Inclusive Agriculture Growth In India

Chief Editor

Huchhe Gowda

Co-Editors

Talwar Sabanna

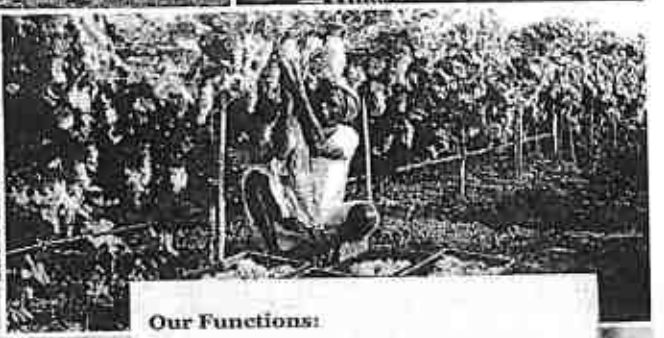
M.S.Adi

D.N.Patil

Kiran Kumar

National Bank for Agriculture and Rural Development

NABARD



Our Mission: Promotion of sustainable and equitable agriculture and rural prosperity through effective credit support, related services, institution development and other innovative initiatives.

- Research and Development on matters of importance pertaining to agriculture, agricultural operations and rural development including the provision of training and research facilities.
- Consultancy services related to Agriculture & Rural Development through subsidiary (NABCONS).

Our Functions:

- Provide Credit/Refinance for production credit and investment credit to eligible banks and financing institutions.
- Development functions undertaken through Farm Sector Promotion Fund (FSPF), Financial Inclusion Fund (FIF), Watershed Development Fund (WDF), Tribal Development Fund (TDF), Rural Infrastructure Development Fund (RIDF), etc.
- Supervisory functions in respect of Cooperative Banks and Regional Rural Banks.

Head Office Plot C-24, 'G' Block Bandra Kurla Complex, Bandra (East) Mumbai - 400 051

www.nabard.org /nabardonline Taking Rural India >> Forward

Inclusive
Agriculture Growth in India

Chief Editor

Dr. Huchhe Gowda
Assistant Professor

Co- Editors

Dr. Talwar Sabanna
Professor and Director
Dr. D.N.Patil
Professor and Chairman
Dr. (Smt) M.S.Adi
Professor
Dr. Kiran Kumar

Department of Studies in Economics
School of Business and Economics
Rani Channamma Univer sity, Belgaum, Karnataka, India

Current Publications
Agra-282 010, U.P. (India)

First Edition, 2017
ISBN : 978-93-8480301-8

Published By :
Current Publications
A-15 Kalakunj, Maruti Estate Road,
Opp. R. D. Higher Sec. School
Maruti State, Shahganj - Bodla Road,
AGRA-282 010
Mob. : 09457780387, 09557458853
E-mail : Currentpublications001@gmail.com

Laser Typesetting By :
R.K. Offset
Naveen Shahdara, Delhi (India)

Contents

AGRICULUTRAL PRODUCTIVITY: NEED FOR INCLUSIVE GROWTH

Dr. Abhay M. Patil
Asst. Professor & Head, Dept. of Geography
Shri. Prasanna B. Joshi
Asst. Professor & Head, Dept. of Economics
Dr. M. S. Kurani
Asst. Professor Dept. of Geography, R.P.D. College Belgaum, Karnataka

Abstract

India's agriculture sector continues to be the lifeline of its people and a key factor in the economy's overall productivity. Considering that agriculture is the mainstay of the Indian economy as more than half of our population is still dependent on agriculture and allied activities, rapid and more inclusive growth of the economy and poverty reduction would not be possible without agricultural growth. Inclusive growth is an all encompassing concept, which includes aspects, such as agriculture development, employment generation, poverty reduction, particularly with respect to small and marginal farmers, landless labourers and reduced regional inequality. Agriculture development may be deemed as the critical aspect of inclusive growth and proves to be a smooth path for achieving social and economic inclusion. Agriculture development is a multi-dimensional phenomenon, which denotes the quality of an agricultural system in terms of productivity, diversification and commercialization (Gopal Krishna-1981). It is a manifestation of the combined effect of many factors viz. environmental, technological, and institutional. The level of agricultural development may be considered as the degree to which agrarian structure gets strengthened leading thereby to increase production. In this paper an attempt has been made only to measure the levels of agricultural productivity attained by different talukas of the Belgaum District during the period 1983 - 84 to 2013-14 and to analyze it in the light of some major casual factors. The study is based on secondary sources. For the analysis of individual crop productivity, in the study region the taluka wise yield data are used and yield indices were calculated to the total harvested area, for two point of time i.e. 1983-84 and 2013-14, based on Jasbir Singh's (1976) method. The crop yield and concentration indices are derived for all the selected principal crops at taluka level in the study region. The study has identified three levels of disparities covering 10 talukas of the District. The study reveals that, the productivity index values vary from 3.05 to 8.53 during 1983-84 and 3.7 to 9.3 during 2013-14. The obtained index values are arranged and divided into three broad categories like high, medium, and low, which are used to differentiate agricultural productivity regions in the study region.

