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An empirical research study on Food security and Sustainable agriculture in selected districts of Karnataka.

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Introduction

Sustainable agriculture, a system of farming that strives to provide the resources necessary for present human populations while conserving the planet's ability to sustain future generations. Food security is the state of having reliable access to a sufficient quantity of affordable, nutritious food. The availability of food for people of any class and state, gender or religion is another element of food security. Food security, as defined by the World Food Summit in 1996 have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life".

The Research Methodology: Overall objective of the study is to examine the sustainable agriculture and food security in Karnataka. Specific objectives of the study are: To examine the area, production and productivity of food crops in Karnataka. To examine the problem of food insecurity in Karnataka. Nature and source of data: The study conducted with the help of primary as well as secondary data base information. Sample design: The study conducted in Bangalore Rural and Tumkur districts in Karnataka.

Statement of the problem

The problem of Food insecurity has been identified in India . At the household level, food security exists when all members, at all times, have access to enough food for an active, healthy life. Individuals who are food secure do not live with hunger or fear starvation. Across urban settings, the prevalence of food insecurity has been found to range from 51 to 77%, yet over 70% of India's population resides in rural area.

Review of literature

1) Fabio G. Santeramo (2024)conducted research study on 'Research in Agriculture and food security:retrospets and prospects. The stud focused that Research in agricultural science has deeply evolved during the past decades, shifting attention from local to global issues, from production functions to market dynamics and equilibrium models, from orthodox economic theories to multidisciplinary frameworks. While evolving, agricultural science has constantly targeted solutions to feed the world .These tendencies have been parallel to the development of new paradigms for agriculture, moving toward complex agri-food systems inspired to principles of security, resilience, sustainability and inclusiveness , that require technological innovations, financial support, policy interventions, regional and international cooperation and a long run vision

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2) Devendra Beeraladinni(2023) conducted study on Agricultural sustainability in Karnataka: Application of Sustainable Livelihood Security Index.

The present study was carried out in Karnataka state to assess the relative agricultural sustainability status of Karnataka during the year 2021–22 using Sustainable Livelihood Security Index (SLSI). Three indicators, viz. Ecological Security, Economic Efficiency and Social Equity Index were used. The results of the study show that in Karnataka better conditions for sustainable agriculture exist in majority of the Southern districts. However, few Northern districts, viz. Belagavi, Raichur, Bagalkote and Ballari have better level of ecological security and some Southern districts Bengaluru (U), Bengaluru (R), Chikkaballapur, Kolar and Ramanagara have low level of ecological security. In economic efficiency and social equity indicator also, majority of the Northern districts lagged behind compared to southern districts while Belagavi and Kalburgi districts have shown better performance compared to rest of the districts in the state. Adoption of sustainable agricultural practices such as judicial use of fertilizers and plant protection chemicals, efficient water use techniques (drip and sprinkler irrigation), use of organic manures and diversification of farm activities would help in sustainable agricultural development. To achieve ecological sustainability, steps need to be taken to enhance forest cover through afforestation especially in the districts which have poor ecological security. Further, there is a need to enhance the crop yield, encourage dairy farming and improve work force participation through training and skill development in the districts with poor economic efficiency.

