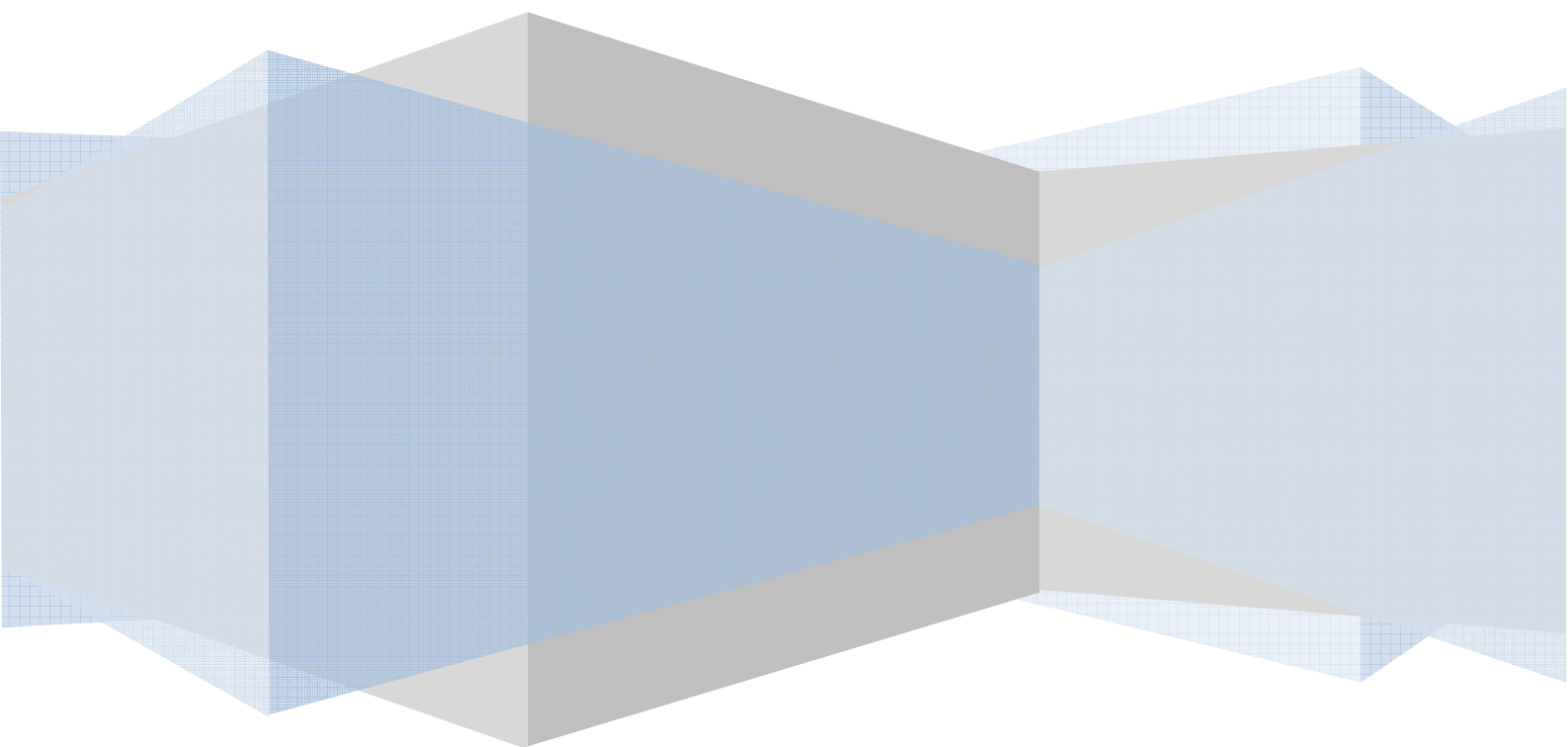


CLUSTER INNOVATION CENTRE, DU

Analysis of Crop Production and Suggestion of Crop Pattern Plan

A Case Study of Karnataka

BY: - Vaibhav Jain [1st Semester]



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1. INTRODUCTION

Karnataka is a state in southwest India with Arabian Sea coastlines. It is amongst the leading state in India in terms of production of crop and revenue in agriculture industry. Agriculture is one of the priority sectors of the State's economy, particularly rural economy, having a large share in State domestic product. Accounting to such large importance of agricultural industry, government timely plan and implement techniques to improve productivity.

Besides human implemented techniques, coordination of many natural

phenomenon, primarily rainfall and weather conditions are also crucial factors. Being a prime industry, it is important to have records of all types of crops and its products, with much precision to monitor the growth of industry and to plan future schemes accordingly. Government put a great time and effort to achieve this.

In this case study, we will try to do the whole exercise as an activity. We choose Karnataka as our subject state due to its rich agricultural industry and the large

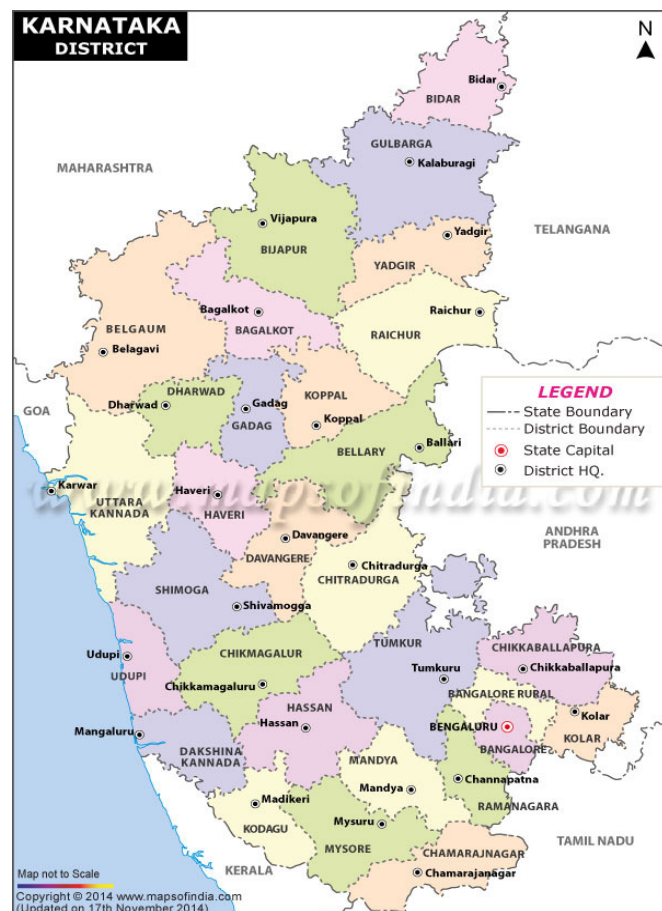


Figure-1: A map of Karnataka showing its districts (Source: Ref-4)

variety in crop produced here. First we will try to record the yield of major crops in Karnataka for three fiscal years (being 2008-11). To reduce complexity in data, we choose to characterize the total crops into three major fields namely *Pulses*, *Cereals* and *Food grains*. These data will help us to analyse the growth pattern of these crops and then we will be able to simulate a demo plan of the crop pattern for next year accordingly to maximise production.

