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The Use of Land and The Effectiveness of Crop Production in India

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ABSTRACT
Agriculture is fundamental to India's economy, supporting over 1.4 billion people and employing 58% of the population, while contributing 19-20% to the GDP. Government spending on agriculture increased from ₹. 1,22,836 crores in 2022-23 to ₹. 1,25,036 crores in 2023-24 and was estimated at ₹. 1,22,529 crore for 2024-25. Land classification shows significant areas dedicated to forests (72,021), non-agricultural uses (27,845), and net area sown (140,705), with a total agricultural land of 179,982 and cultivated land of 154,203. The cropping intensity stands at 155.9%. Both food grains and commercial crops production have shown increasing trends, with food grains rising from 2975.04 lakh tonnes to 3322.95 lakh tonnes, and commercial crops peaking at 4905.33 lakh tonnes in 2022-23 before a slight drop in 2023-24. Despite challenges like climate volatility and soil depletion, government initiatives focusing on technology, infrastructure, and farmer support are aiming to modernize the sector, boost incomes, and enhance food security through integrated policies, investments, and digital solutions.

Key words: *Classification of land, crop production, yield, production of food grains and commercial crops.*

I. INTRODUCTION

India's agricultural sector has shown varying trends in crop production. Rice production significantly increased from 1294.71 lakh tonnes to 1378.25 lakh tonnes, with a yield improvement from 2798 kg/hectare to 2882 kg/hectare. Wheat production also rose from 1077.42 lakh tonnes to 1132.92 lakh tonnes, and its yield grew from 3537 kg/hectare to 3559 kg/hectare. Nutri/Coarse cereals saw growth from 511.01 lakh tonnes to 569.36 lakh tonnes, with yield increasing from 2251 kg/hectare to 2283 kg/hectare. In contrast, Pulses experienced a decline in both area (from 307.31 to 275.05 lakh hectares) and production (from 273.02 to 242.46 lakh tonnes), with yield dropping from 888 kg/hectare to 881 kg/hectare. Total Food Grains production increased from 3156.16 lakh tonnes to 3322.98 lakh tonnes, and the yield improved from 2425 kg/hectare to 2515 kg/hectare. Sugarcane production saw an increase from 4394.25 to 4531.58 lakh tonnes, although its yield slightly decreased from 84906 kg/hectare to 78953 kg/hectare.

Regarding specific food grains, total food grains consistently increased from 2975.04 lakh tonnes to 3322.95 lakh tonnes. Rice production steadily grew from 1188.70 lakh tonnes to 1378.25 lakh tonnes, and wheat increased from 1078.61 lakh tonnes to 1132.92 lakh tonnes, with a dip in 2021-22. Coarse cereals & shree anna/nutri cereals increased from 304.88 lakh tonnes to a peak of 399.98 Lakh tonnes in 2022-23, then slightly decreasing to 393.64 lakh tonnes in 2023-24. Notably, Shree Anna/Nutri Cereals dropped to 160.00 lakh tonnes in 2021-22 before recovering. Total Pulses fluctuated, peaking at 273.02 lakh tonnes in 2021-22 and declining to 242.42 lakh tonnes in 2023-24.

Commercial Crops Production generally increased from 3705.00 lakh tonnes to 4531.58 lakh tonnes, peaking at 4905.33 lakh tonnes in 2022-23. Sugarcane initially increased but declined after 2020-21, dropping from 4053.99 lakh tonnes to 325.22 lakh tonnes in 2023-24. Cotton production fluctuated, starting at 360.65 lakh tonnes in 2019-20, dropping to 311.18 lakh tonnes in 2021-22, and recovering slightly to 325.22 lakh tonnes in 2023-24. Jute & Mesta remained relatively stable, ranging from 93.54 lakh tonnes to 101.49 lakh tonnes.

Several challenges persist in agriculture, including climate change impacts, land and water scarcity, degradation, and input costs. The government initiatives like the digital agriculture mission and national mission on natural farming aim to address these issues and promote sustainable practices, ensuring financial security through programs like PM-Kisan Samman Nidhi and Pradhan Mantri Fasal Bima Yojana.