III. Background of the study: The Village Accountants reported the crop area during 2022-23 for Paddy (2.91%), Jowar (3.77%),Maize (5.62%), Bajra (10.78%), Tur (1.03%), Greengram (11.11%), Sugarcane (0.42%),Groundnut (4.34%), Cotton (1.20%) and Sunflower (1.12%) Crops and the crop area in case of other crops (0.86%) in Kharif season. Similarly, during Rabi season the Village Accountants reported the crop area in case of Jowar, Bengalgram & Sunflower to the extent of 2.47%, 2.52%, & 1.53% respectively and the crop area in case of Other Crops (1.26%).During Summer season the Village Accountants reported the crop area in case of Paddy,Groundnut & Other Crops to the extent of 7.75%, 204.51% & 0.35% respectively. During 2022-23 the Village Accountants reported the irrigated area in case of Paddy (5.04%) and Sunflower (10.13%) crops .the irrigated area in case of Jowar (23.06%), Ragi (2.66%),Maize (3.52%), Bajra (0.38%/), Tur (12.48%), Greengram (55.62%), Sugarcane (0.69%),Groundnut (63.22%), Cotton (4.06%) and Other Crops (1.39%) in Kharif season. During Rabi season the Village Accountants reported the irrigated area in case of Jowar (0.66%)and Sunflower (4.98%) crops and reported the irrigated area for Wheat (1.83%),Bengalgram (2.16%) and Other Crops (1.65%). During summer season the Village Accountants reported the irrigated area for Paddy (6.73%) and Groundnut (91.65%) crops and the irrigated area in case of Other Crops (1.23%). during 2021-22 for Paddy (1.83%), Maize (2.19%), Bajra (3.52%), Tur (1.16%), Greengram (6.69%), Sugarcane (0.81%),Groundnut (1.55%), Cotton (2.75%) and Sunflower (1.23%) Crops and under reported the crop area in case of other crops (2.15%) in Kharif season. Similarly, during Rabi season the Village Accountants reported the crop area in case of Jowar, Wheat & Bengalgram to the extent of 1.28%, 0.73%, & 1.54% respectively and reported the crop area in case of other crops (0.50%). During Summer season the Village Accountants over reported the crop area in case of Paddy, Groundnut & Other Crops to the extent of 34.41%, 3.05% & 0.20% respectively . Related to food security ,the global average cost of a healthy diet rose to USD 3.96 in purchasing power parity (PPP) terms per person per day in 2022. Despite this increase, the number of people unable to afford a healthy diet fell to 2.83 billion in 2022. 13% of India's population suffers from chronic undernourishment, indicating prolonged food insecurity. In the Global Hunger Index (GHI) 2023, India ranked 111th, highlighting significant issues in food security. 3% of women in India are anaemic, the

highest in South Asia. The global prevalence of anaemia in women aged 15-49 is expected to increase, driven significantly by South Asia.

Results and Discussion

The problem of Food insecurity has been identified in India . At the household level, food security exists when all members, at all times, have access to enough food for an active, healthy life. Individuals who are food secure do not live with hunger or fear starvation. Across urban settings, the prevalence of food insecurity has been found to range from 51 to 77%, yet over 70% of India's population resides in rural area.

The concept of food security consists of six main dimensions: availability, access, utilization, stability, agency, and sustainability. The first three dimensions are interlinked and hierarchical. Food availability is concerned with ensuring that sufficient quantities of food of appropriate quality are supplied through domestic production or imports (including food aid). Access to food is necessary but not sufficient for access. Access is concerned with ensuring adequate resources, or entitlements, are available for the acquisition of appropriate foods for a nutritious diet. Access is necessary but not sufficient for utilization. Utilization is concerned with the ability of an individual to access an adequate diet, clean water, sanitation, and health care to reach a state of nutritional well-being. The three other concepts have become increasingly accepted as important, as risks such as climatic fluctuations, conflict, job loss, and epidemic disease can disrupt any one of the first three factors. Stability refers to the constancy of the first three dimensions. Agency is recognized as the capacity of individuals or groups to make their own food decisions, including about what they eat, what and how they produce food, and how that food is distributed within food systems and governance. Finally, sustainability refers to the long-term ability of food systems to provide food security and nutrition in a way that does not compromise the economic, social, and environmental bases that generate food security and nutrition for future generations.

Ensuring food security is one of the most challenging policy problems in a country such as India, where more than one-third of the population is poor and extremely malnourished. The attempts to ensure food security in India started with productivist approaches and shifted to distribution and welfare approaches.

As a growing proportion of world's population lives in cities and towns, food security is increasingly acquiring an urban character. The locus of food security research and policy agendas has correspondingly expanded from rural areas to include urban centres in recent years. However, the dominant discourse on urbanization-food security relationship appears to be shaped by perspectives from the Global North and large cities, and disregards urbanization-food security nexus in small towns of the Global South.