2. Methodology

2.1 Overview

In this activity, we first present the data of production of crops in the state on a district-wise level for each year. Here we choose to express productivity in terms of **Yield**. Yield of a given crop can be calculated as the total production of crop (in tonnes) divided by the approximate area (in hectares) in which the crop is sown. This activity involves a lot of raw data which requires to be structured to present in this report. We amount the total yield of different crops into a table corresponding to the respective district yearly. Then we calculate the total change in the productivity after three years and analyse the variation pattern.

2.2 Tools

For this activity we use the following two softwares for processing data.

- a. ILWIS (Integrated Land and Water Information System): ILWIS is an integrated GIS and Remote Sensing application for raster processing. ILWIS is one of the most user-friendly integrated vector and raster software programmes currently available. We used it to make maps for different state-wise data.
- b. Microsoft Excel: It is a spreadsheet developed by Microsoft which features calculation, graphing tools, pivot tables etc. We used it for making tables and histograms.

2.3 Year 2008-09

First we collected information of each districts and arranged them in a table (appendix-1). Then referring from appendix-1, we calculated the histogram shown in *figure 2*

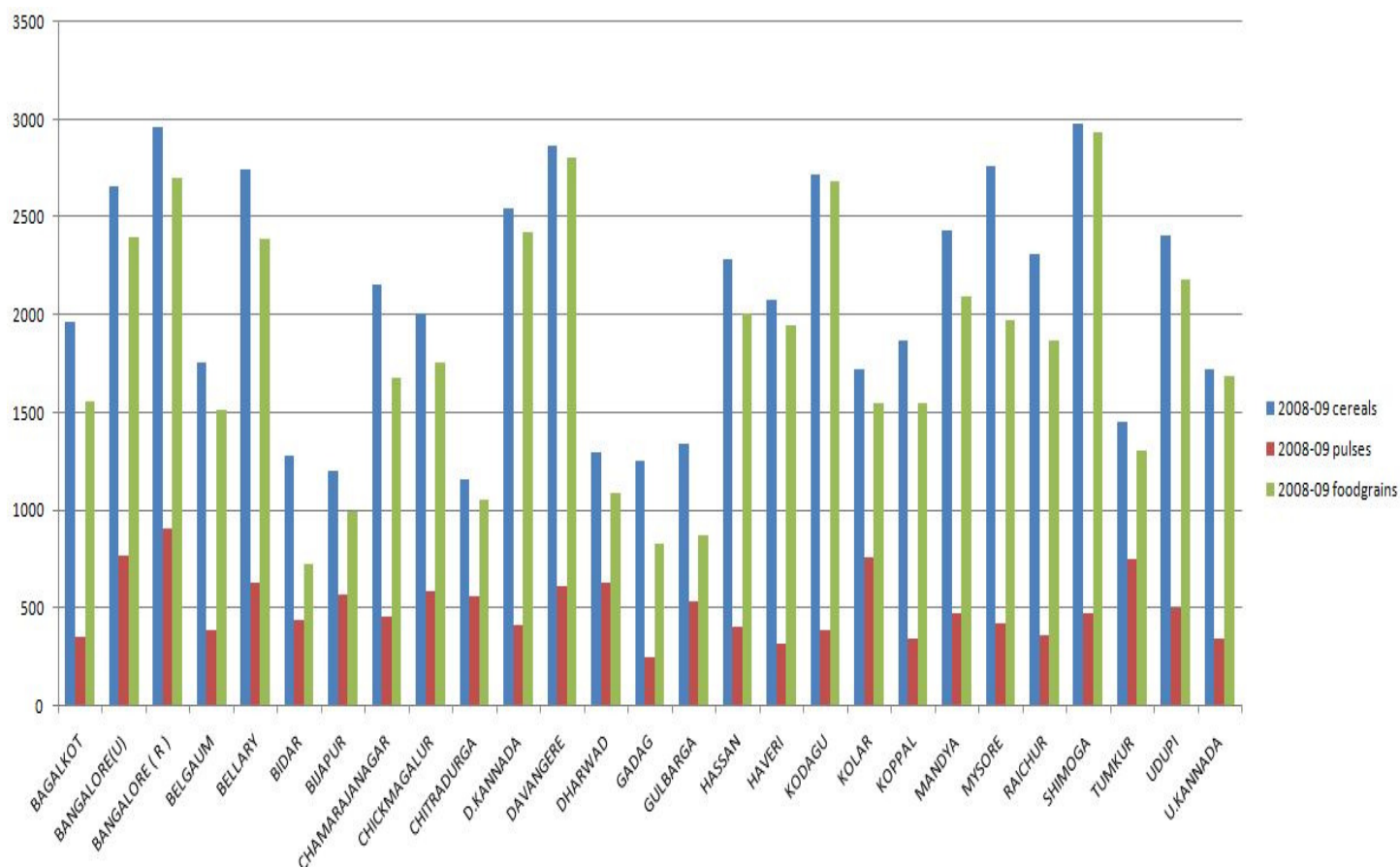


Figure 2: Yield versus District histogram for year 2008-09

After that we formed maps given in *figure 3, 4, and 5* to have a better pictorial representation and comparison of yields of every district. Maps are easily formed using ILWIS software. We take a raster map of Karnataka and put values of yields corresponding to each district, and then ILWIS simply forms a density map using colour coded system.

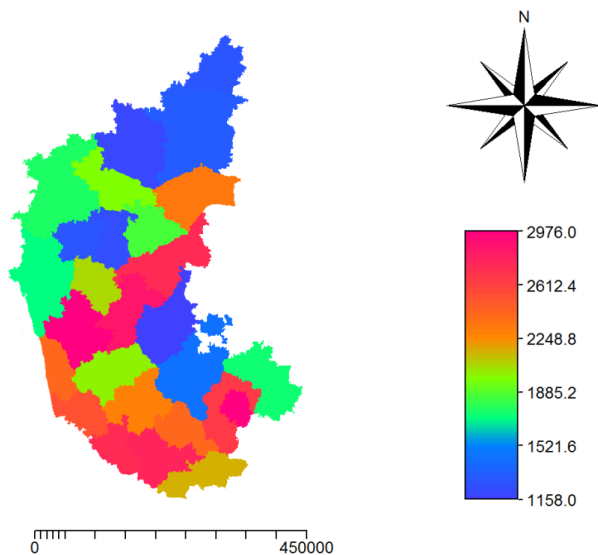


Figure 3: Density map of Karnataka showing Cereals yield as legend for different districts (2008-09)

