharif) exhibited a generally increasing trend, rising from 8.94 to 10.662, indicating gradual improvement in productivity. In the Rabi season, Total Grains displayed considerable variability, falling sharply in 2014–15 and subsequently recovering to 18.098 in 2021–22. Total Pulses (Rabi) remained relatively stable with minor fluctuations, ranging between 6.05 and 7.11. Kharif oilseeds recorded modest and inconsistent yields, while Rabi oilseeds experienced greater variability, with yields declining sharply in 2016–17 and recovering thereafter. Overall, the data suggest uneven productivity growth across crop groups, with notable improvement in Kharif pulses and Rabi grains, alongside persistent instability in oilseed yields.

D. Growth Rates in major Crop Productions

Figure 4: Growth rate of Major Crops in Uttarkashi



Source: Authors' Calculations

The growth rate trends from 2012–13 to 2021–22 exhibit high volatility across all crop groups, reflecting pronounced inter-annual fluctuations in agricultural performance. Total grains show alternating phases of contraction and recovery, with sharp declines in the early years followed by moderate positive growth toward 2021–22, indicating instability in production and area dynamics. Pulses demonstrate comparatively stronger and more sustained positive growth, particularly during the mid-period and again by 2021–22, highlighting their increasing importance within the cropping system. Oilseeds record the greatest instability, with extreme negative growth in certain years followed by sharp rebounds, suggesting sensitivity to climatic variability and market incentives. Other crops display the most dramatic swings, culminating in exceptionally high growth by 2021–22, which may reflect low initial bases or shifts toward high-value crops. Overall, the pronounced variability underscores the vulnerability of agriculture to climatic and structural factors, emphasizing the need for stabilization strategies and resilient crop planning.

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Table 6: Compound Annual Growth Rate of Major Crops

Crop Category	2012–13	2021–22	CAGR (%)
Total Grains (Kharif)	34,318	32,970	**–0.44%**
Total Pulses (Kharif)	2,967	4,914	**+5.74%**
Total Grains (Rabi)	18,774	17,349	**–0.88%**
Total Pulses (Rabi)	694	711	**+0.27%**
Total Oilseeds (Kharif)	395	461	**+1.74%**
Other Crops	26,831	28,300	**+0.59%**

Source: Authors' Calculations

The CAGR analysis for the period 2012–13 to 2021–22 reveals a pattern of slow structural change in the cropping system, with notable contrasts across crop groups. Both kharif and rabi grains register marginal negative growth (–0.44% and –0.88%, respectively), indicating stagnation or a gradual decline in cereal cultivation over the decade. In contrast, kharif pulses exhibit the highest positive CAGR (5.74%), reflecting a sustained expansion likely driven by policy incentives, market demand, and agronomic advantages. Rabi pulses show near stagnation with negligible positive growth (0.27%), while oilseeds record modest expansion (1.74%), suggesting limited but consistent improvement. Other crops also demonstrate low positive growth (0.59%), indicating relative stability rather than rapid diversification. Overall, the CAGR results point to a slow transition away from cereal dominance toward pulses and oilseeds, highlighting gradual diversification but also underscoring the need for stronger interventions to accelerate balanced and resilient agricultural growth.

KEY DISCUSSION

The analysis of area, production, yield, growth rates, and CAGR of major crops in Uttarkashi from 2012–13 to 2021–22 reveals a cropping system undergoing **gradual but uneven transformation**. The total area under major crops shows a declining trend, accompanied by a sharper reduction in irrigated area, indicating increasing pressure on water resources and a growing dependence on rainfed agriculture. Crop-wise area distribution highlights a contraction in land allocated to grains, while pulses and oilseeds gain relative importance, suggesting emerging diversification. However, production trends remain cereal-centric, with paddy and wheat continuing to dominate output despite inter-annual fluctuations caused by climatic variability. Yield analysis indicates modest improvements in grains, pulses, and oilseeds, reflecting incremental gains in management and technology, although productivity levels—particularly for oilseeds—remain low.

Growth rate and CAGR analyses further emphasize the **volatility of short-term performance** and the **stagnation of long-term growth** in cereals. While year-to-year growth rates show extreme fluctuations, the CAGR results provide a more stable long-term perspective, revealing marginal negative growth for both kharif and rabi grains and modest positive growth for pulses, oilseeds, and other crops. The strong positive CAGR of kharif pulses points to a sustained shift toward pulse cultivation, likely supported by policy interventions and nutritional considerations, whereas oilseeds and other crops exhibit only limited expansion. Overall, the findings suggest that agricultural change in Uttarkashi has been slow and constrained, with diversification occurring gradually rather than through transformative shifts. Strengthening irrigation infrastructure, promoting climate-resilient crop varieties, and enhancing productivity especially in pulses and oilseeds are critical for achieving balanced, resilient, and sustainable agricultural growth in the region.

CONCLUSION AND SUGGESTIONS

The paper highlights that agriculture in Uttarkashi district during 2012–13 to 2021–22 has experienced a gradual decline in cultivated and irrigated area, modest yield improvements, and highly variable short-term growth, resulting in largely stagnant long-term performance, particularly for cereal crops. While cereals continue to dominate production, their negative or negligible CAGR indicates limited structural progress, whereas the positive growth of pulses especially kharif pulses suggests a slow but meaningful shift toward diversification. However, low productivity levels, shrinking irrigation coverage, and strong sensitivity to climatic variability remain major constraints. To address these challenges, policy efforts should focus on strengthening irrigation and water-use efficiency, promoting climate-resilient and high-yielding varieties, and improving extension services to enhance farm-level management practices. Encouraging diversification toward pulses, oilseeds, and other high-value crops through institutional support, market linkages, and price incentives can help improve farm incomes and nutritional security. Overall, region-specific, resource-efficient, and climate-resilient strategies are essential to ensure sustainable and balanced agricultural development in the district.

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