Table 1

Proposed Target of Season-wise Total Foodgrains in Karnataka during 2024-25

Unit: Area in Hectares, production in tonnes and yield in kg/ha

Sl	District	Total Foodgrains			
		Kharif	Rabi	Summer	Total

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No.		Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
1	Bagalkote	146000	321987	2205	261500	299155	1144	4650	10863	2336	412150	632005	1533
2	Ballari	128461	413174	3216	40305	46020	1142	62605	183891	2937	231371	643085	2779
3	Belagavi	293185	731993	2497	328110	420684	1282	8672	30943	3568	629967	1183620	1879
4	Bengaluru Rural	68642	142919	2082	644	943	1464	213	481	2258	69499	144343	2077
5	Bengaluru Urban	22189	38371	1729	189	317	1677	121	189	1562	22499	38877	1728
6	Bidar	170919	153519	898	132787	97834	737	0	0	0	303706	251353	828
7	Chamarajanagara	79272	149310	1884	29845	27308	915	1951	6072	3112	111068	182690	1645
8	Chikkaballapur	107402	234459	2183	5806	13651	2351	5103	14179	2779	118311	262289	2217
9	Chikkamangaluru	87725	154864	1765	16760	12907	770	2150	8064	3751	106635	175835	1649
10	Chitradurga	187273	346239	1849	55628	46302	832	3860	7330	1899	246761	399871	1620
11	Dakshina Kannada	9390	18627	1984	2036	5539	2721	160	374	2338	11586	24540	2118
12	Davanagere	211846	581484	2745	17098	13088	765	59710	193703	3244	288654	788275	2731
13	Dharwad	144220	236004	1636	187345	171875	917	835	2094	2508	332400	409973	1233
14	Gadag	236810	296914	1254	215640	151067	701	2723	4840	1777	455173	452821	995
15	Hassan	234864	686468	2923	17210	30683	1783	1412	2780	1969	253486	719931	2840

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16	Haveri	241455	579783	2401	102143	126681	1240	22534	63959	2838	366133	770423	2104
17	Kalburgi	681827	639662	938	201804	183917	911	2893	9010	3114	886524	832589	939
18	Kodagu	32070	68675	2141	5	0	0	20	5	250	32095	68680	2140
19	Kolar	82571	172300	2087	5460	5211	954	2750	5332	1939	90781	182843	2014
20	Koppal	273810	561984	2052	124075	78964	636	61300	264595	4316	459185	905543	1972
21	Mandya	142620	290757	2039	22125	30543	1380	22771	59931	2632	187516	381231	2033
22	Mysuru	266750	572406	2146	63720	60509	950	14275	39978	2801	344745	672893	1952
23	Raichuru	380652	805558	2116	96587	104433	1081	97119	248975	2564	574358	1158966	2018
24	Ramanagara	88220	169434	1921	2184	2351	1076	490	708	1445	90894	172493	1898
25	Shivamogga	122431	399419	3262	1340	4874	3637	19885	62304	3133	143656	466597	3248
26	Tumkur	236988	335805	1417	3844	2012	523	2819	4478	1589	243651	342295	1405
27	Udupi	36509	105167	2881	8052	16513	2051	165	166	1006	44726	121846	2724
28	Uttarkannada	54459	130641	2399	7251	12809	1767	1650	3429	2078	63360	146879	2318
29	Vijayanagar	239065	773111	3234	45156	47011	1041	9690	26611	2746	293911	846733	2881
30	Vijayapura	531450	662784	1247	187000	220839	1181	2600	8552	3289	721050	892175	1237
31	Yadgiri	212415	429319	2021	20703	32219	1556	52603	106240	2020	285721	567777	1987