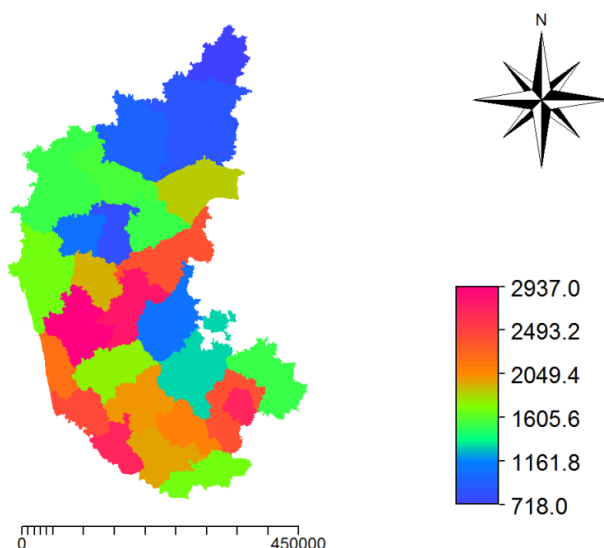


Figure 4: Density map of Karnataka showing Food grains yield as legend for different districts (2008-09)

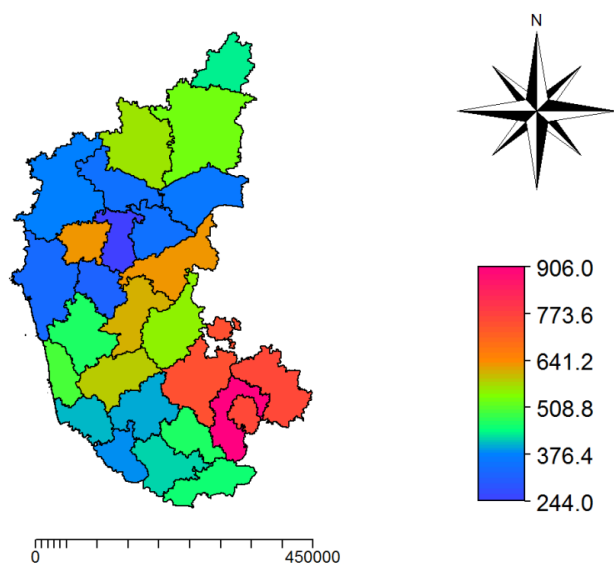


Figure 5: Density map of Karnataka showing Pulses yield as legend for different districts (2008-09)

2.4 Year 2009-10

First we collected information of each districts and arranged them in a table (appendix-2). Then referring from appendix-2, we calculated the histogram shown in figure 6

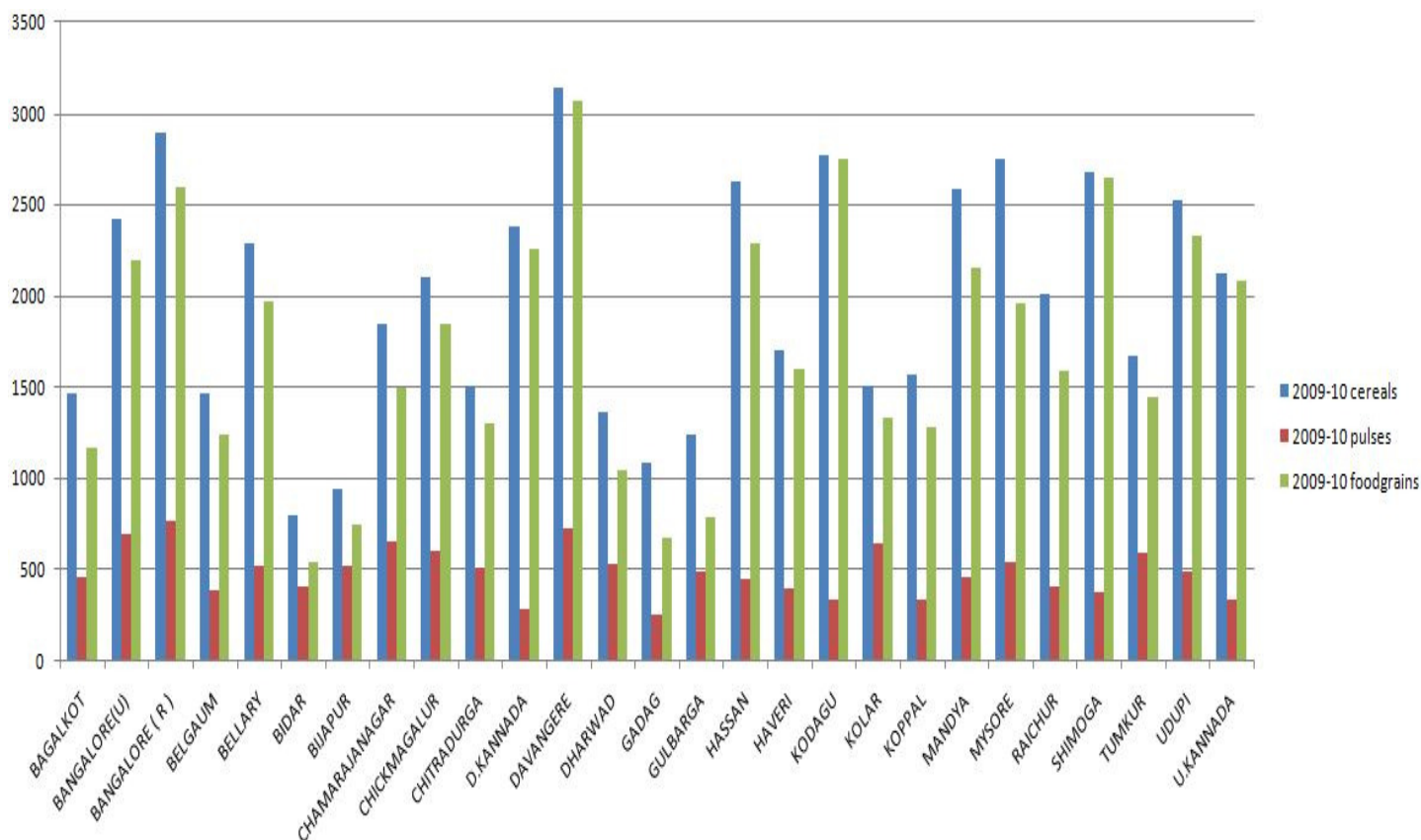


Figure 6: Yield versus District histogram for year 2009-10

After that we formed maps given in *figure 7, 8 and 9* to have a better pictorial representation and comparison of yields of every district. Maps are easily formed using ILWIS software. We take a raster map of Karnataka and put values of yields corresponding to each district, and then ILWIS simply forms a density map using colour coded system.