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Objectives

1. To discuss the classification of land and utilization of crops area in India.
2. To analyse the performance of area, production and yield of major crops in India
3. To study the performance of production of food grains and commercial crops in India.

LAND CLASSIFICATION AND AREA UNDER CROPS IN INDIA

Table-1 represents the classification of land based on land utilization statistics for the year 2022-23, with areas reported in thousand hectares. The total reporting area for land utilization statistics is 306,650 thousand hectares. The land is categorized into various uses, providing insights into the distribution of land resources.

Forests category accounts for a significant portion of the land, with an area of 72,021 thousand hectares, indicating a substantial forest cover. Area put to non-agricultural uses includes land used for purposes other than agriculture, such as urban development, infrastructure, etc., covering 27,845 thousand hectares. Barren & unculturable land refers to land that is unproductive and cannot be cultivated, totaling 16,554 thousand hectares. Permanent pastures & other grazing lands designated for grazing livestock occupies 10,248 thousand hectares. culturable wasteland represents land that is currently uncultivated but has the potential for cultivation, amounting to 11,659 thousand hectares. Land under misc. tree crops includes land dedicated to miscellaneous tree crops, covering 2,992 thousand hectares. Fallow land other than current fallows land left uncultivated for a period longer than the current agricultural year is 11,128 thousand hectares. Current fallow land left uncultivated for the current agricultural year is 13,498 thousand hectares. Net area represents the actual area under cultivation, which is 140,705 thousand hectares. Agricultural land calculated as the sum of culturable wasteland, land under misc. tree crops, fallow land other than current fallows, current fallow, and net area sown (5+6+7+8+9), the total agricultural land is 179,982 thousand hectares. Cultivated land refers specifically to the sum of current fallow and net area sown (8+9), totaling 154,203 thousand hectares. Cropping intensity expressed as a percentage of total cropped area over net area sown, is 155.9%, indicating the extent to which the cultivated land is used for growing multiple crops in a year.

The provided table gives a breakdown of irrigated area by different sources dominant irrigation source is tube wells are the primary source of irrigation, accounting for the largest share of the net irrigated area with 39,134 units. Significant contribution from canals includes government canals contribute significantly with 17,959 units, while private canals have a much smaller contribution of 165 units, leading to a total of 18,124 units from canals. Other sources include tanks (2,235 units) and other wells (10,672 units) also contribute to the irrigated area, along with a category of other sources' (9,147 units).

Out of total irrigated areas, the net irrigated area, which sums up the contributions from all identified sources (canals, tanks, tube wells, other wells, and other sources), stands at 79,312 units. The gross irrigated area is higher at 122,294 units, suggesting that some areas are irrigated more than once a year (for multiple crops). Irrigation Intensity the percentage of gross irrigated area over gross cropped area is 55.8%, indicating that a significant portion of the cropped area is under irrigation. Similarly, the percentage of net irrigated area over net area sown is 56.4%, further highlighting the reliance on irrigation for cultivation.

The table provides a breakdown of the area under various types of crops, categorized into food grains, other food crops, and non-food crops, with a total cropped area presented.

Dominance of food grains constitute the largest portion of the total cropped area (136,309 units), with cereals and millets (108,781 units) being the most significant sub-category within food grains. Rice (49,527 units) and wheat (34,994 units) are the major cereals. Among other food crops, fruits & vegetables (12,024 units) occupy a considerably larger area compared to condiments and spices (4,598 units). Total food crops, including food grains and other food crops, amount to 160,244 units. Non-food crops collectively cover 59,113 units, with cotton (13,009 units) and sugarcane (6,794 units) being prominent. Oilseeds (33,181 units) also represent a substantial area within this category.

Total cropped cumulative area under all listed crops is 219,357 thousand hectares. This figure represents the sum of total food crops and total non-food crops.