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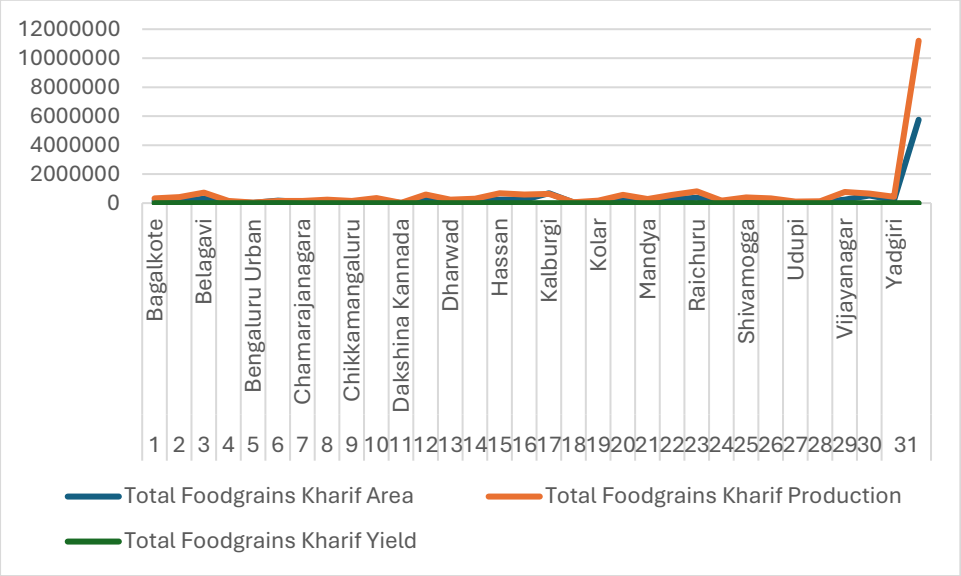
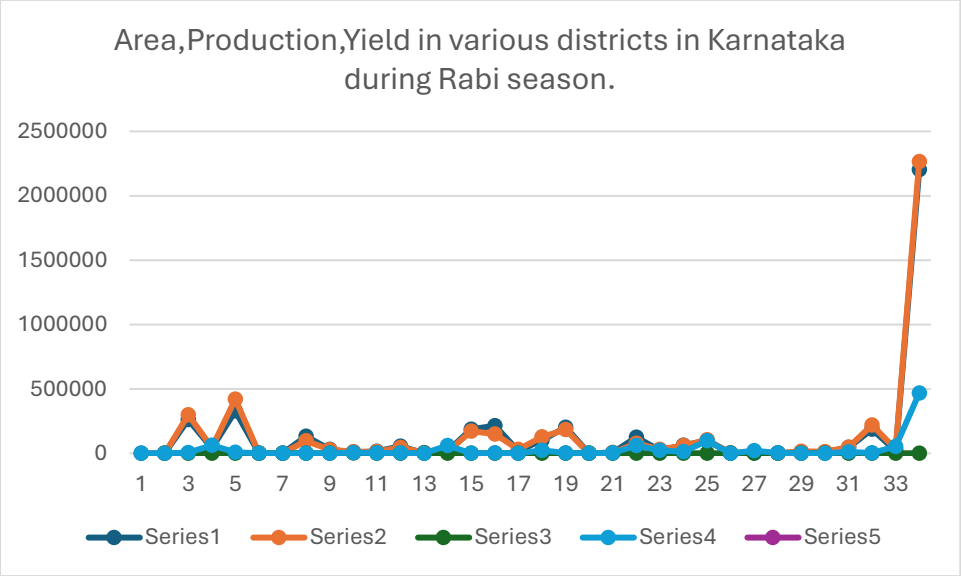
	STATE:	**5751490**	**11203136**	**1948**	**2202352**	**2266259**	**1029**	**467729**	**1370076**	**2929**	**8421572**	**14839472**	**1762**

The above table indicate that total foodgrains in various districts in Karnataka during 2024-25 during kharif, rabi and summer season.



Area, Production, yield of food crops in kharif season in various districts in Karnataka.