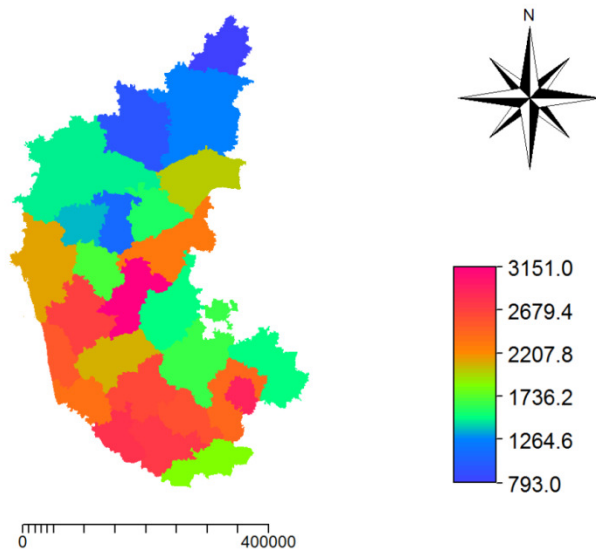


Figure 7: Density map of Karnataka showing Cereals yield as legend for different districts (2009-10)

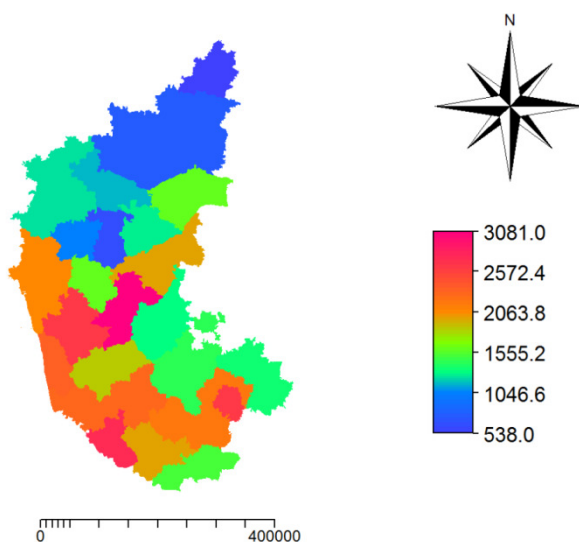


Figure 8: Density map of Karnataka showing Food Grains yield as legend for different districts (2009-10)

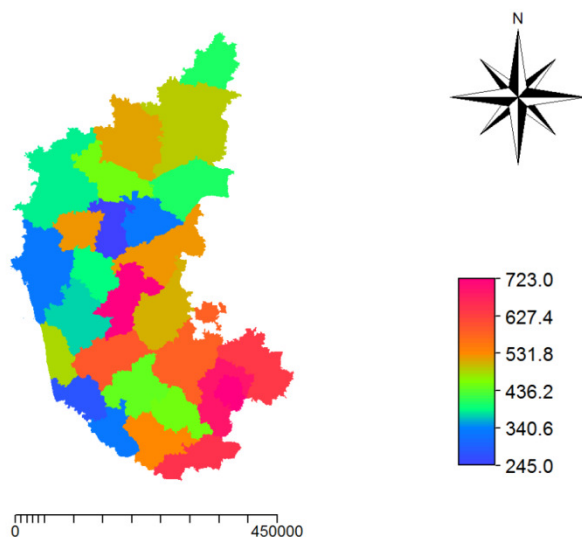


Figure 9: Density map of Karnataka showing Pulses yield as legend for different districts (2009-10)

2.5 Year 2010-11

First we collected information of each districts and arranged them in a table (appendix-3). Then referring from appendix-3, we calculated the histogram shown in figure 10

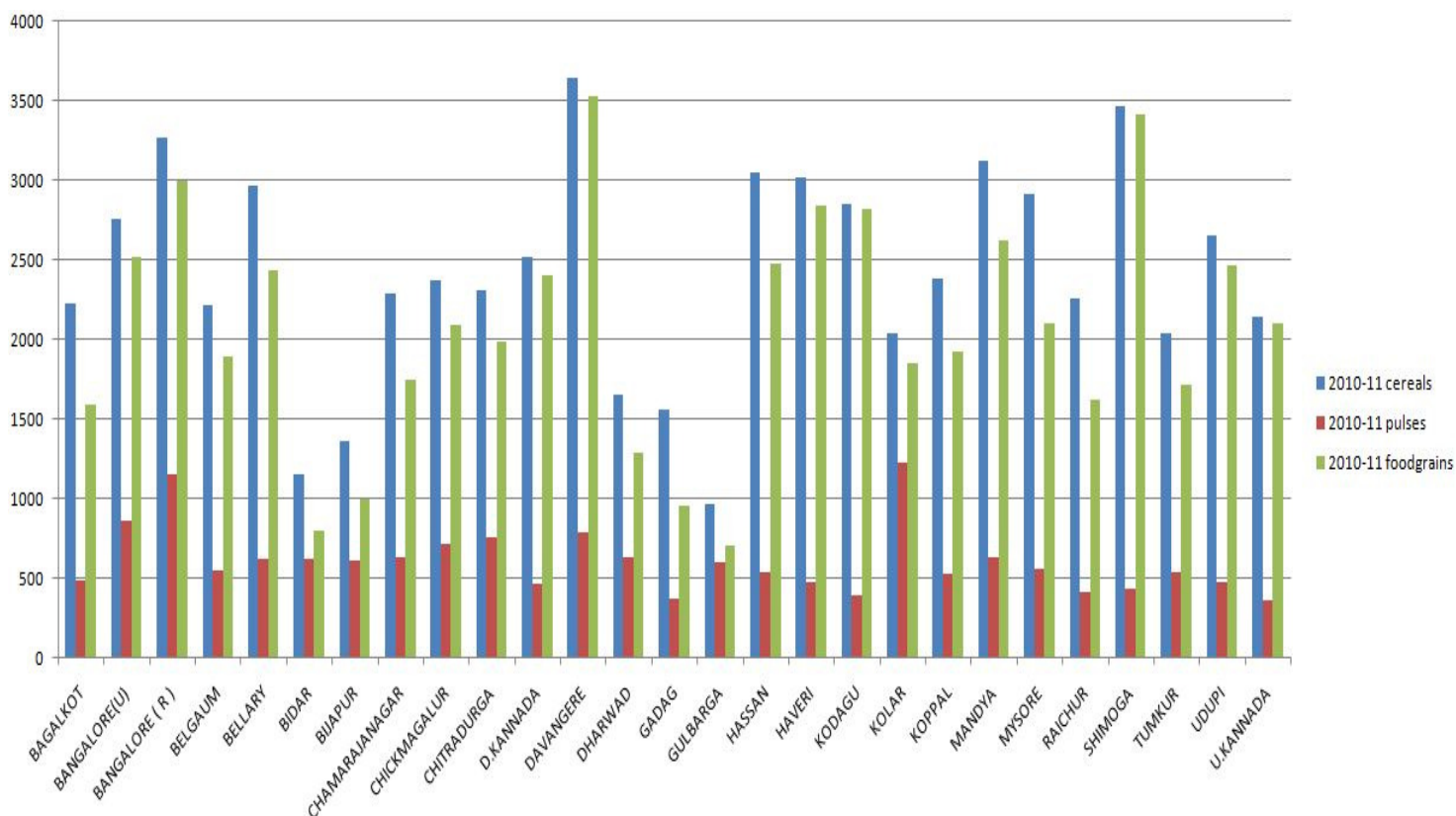


Figure 10: Yield versus District histogram for year 2010-11

After that we formed maps given in *figure 11, 12 and 13* to have a better pictorial representation and comparison of yields of every district. Maps are easily formed using ILWIS software. We take a raster map of Karnataka and put values of yields corresponding to each district, and then ILWIS simply forms a density map using colour coded system.