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Table-1

Details of important parameters of land use statistics for the year 2022-23 (Thousand hectares)

A)	**Classification of land**	
	Reporting area for land utilization statistics (1 to 9)	306650
1	Forests	72021
2	Area put to non-agricultural uses	27845
3	Barren & unculturable land	16554
4	Permanent pastures& other grazing lands	10248
5	Culturable Wasteland	11659
6	Land under Misc. tree Crops	2992
7	Fallow Land Other than Current Fallows	11128
8	Current Fallow	13498
9	Net Area Sown	140705
	Agricultural Land (5+6+7+8+9)	179982
	Cultivated Land (8+9)	154203
	Cropping Intensity (% of Total cropped Area over Net Area Sown)	155.9
B) Irrigated Area		
1	Government Canals	17959
2	Private Canals	165
3	Total Canals (1+2)	18124
4 4	Tanks	2235
5	Tube wells	39134
6	Other wells	10672
7	Other Sources	9147
	Net Irrigated Area (3+4+5+6+7)	79312
	Gross Irrigated Area	122294
	% of Gross Irrigated Area over Gross Cropped Area	55.8
	% of Net Irrigated Area over Net Area Sown	56.4
C) Area under crops		
	Total Food grains	136309
	Total Cereals& Millets	108781
	Rice	49527
	Wheat	34994
	Total Pulses	27528
	Total Condiments and Spices	4598
	Total Fruits & Vegetables	12024
	Total Food Crops	160244
	Total Oilseeds	33181
	Sugarcane	6794
	Cotton	13009

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	Total non food crops	59113
	Total Cropped Area	219357

Source: Land use statistics for 2022-23, Agriculture Census Unit, Economics, Statistics & Evaluation Division, DA&FW.

PERFORMANCE OF PRODUCTION AREA, CROP PRODUCTION AND YIELD

The table-2 presents data on the production area (lakh hectare), production (lakh tonnes), and yield (kg/hectare) of major crops for the years 2021-22, 2022-23, and 2023-24.

The major crops include the rice area cultivation slightly increased from 462.79 lakh hectares in 2021-22 to 478.28 lakh hectares in 2023-24. Production also saw a steady increase from 1294.71 lakh tonnes to 1378.25 lakh tonnes, and yield per hectare improved from 2798 kg/hectare to 2882 kg/hectare over the three years. Wheat area, production, and yield all showed a consistent upward trend. Area increased from 304.59 to 318.33 lakh hectares, production from 1077.42 to 1132.92 lakh tonnes, and yield from 3537 to 3559 kg/hectare. Nutri/Coarse cereals area increased from 227.00 to 249.38 lakh hectares, production from 511.01 to 569.36 lakh tonnes, but the yield saw a slight dip in 2023-24 (2283 kg/hectare) after an increase in 2022-23 (2381 kg/hectare). Pulses area under pulses decreased from 307.31 to 275.05 lakh hectare, and production also declined from 273.02 to 242.46 lakh tonnes. Yield showed a fluctuating trend, peaking in 2022-23 at 902 kg/hectare before falling to 881 kg/hectare in 2023-24. The total area under foodgrains remained relatively stable around 1300 lakh hectare. Production increased steadily from 3156.16 to 3322.98 lakh tonnes, and yield also increased from 2425 to 2515 kg/hectare. Area and production of oilseeds increased from 2021-22 to 2022-23, but then saw a slight decrease in 2023-24. The yield followed a similar pattern.

Table-2
Area, production and yield of major crops during 2021-22 to 2023-24

Crops	Area (Lakh hectare)			Production (Lakh tonnes)			Yield (kg/hectare)		
	2021-22	2022-23	2023-24	2021-22	2022-23	2023-24	2021-22	2022-23	2023-24
Rice	462.79	478.32	478.28	1294.71	1357.55	1378.25	2798	2838	2882
Wheat	304.59	314.01	318.33	1077.42	1105.54	1132.92	3537	3521	3559
Nutri/Coarse	227.00	240.70	249.38	511.01	573.19	569.36	2251	2381	2283
Pulses	307.31	289.00	275.05	273.02	260.58	242.46	888	902	881
Food grains	1301.69	1322.04	1321.04	3156.16	3296.87	3322.98	2425	2494	2515
Oilseeds	289.45	302.39	301.92	379.63	413.55	396.69	1312	1368	1314
Sugarcane	51.75	58.85	57.40	4394.25	4905.33	4531.58	84906	83349	78953
Cotton@	123.72	129.27	126.88	311.18	336.60	325.22	428	443	436
Jute & Mesta#	6.67	6.58	6.37	101.49	93.92	96.92	2738	2569	2737