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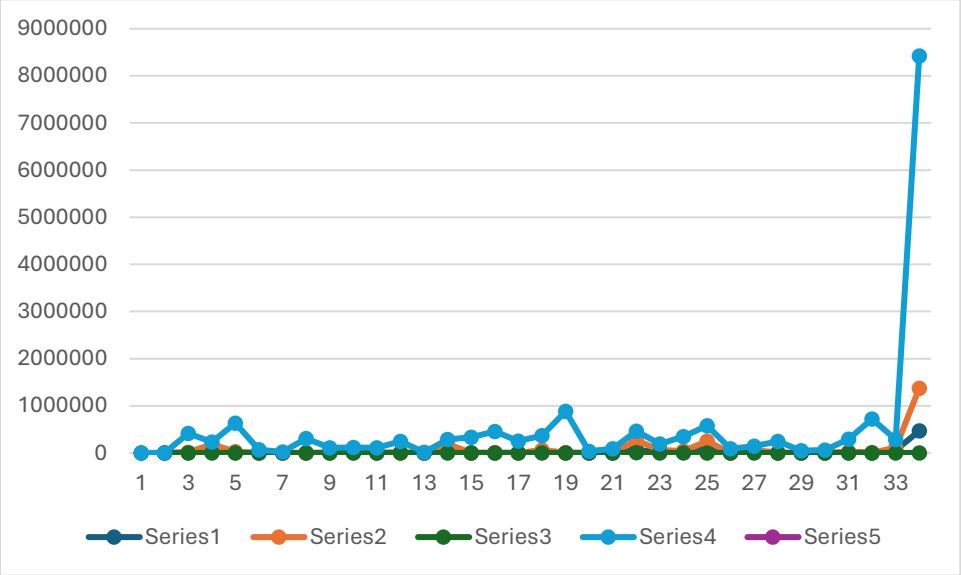
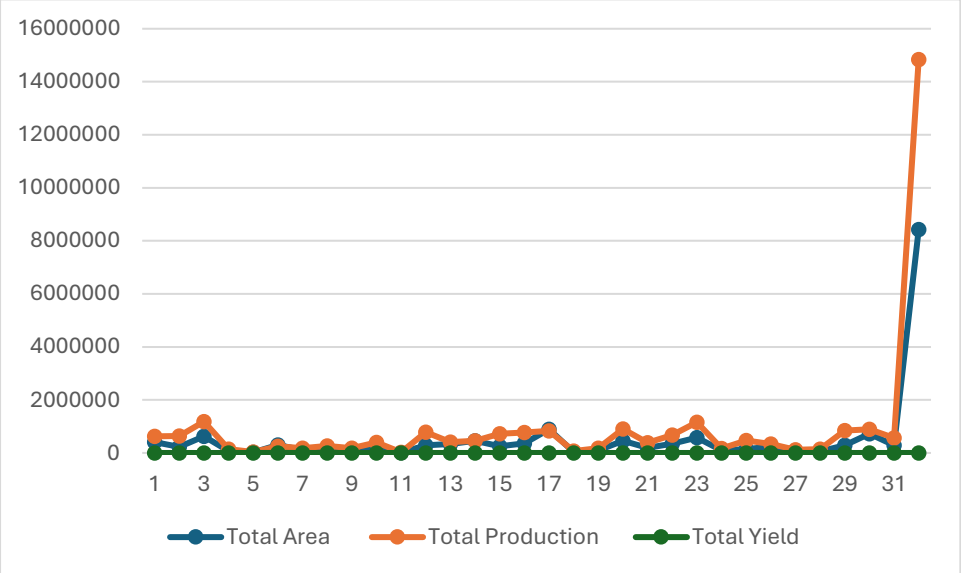


Area, Production, Productivity of food crops in various districts in Karnataka in summer season.



Total area under food crops, production, yield of various districts in Karnataka.