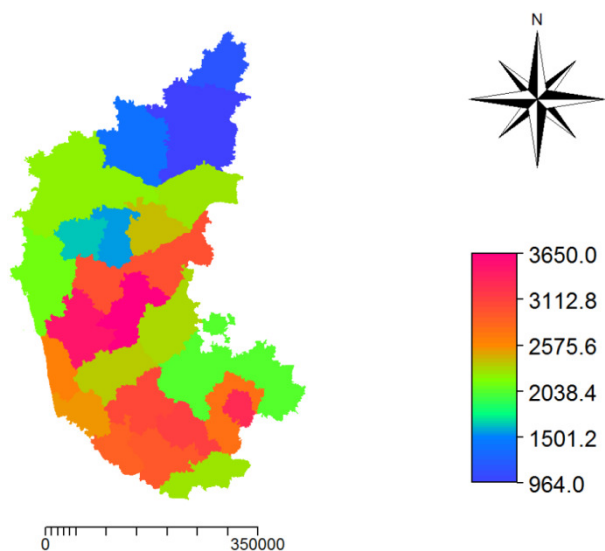


Figure 11: Density map of Karnataka showing Cereals yield as legend for different districts (2010-11)

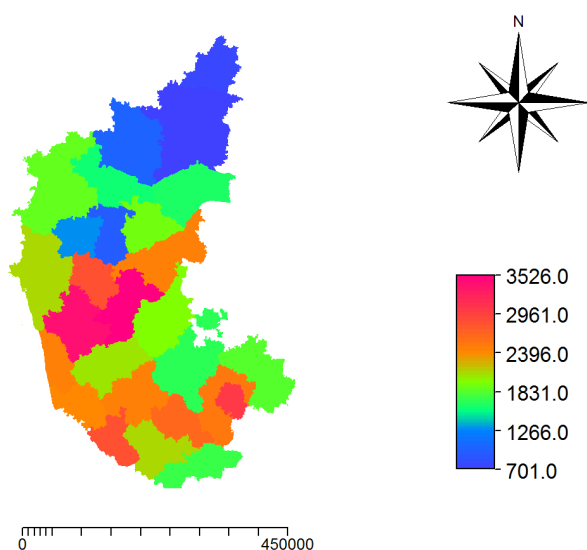


Figure 12: Density map of Karnataka showing Food Grains yield as legend for different districts (2010-11)

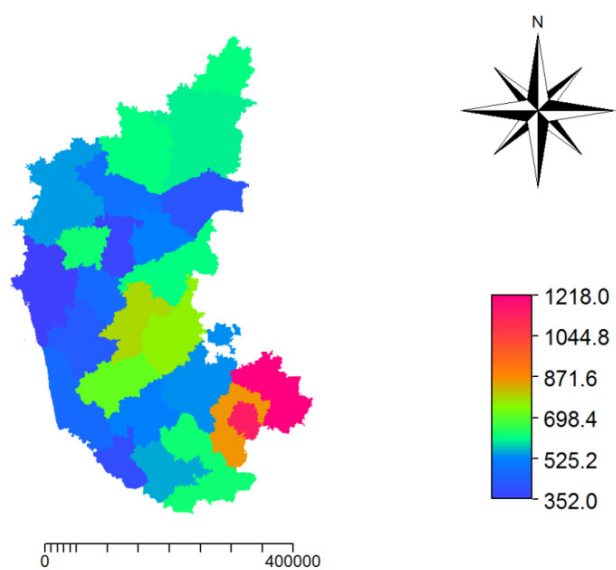


Figure 13: Density map of Karnataka showing Pulses yield as legend for different districts (2010-11)

3. RESULT

3.1 Comparison of Three Years

As per the information we collect through section 2.3 to 2.5, we are now ready to compare the yield of crops before and after the time span of 2008-11.

A. CEREALS

Amongst the given years, year 2009-10 significantly produced largest amount of cereals. Observing from *figure 14* we can also see that the district of *Bellary* saw most change in cereals production. Bagalkot and Bidar also saw high difference in their production level. The year 2008-09 generally had lower production level in most of the districts.

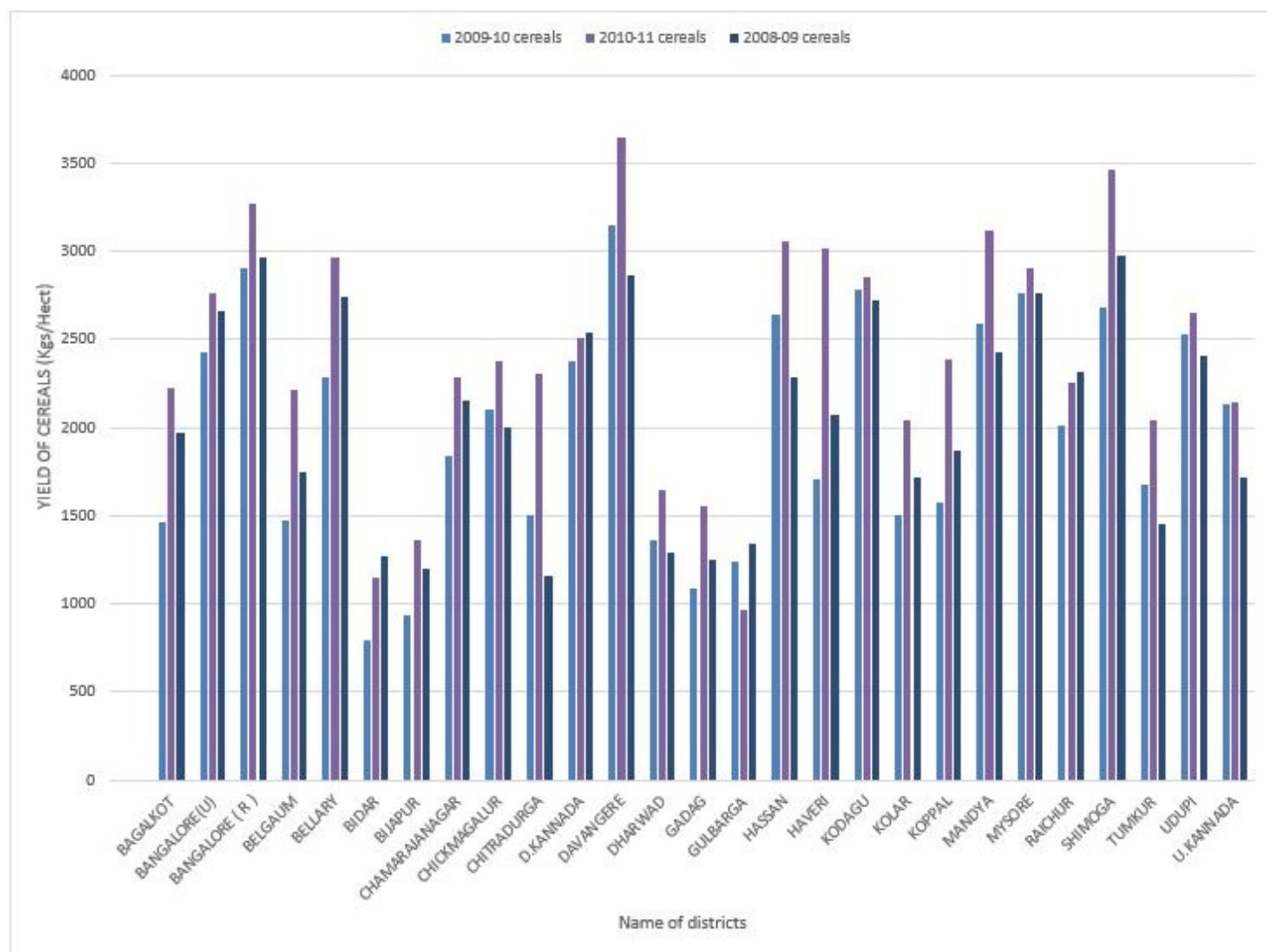


Figure 14: Histogram showing comparison of Cereals production of years 2008-11

B. FOOD-GRAINS

Except for 2009-10 food-grains does not show much change in their production yield. From *figure 15*, yield in 2009-10 is higher than both of the year in every district except *Gulbarga*. *Devangree* produced highest yield of food-grains.