@Production in lakh bales of 170 kg each
Production in lakh bales of 180 Kg. each.

Sugarcane saw an increase in area and production from 2021-22 to 2022-23, followed by a decrease in 2023-24. Yield also showed a decline in 2023-24. Cotton area and production increased from 2021-22 to 2022-23, then decreased in 2023-24. Yield per hectare showed a similar trend. Area and production of jute & mesta showed a declining trend over the three years. Yield also decreased in 2022-23 before slightly recovering in 2023-24.

The data suggests a general positive trend in area, production, and yield for staple crops like rice, wheat, and total foodgrains. However, crops like pulses, sugarcane, cotton, and jute & mesta show more fluctuating or declining trends in certain aspects over the observed period.

COST, MINIMUM SUPPORT PRICES (MSP) AND RETURN STATEMENT

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The table-3 presents data on the cost, Minimum Support Prices (MSP), and percentage return over cost for various kharif and rabi crops, as well as other crops, across the KMS2022-23, KMS2023-24, and KMS2024-25 seasons (and corresponding calendar years for other crops).

MSP as a price floor commodity is consistently higher than the cost, ensuring a minimum assured price for farmers and a positive return over cost. For instance, in KMS2024-25, paddy (common) has a cost of ₹1533 and an MSP of ₹2300, guaranteeing a 50% return over cost.

Varying return over cost while many crops, particularly most kharif crops like paddy, jowar, ragi, maize, moong, cotton, groundnut in shell, sunflower seed, soyabean, and sesamum, show a consistent 50% return over cost across the seasons, some crops exhibit higher or fluctuating returns.

High Returns wheat consistently shows a return over cost of 100% or more (e.g., 102% in KMS2024-25), indicating MSP is double the cost. Rapeseed/mustard and masur (lentil) also show high returns, often in the range of 85-104%. Fluctuating returns crops like bajra show a decreasing trend in return over cost, from 85% in KMS2022-23 to 77% in KMS2024-25. Arhar (tur) and urad also show slight variations in their return percentages across seasons.

Increasing Costs and MSPs generally, the Cost and MSP for most commodities show an increasing trend across the successive seasons (KMS2022-23 to KMS2024-25). This reflects rising input costs and the government's periodic revisions of MSP to compensate for inflation and ensure farmer profitability. For example, the MSP of Wheat increased from ₹2125 in RMS2023-24 to ₹2425 in RMS2025-26.

Specific crop variances like paddy and jowar (grade a/maldandi) varieties consistently have slightly higher MSPs than their common/hybrid counterparts, reflecting their premium quality.

Cotton (long staple) variety consistently has a higher MSP than medium staple cotton, indicating its higher value. Toria oilseed crop also has an MSP listed, similar to Rapeseed/Mustard, suggesting its importance in the oilseed sector. Other crops (calendar year) for copra (milling and ball) and de-husked coconut shows increasing costs and MSPs over the calendar years, with copra maintaining a 52% return over cost, while ball copra shows a higher return of 64% in 2023season. jute also shows increasing trends in cost, MSP, and return over cost.

In summary, the table demonstrates the government's commitment to supporting farmers through MSPs, ensuring a guaranteed return over their production costs, with variations in return percentages reflecting different crop economics and policy considerations.