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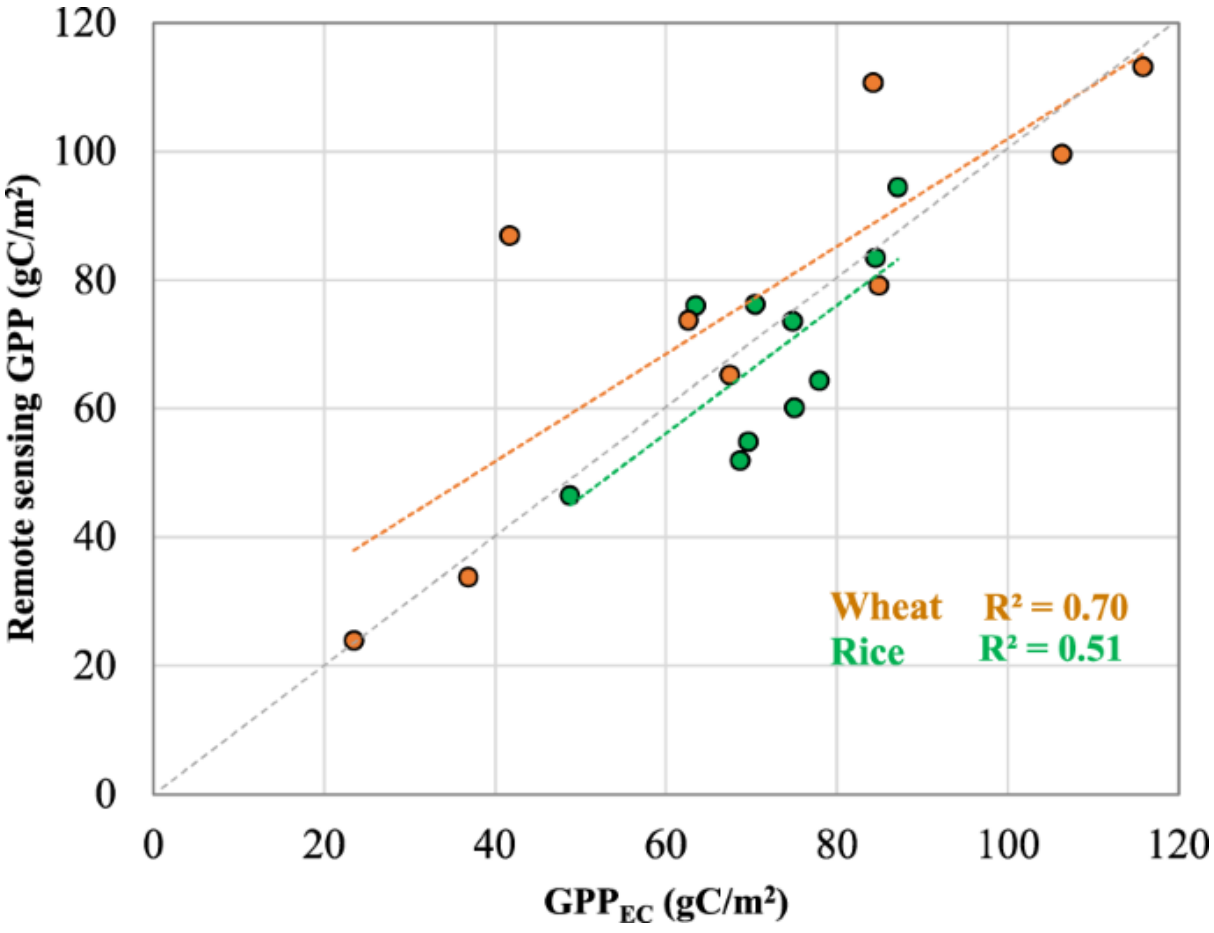

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Validation of cumulative 16 days estimated GPPCY-IN with measured GPP by eddy covariance approach (GPP_{EC}) in winter wheat and dry season rice. R square value for wheat 70 per cent and for rice 51 per cent.