In 2008-09 and 2010-11, yield of food-grains is nearly same in all districts with very slight variations with 2010-11 generally producing more yields.

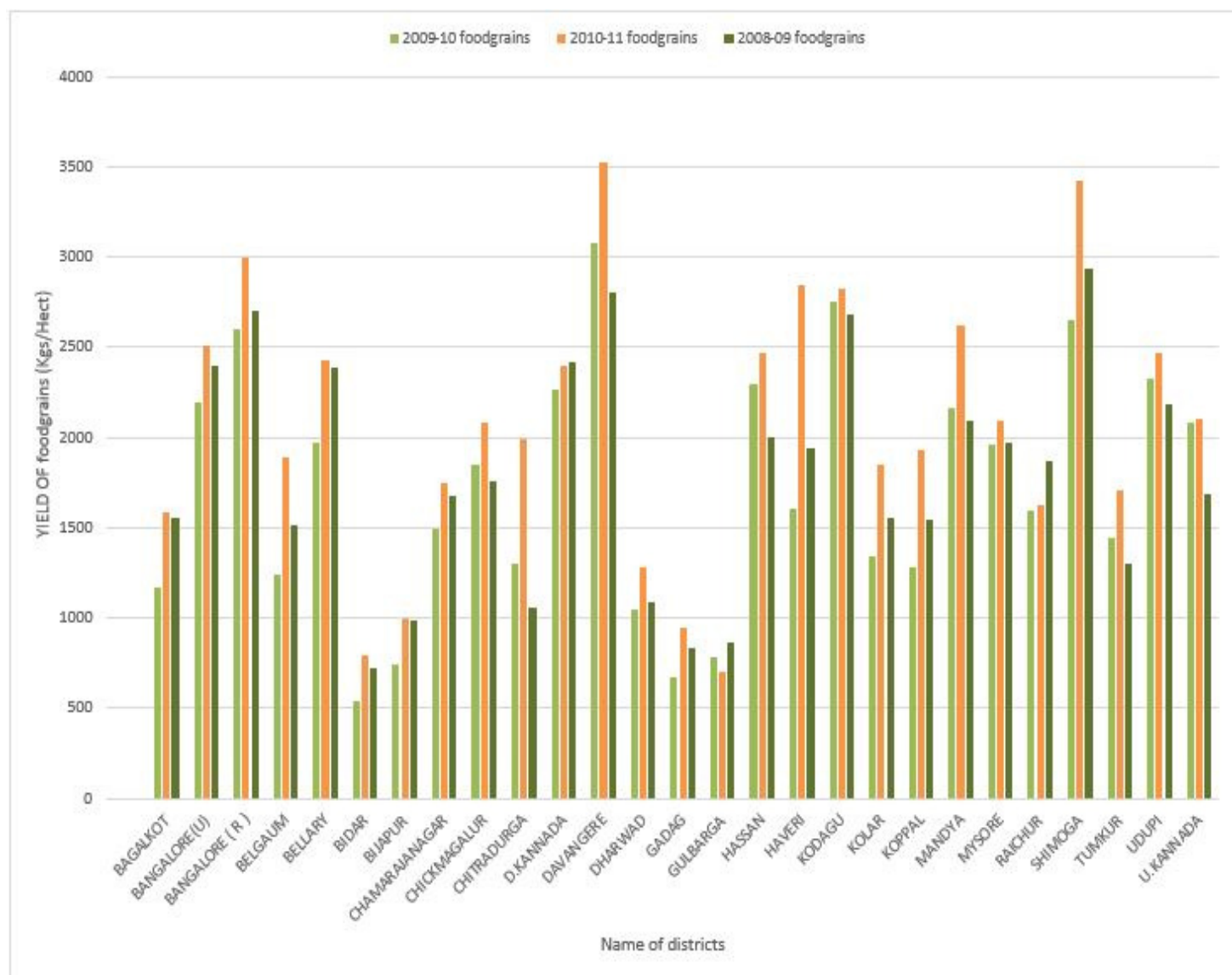


Figure 15: Histogram showing comparison of Food-grains production of years 2008-11

C. PLUSES

Pattern of pulses yield is somewhat similar to previously discussed cereals and food-grains (*from figure 16*). Again pulses yields are most in 2009-10. Kolar produced exceptionally high yield of pulses in that year. But districts of Tumkur and Udupi showed a slight decrease in production.