Table-3
Cost, Minimum Support Prices (MSP) and Return Statement

Sl.No.	*Commodity*	*KMS2022-23*			*KMS2023-24*			*KMS2024-25*		
	KHARIFCROPS	*Cost**	*MSP*	*% Return over Cost*	*Cost**	*MSP*	*% Return over Cost*	*Cost**	*MSP*	*% Return over Cost*
1	PADDY(Common)	1360	2040	50	1455	2183	50	1533	2300	50
	(Grade A)^		2060			2203			2320	
2	JOWAR(Hybrid)	1977	2970	50	2120	3180	50	2247	3371	50
	(Maldandi)^		2990			3225			3421	
3	BAJRA	1268	2350	85	1371	2500	82	1485	2625	77
4	RAGI	2385	3578	50	2564	3846	50	2860	4290	50
5	MAIZE	1308	1962	50	1394	2090	50	1447	2225	54
6	ARHAR(Tur)	4131	6600	60	4444	7000	58	4761	7550	59
7	MOONG	5167	7755	50	5705	8558	50	5788	8682	50
8	URAD	4155	6600	59	4592	6950	51	4883	7400	52
9	COTTON(Medium	4053	6080	50	4411	6620	50	4747	7121	50
	(Long Staple)^		6380			7020			7521	

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10	GROUNDNUTINSHELL	3873	5850	51	4251	6377	50	4522	6783	50
11	SUNFLOWERSEED	4113	6400	56	4505	6760	50	4853	7280	50
12	SOYABEAN	2805	4300	53	3029	4600	52	3261	4892	50
13	SESAMUM	5220	7830	50	5755	8635	50	6178	9267	50
14	NIGERSEED	4858	7287	50	5156	7734	50	5811	8717	50
	RABICROPS	*RMS2023 -24*			*RMS2024 -25*			*RMS2025 -26*		
1	WHEAT	1065	2125	100	1128	2275	102	1182	2425	105
2	BARLEY	1082	1735	60	1158	1850	60	1239	1980	60
3	GRAM	3206	5335	66	3400	5440	60	3527	5650	60
4	MASUR(LENTIL)	3239	6000	85	3405	6425	89	3537	6700	89
5	RAPESEED/MUSTARD	2670	5450	104	2855	5650	98	3011	5950	98
6	SAFFLOWER	3765	5650	50	3807	5800	52	3960	5940	50
7	TORIA^		5450			5650			5950	
	OTHER CROPS	*2022Season*			*2023Season*			*2024Season*		
1	COPRA(Calendar Year) (Milling)	6974	10590	52	7153	10860	52	7350	11160	52
	(Ball)^		11000			11750	64		12000	
2	DE-HUSKEDCOCONUT (Calendar Year)^		2860			2930			3013	
		2022-23Season			2023-24Season			2024-25Season		
3	JUTE	2959	4750	61	3095	5050	63	3237	5335	65

* Refers to cost which includes all paid out costs such as those incurred on account of hired human labour, bullock labour/machine labour, rent paid for leased inland, expenses incurred on use of material inputs like seeds, fertilizers, manures, irrigation charges, depreciation on implements and farm buildings, interest on working capital, diesel / electricity for operation of pump sets etc., miscellaneous expenses and imputed value of family labour.

^ Cost data are not available for Paddy (GradeA), Jower (Maldandi), Cotton (Longstaple), Toria, Copra (Ball) and De-husked Coconut. MSPs of Toria and De-husked coconut are determined on the basis of MSPs of Rapeseed / Mustardand Copra respectively. KMS: Kharif Marketing Season, RMS: Rabi Marketing Season

PERFORMANCE OF PRODUCTION OF FOOD GRAINS AND COMMERCIAL CROPS

Table-4 represents the production of various food grain crops and commercial crops in India (in lakh tonnes) from 2019-20 to 2023-24.