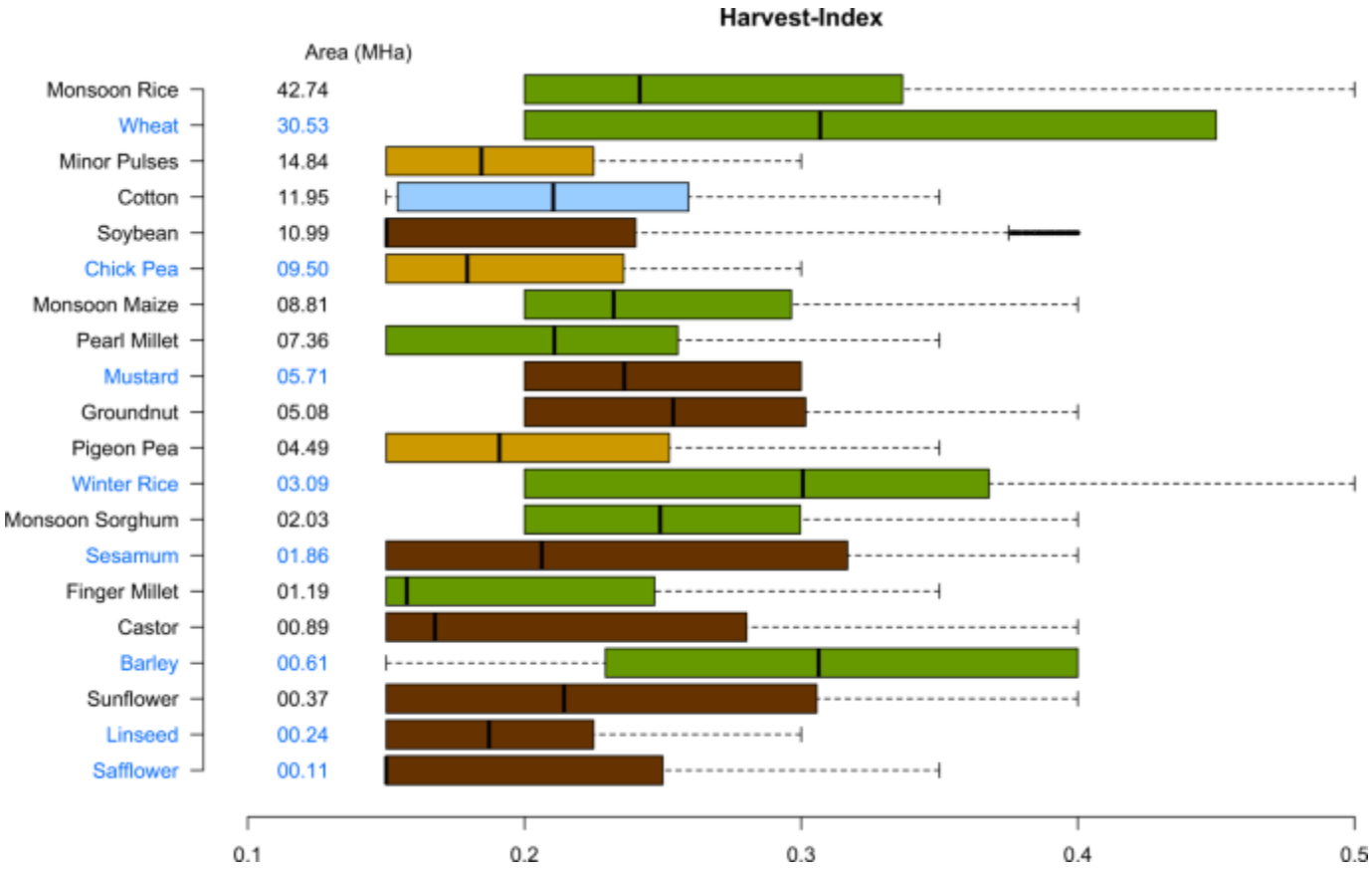

Fig:1

Harvest Index of selected crops for monsoon (in black) and winter season (in blue). The average value of HI for sugarcane was 0.69 and not shown in Fig. 4 due to scale difference. The values are arranged in decreasing order of average area from 2015–17. The green, brown and yellow colors represent cereals, pulses and oilseeds.

The normalized root mean square (nRMSE) values of monsoon seasons vary from 13% to 29% with an average of 20% for calibration years and validation years the nRMSE range is 24% to 36% with an average of 28%. For the winter season the mean nRMSE are 20% and 28% for calibration years and validation years respectively.

Conclusion

Food security and food self sufficiency is gaining increasing importance in the modern era. Commercialisation in agriculture, mechanisation in agriculture, modernization in agriculture surely helpful to achieve food for all goal In Indian economy and in Karnataka. With assurance of food People they can contribute more to the economy. Which will be helpful to achieve faster rate of GDP growth rate and overall development.

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