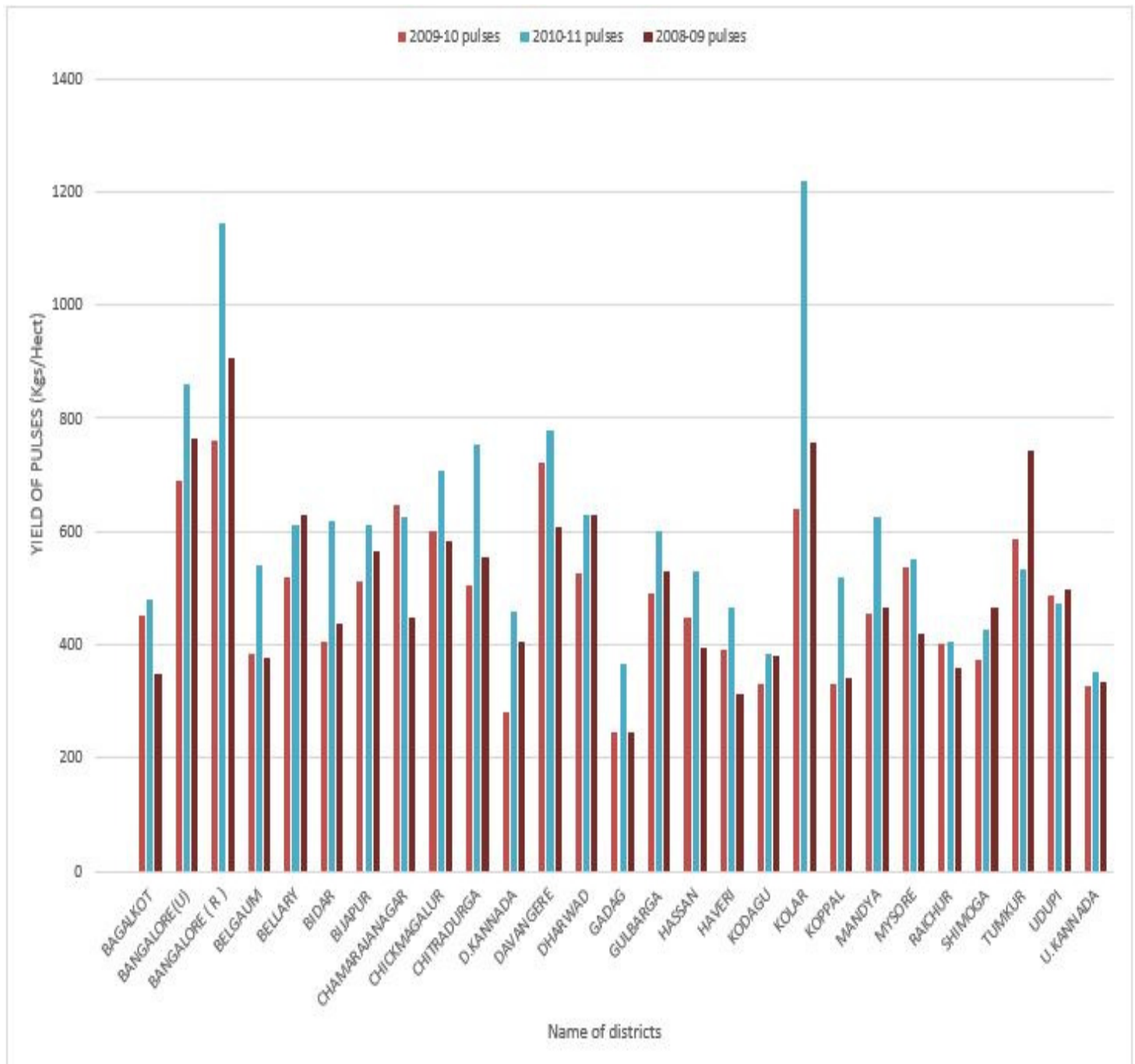


Figure 16: Histogram showing comparison of Pulses production of years 2008-11

3.2 Crop Pattern Plan

We can observe from maps given in section 2: *Methodology* that many districts generally in the central and western region of Karnataka like *Davangree* are at top in production level and are producing high yields of every crop. Whereas districts located in the northern region are somewhat low in yield. Therefore we may concentrate our focus to that part of state. Reasons behind low yield in that area can be not one but a combination of many factors. One of them could be rainfall. To overcome this factor, government could implement modern irrigation techniques like canal network or drip irrigation though bore well. Farmers there could also use better quality seeds and organic manure which government can provide at subsidised rates. Overall plan is to increase yield where it is low and maintain where it is at sufficient level. Once yield is good in those regions, we can think of increasing production level everywhere.

4. DISCUSSION

In this activity, we first collected information about crops produced in Karnataka which were classified as Cereals, Food-Grains and Pluses. Then later in section 2 we create different pictorial representation of data as Histograms and Maps using ILWIS. After that in section 3, we analyse the data we get and then at last, we proposed necessary steps to increase production in crop pattern plan.

Results we get in this activity may not be accurate enough to implement in real-life situation but this activity was just a mere simple simulation of a large complex process in real world. In reference to that we think this experiment was a success.

6. REFERENCES

Ref. 1 – Agriculture Department of Karnataka: Report on Area, Production, Productivity and Prices of Agriculture Crops in Karnataka 2008-09: page no. 78 (des.kar.nic.in/docs/2008-09.pdf)

Ref. 2 – Agriculture Department of Karnataka: Report on Area, Production, Productivity and Prices of Agriculture Crops in Karnataka 2009-10: page no. 68 (des.kar.nic.in/docs/ASCR-2009-10-area%20production%20&Prices%20Report.pdf)

Ref. 3 – Agriculture Department of Karnataka: Report on Area, Production, Productivity and Prices of Agriculture Crops in Karnataka 2010-11: page no. 81 (des.kar.nic.in/docs/2008-09.pdf)

Ref. 4 – Images of India: Karnataka District Map (https://www.google.co.in/search?q=karnataka+map&rlz=1C1KMZB_enIN594IN595&espv=2&biw=1302&bih=702&source=lnms&tbn=isch&sa=X&ved=0ahUKEwiF2bSNoY7QAhWLq48KHacEB1QQ_AUIBygC#imgrc=Y1gBCx_LpZjZAM%3A)

5. APPENDIX

APPENDIX-1

AREA, PRODUCTION AND PRODUCTIVITY DURING 2008-09

Sl. No.	District	Cereals and Minor Millets			Pulses			Foodgrains		
		Area (in hect)	Production (Tonnes)	Yield (Kgs/Hect)	Area (in hect)	Production (Tonnes)	Yield (Kgs/Hect)	Area (in hect)	Production (Tonnes)	Yield (Kgs/Hect)
1	2	3	4	5	6	7	8	9	10	11
1	BAGALKOT	255465	477168	1966	86635	28590	347	342100	505758	1556
2	BANGALORE(U)	28114	70937	2656	4383	3179	763	32497	74116	2401
3	BANGALORE(R)	56813	159950	2964	8348	7186	906	65161	167136	2700
4	BELGAUM	464273	772542	1752	97100	34889	378	561373	807431	1514
5	BELLARY	291090	758288	2742	58039	34698	629	349129	792986	2391
6	BIDAR	101533	122920	1274	200488	83182	437	302021	206102	718
7	BIJAPUR	370404	421525	1198	187466	100921	567	557870	522446	986
8	CHAMARAJANAGAR	99441	203519	2154	38323	16354	449	137764	219873	1680
9	CHIKKABALLAPURA	83257	218655	2764	16872	10694	667	100129	229349	2411
10	CHICKMAGALUR	118103	224843	2004	25365	14058	583	143468	238901	1753
11	CHITRADURGA	178009	195908	1158	36784	19333	553	214793	215241	1055
12	D.KANNADA	55382	133870	2544	3390	1302	404	58772	135172	2421
13	DAVANGERE	349114	949657	2863	9893	5727	609	359007	955384	2801
14	DHARWAD	162866	200204	1294	74144	44227	628	237010	244431	1086
15	GADAG	136327	162302	1253	98979	22924	244	235306	185226	829
16	GULBARGA	478131	607594	1338	667839	337109	531	1145970	944703	868
17	HASSAN	172303	373752	2283	29758	11206	396	202061	384958	2005
18	HAVERI	227103	447063	2072	18215	5412	313	245318	452475	1942
19	KODAGU	39563	102130	2717	532	193	382	40095	102323	2686
20	KOLAR	68790	112357	1719	14674	10546	757	83464	122903	1550
21	KOPPAL	235714	418388	1868	63777	20683	341	299491	439071	1543
22	MANDYA	174965	403950	2430	36319	16027	465	211284	419977	2092
23	MYSORE	225774	592675	2763	115311	45913	419	341085	638588	1971
24	RAICHUR	313274	688260	2313	92873	31678	359	406147	719938	1866
25	RAMANAGARA	86864	161871	1962	19840	14247	756	106704	176118	1737
26	SHIMOGA	189675	536180	2976	2946	1305	466	192621	537485	2937
27	TUMKUR	264317	363982	1450	69992	49400	743	334309	413382	1302
28	UDUPI	61557	140683	2406	8081	3816	497	69638	144499	2184
29	U.KANNADA	83911	136791	1716	2105	671	336	86016	137462	1682
	STATE	5372132	10157964	1990	2088471	975470	492	7460603	11133434	1571