Food grain crops includes rice shows a consistent increase in production over the years, rising from 1188.70 lakh tonnes in 2019-20 to an estimated 1378.25 lakh tonnes in 2023-24. Wheat also shows an increasing trend, starting at 1078.61 lakh tonnes in 2019-20 and reaching an estimated 1132.92 lakh tonnes in 2023-24, with a slight dip in 2021-22. Coarse cereals production increased significantly from 304.88 lakh tonnes in 2019-20 to a peak of 399.98 lakh tonnes in 2022-23, before slightly declining to 393.64 lakh tonnes in 2023-24. Shree anna/nutri cereals shows fluctuations, with 172.61 lakh tonnes in 2019-20, a dip to 160.00 lakh tonnes in 2021-22, and then an increase to 175.72 lakh tonnes in 2023-24. Total pulses experienced an increase from 230.25 lakh tonnes in 2019-20 to 273.02 lakh tonnes in 2021-22, followed by a decline to 242.42 lakh tonnes in 2023-24. Total food grains the overall production of food grains demonstrates a steady increase throughout the period, from 2975.04 lakh tonnes in 2019-20 to an estimated 3322.95 lakh tonnes in 2023-24.

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Table-4
The production of food grains and commercial crops during 2019-20 to 2023-24
(Production in Lakh tonnes)

Food grain Crops	***2019-20***	***2020-21***	***2021-22***	***2022-23***	***2023-24****
Rice	1188.70	1243.68	1294.71	1357.55	1378.25
Wheat	1078.61	1095.86	1077.42	1105.54	1132.92
Coarse Cereals	304.88	333.03	351.01	399.98	393.64
Shree Anna /Nutri Cereals	172.61	180.21	160.00	173.21	175.72
Total Pulses	230.25	254.63	273.02	260.58	242.42
Total Food Grains	**2975.04**	**3107.42**	**3156.16**	**3296.87**	**3322.95**
Commercial Crops					
Sugarcane	3705.00	4053.99	4394.25	4905.33	4531.58
Cotton#	360.65	352.48	311.18	336.60	325.22
Jute & Mesta##	98.77	93.54	101.49	93.92	96.92

Source: UP Ag Portal, DA&FW (*As per Final Estimates of 2023-24).
Cotton Production in Bales, 1Bale=170 Kg
Jute, Sannhemp & Mesta Production in Bales, 1Bale=180 Kg

Commercial crops includes sugarcane shows an upward trend in production from 3705.00 lakh tonnes in 2019-20 to a peak of 4905.33 lakh tonnes in 2022-23, before an estimated decrease to 4531.58 lakh tonnes in 2023-24. Cotton production fluctuated, with 360.65 lakh tonnes in 2019-20, a decrease in 2021-22 to 311.18 lakh tonnes, and then a slight recovery to an estimated 325.22 lakh tonnes in 2023-24. Jute & mesta production remained relatively stable, with minor fluctuations around 93.54 lakh tonnes to 101.49 lakh tonnes between 2019-20 and 2023-24.

The table indicates a positive trend in total food grain production, largely driven by consistent growth in rice and, to a lesser extent, wheat and coarse cereals. Commercial crops like sugarcane also saw an overall increase despite annual fluctuations, while cotton production remained relatively stable. The missing data for jute & mesta in the latter years limits a complete analysis of that category.

II. CONCLUSION

India's agricultural sector, despite significant investments and arable land, faces slow growth rates, yet it remains crucial for food security and employment, supporting over 1.4 billion people and employing 58% of the population while contributing 19-20% to GDP. Government spending on agriculture increased from ₹. 1,22,836 crores in 2022 to ₹. 1,25,036 crores in 2023. While food grain production consistently increased from 2975.04 lakh tonnes to 3322.95 lakh tonnes, commercial crops saw a general increase from 3705.00 lakh tonnes to 4531.58 lakh tonnes, peaking at 4905.33 lakh tonnes in 2022-23 before a drop in 2023-24. Challenges like climate volatility, soil fertility depletion, and shrinking landholdings persist despite government initiatives focusing on technological advancement, infrastructure, farmer support, and diversification. The overarching strategy is to modernize the sector, boost farmer incomes, and strengthen the agricultural value chain through policy adjustments, investment, and digital integration. Therefore, a reorientation of India's agricultural policy is essential, shifting the subsidy regime towards balanced outcomes, integrating broader interventions, and conducting regular impact reviews to maximize benefits for all stakeholders and the environment.

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