Table 1: Area, Production and Yield for year 2008-09 (Ref.-1)

APPENDIX -2

AREA, PRODUCTION AND PRODUCTIVITY DURING 2009-10

Sl. No.	District	Cereals and Minor Millets			Pulses			Foodgrains		
		Area (in hec)	Production (Tonnes)	Yield (Kgs/Hect)	Area (in hec)	Production (Tonnes)	Yield (Kgs/Hect)	Area (in hec)	Production (Tonnes)	Yield (Kgs/Hect)
1	2	3	4	5	6	7	8	9	10	11
1	BAGALKOT	267743	372708	1465	112222	47976	450	379965	420684	1165
2	BANGALORE(U)	26787	61747	2426	4130	2712	691	30917	64459	2195
3	BANGALORE(R)	54369	150102	2906	8891	6413	759	63260	156515	2604
4	BELGAUM	489238	683327	1470	128901	47090	385	618139	730417	1244
5	BELLARY	298366	648433	2288	65942	32596	520	364308	681029	1968
6	BIDAR	102629	77324	793	195769	75213	404	298398	152537	538
7	BIJAPUR	408801	363937	937	333925	162651	513	742726	526588	746
8	CHAMARAJANAGAR	92834	162562	1843	38568	23757	648	131402	186319	1493
9	CHIKKABALLAPURA	88503	177101	2106	18249	8930	515	106752	186031	1834
10	CHICKMAGALUR	117670	235039	2103	24432	13929	600	142102	248968	1844
11	CHITRADURGA	181317	259220	1505	46823	22519	506	228140	281739	1300
12	D.KANNADA	54909	124153	2380	3167	842	280	58076	124995	2266
13	DAVANGERE	355310	1063565	3151	10532	7231	723	365842	1070796	3081
14	DHARWAD	161676	209463	1364	100510	50158	525	262186	259621	1042
15	GADAG	153616	158689	1087	153638	35704	245	307254	194393	666
16	GULBARGA	465781	548754	1240	706306	328110	489	1172087	876864	787
17	HASSAN	184056	460845	2636	34275	14565	447	218331	475410	2292
18	HAVERI	221125	357511	1702	17707	6558	390	238832	364069	1605
19	KODAGU	38689	102200	2781	389	122	330	39078	102322	2756
20	KOLAR	58638	83799	1504	14120	8588	640	72758	92387	1337
21	KOPPAL	243836	364404	1573	74581	23486	331	318417	387890	1282
22	MANDYA	149622	368628	2593	37847	16361	455	187469	384989	2162
23	MYSORE	231192	605813	2758	128719	65490	536	359911	671303	1963
24	RAICHUR	347604	665097	2014	123578	47301	403	471182	712398	1592
25	RAMANAGARA	87237	171293	2067	19584	13317	716	106821	184610	1819
26	SHIMOGA	204923	522933	2686	3208	1133	372	208131	524066	2650
27	TUMKUR	247191	392803	1673	65040	36136	585	312231	428939	1446
28	UDUPI	57524	138244	2530	6233	2878	486	63757	141122	2330
29	U.KANNADA	84769	171652	2132	2217	686	326	86986	172338	2085
	STATE	5475955	9701346	1865	2479503	1102452	468	7955458	10803798	1429

Table 2: Area, Production and Yield for year 2009-10 (Ref.-2)

APPENDIX -3

AREA, PRODUCTION AND PRODUCTIVITY DURING 2010-11

Sl. No.	District	Cereals and Minor Millets			Pulses			Foodgrains		
		Area (in hec)	Production (Tonnes)	Yield (Kgs/Hect)	Area (in hec)	Production (Tonnes)	Yield (Kgs/Hect)	Area (in hec)	Production (Tonnes)	Yield (Kgs/Hect)
1	2	3	4	5	6	7	8	9	10	11
1	BAGALKOT	252774	533771	2223	144589	65808	479	397363	599579	1588
2	BANGALORE(U)	26900	70591	2762	4063	3323	861	30963	73914	2513
3	BANGALORE(R)	56299	174923	3271	8266	9001	1146	64565	183924	2999
4	BELGAUM	448693	945638	2218	107955	55350	540	556648	1000988	1893
5	BELLARY	298817	842714	2969	88363	51343	612	387180	894057	2431
6	BIDAR	99444	108874	1152	207684	121877	618	307128	230751	791
7	BIJAPUR	396122	510820	1357	381624	221195	610	777746	732015	991
8	CHAMARAJANAGAR	90655	196649	2283	43662	26025	627	134317	222674	1745
9	CHIKKABALLAPURA	94783	249554	2771	19477	16458	889	114260	266012	2451
10	CHICKMAGALUR	122015	275019	2373	25557	17150	706	147572	292169	2084
11	CHITRADURGA	200638	439539	2306	52209	37442	755	252847	476981	1986
12	D.KANNADA	54641	130467	2513	3242	1413	459	57883	131880	2398
13	DAVANGERE	363139	1259315	3650	16477	12211	780	379616	1271526	3526
14	DHARWAD	158625	248015	1646	87910	52453	628	246535	300468	1283
15	GADAG	147346	217764	1556	152787	53104	366	300133	270868	950
16	GULBARGA	261878	239783	964	684094	390120	600	945972	629903	701
17	HASSAN	205250	595345	3053	61619	30931	528	266869	626276	2470
18	HAVERI	227250	651410	3017	17114	7586	467	244364	658996	2839
19	KODAGU	39047	105875	2854	465	170	385	39512	106045	2825
20	KOLAR	67864	131495	2040	20742	23997	1218	88606	155492	1847
21	KOPPAL	266337	602666	2382	86260	42586	520	352597	645252	1926
22	MANDYA	158767	470263	3118	39153	23239	625	197920	493502	2625
23	MYSORE	221619	612462	2909	116992	61102	550	338611	673564	2094
24	RAICHUR	345761	740546	2255	179395	69108	406	525156	809654	1623
25	RAMANAGARA	83675	195056	2454	19298	13587	741	102973	208643	2133
26	SHIMOGA	197955	652019	3467	3105	1254	425	201060	653273	3420
27	TUMKUR	240658	466265	2039	67257	34141	534	307915	500406	1711
28	UDUPI	56360	142122	2654	5319	2389	473	61679	144511	2466
29	U.KANNADA	83541	170251	2145	1995	668	352	85536	170919	2103
30	YADGIR	179025	278233	1636	144389	87570	638	323414	365803	1191
	STATE	5445878	12257444	2369	2791062	1532601	578	8236940	13790045	1762

Table 3: Area, Production and Yield for year 2010-11 (Ref.-3)