Key words: *Inclusive growth, agricultural development, agriculture productivity, yield index and concentration index.*

Introduction:

Like most other developing countries, India has predominantly been an agrarian economy, with agriculture sector contributing the largest share to gross domestic product (GDP). Considering that agriculture is the mainstay of the Indian economy as more than half of our population is still

dependent on agriculture and allied activities, rapid and more inclusive growth of the economy and poverty reduction would not be possible without agricultural growth. Inclusive growth is an all encompassing concept, which includes aspects, such as agriculture development, employment generation, poverty reduction particularly with respect of small and marginal farmers, landless labourers and reduced regional inequality. Agriculture development may be deemed as the critical aspect of inclusive growth and proves to be a smooth path for achieving social and economic inclusion. Historically, India's agriculture growth has lagged growth in the overall economy. In fact, long-term average growth in agriculture has been close to 2 per cent. India's population has been growing at 1.4 per cent. Consequently, India has just managed to maintain its per capita growth in food and non-food crop production. Increasing profitability in agriculture through higher productivity has been an important goal in developing countries like India. It has become more relevant in recent years due to limited scope for expansion of arable land. Increasing yield to their technically highest level may be feasible, through adequate investment in infrastructure and technology i.e. irrigation, land development, storage, markets, etc.

OBJECTIVE AND REVIEW OF LITERATURE:

Inclusive growth approach came into being since the launching of the 11th five year plan and is going to stay as a critical aspect determining the sustainability of future agricultural growth in India. Agricultural growth or development is an important component of inclusive growth approach. The broad objective of this paper is to establish a close link between agriculture development and inclusive Growth. Agriculture development in true sense develops the quality of the agricultural system of a region in terms of productivity and efficiency. The specific objectives of the study is to identify the levels of agricultural productivity and its disparity in Belgaum District for the year 1983-84 and 2013-14 and also to analyze it in the lights of some major causal factors. The following paragraphs present an overview of some of the existing literature on inclusive growth and agriculture productivity concept.

Richard (2004) explained that agriculture growth and rural development have significant potential to achieve inclusive growth among the Asian countries. Hasan and Quibria (2004) also argued that rural poverty generally dominates in most countries where agriculture is the main source of livelihood. Thus growth of agriculture sector is the key for poverty reduction and inclusive growth. Agriculture growth will enhance economic growth and reduce rural poor by increasing their productivity and incomes. So, agriculture connects economic growth and the rural poor (OECD 2006). Agriculture growth and rising farmers income is important aspect for inclusive growth in agriculture sector. Economic growth scenarios of India as well as the major growing states have not been successful in combining growth with equity and making growth inclusive. Rao (2009) observed that regional disparity, rising income inequality, inequality of land holdings and high dependency of workforce are important obstacle for inclusive growth in agriculture or equitable development in the all sectors of the economy. The term 'agricultural productivity' is more empirical and is closely related to the per hectare yields. Bharadwaj B.K. (1981) stated that the term 'agricultural productivity' is both a dynamic and relative concept. The spatio-temporal variations in agricultural

productivity are the result of the combined inter-play of physical, economic, technological and organizational factors. Singh Jasbir (1976) explains that productivity as defined in economics or agricultural geography, means output per unit of input or per unit of area. Productivity and the improvement in agricultural productivity are generally the result of a more effective use of the factors of production viz environment, arable land, labour and capital.

STUDY REGION:

Belgaum district is situated in the Northwestern part of Karnataka state. In terms of area, Belagavi is the largest district of the state; it spreads over 13,415 sq. km (5,180 sq. mi), which is 6.99 percent of the total geographical area of the Karnataka State. The district has been divided in to 10 taluks for administration purpose. They are: Athani, Bailhongal, Belgaum, Chickodi, Gokak, Hukkeri, Khanapur, Raibag, Ramdurga and Soundatti. As per the 2011 Census report, Belgaum district population is about 47,78, 439 persons and the 2011 the density of population is about 356 persons per sq km. The district is drained by three important rivers namely Krishna, Ghataprabha and Malaprabha and its tributaries. The district is dominated by black, red and laterite soil. The climate of Belgaum District is characterized by general dryness except during monsoon season. The mean temperature of the district is 785.9mm.

DATA BASE:

The data used for analysis in this paper has been drawn from the relevant official reports published by the Government of Karnataka and the available literature on the performance of the state's agriculture sector. Crops selected for the study were Rice, Jowar, Wheat, Bajra, Maize, Pulses, Groundnut, Sugarcane and Cotton. The study covers a period of 30 years 1983-84 to 2013-2014. The study has made an attempt for a temporal assessment of agricultural productivity in the district.

METHODOLOGY:

Various scholars from different disciplines have evolved several methods and techniques to regionalize agricultural productivity at macro, meso, and micro level by using different variables. In this present study, Jasbir Singh's new technique of measuring the levels of agricultural productivity, which may be called the *"crop yield and crop concentration indices ranking co-efficient"*, it has been applied to measure the agricultural productivity of the region at taluka level. In this method he has used the food grain's production and the proportion of these crops in the harvested area to calculate the yield of individual crops in the region. The crop yield and crop concentration indices are derived for all the talukas and the cropped area marked separately. The procedure adopted to find crop yield and crop concentration indices may be explained as under.

Where,

i) $Yi = \frac{Yae}{Yar} X 100$

Yi = is the crop yield index

Yae = is the average yield per hectares of crop 'a' in the component enumeration unit, and

Yar = is the average yield of the crop 'a' in the entire region.

Where,

ii) $Ci = \frac{Pae}{Par} X 100$

Ci = is the crop concentration index

Pae = is the percentage strength of crop 'a' in the total harvested area in the component enumeration unit, and

Par = is the percentage strength of crop 'a' in the total harvested area in the entire region or state.

Yield and concentration ranks for individual crops are added and thereafter dived by 2, thus giving the crop yield and concentration indices ranking co-efficient. The formula is as follows.

iii) $\text{Crop yield and Concentration Indices ranking Co-efficient of crop 'a'} = \frac{\text{Crop yield index ranking of crop 'a'} + \text{Crop concentration ranking for crop 'a'}}{2}$

The result thus derived will give us an idea of the level of agricultural productivity, the lower the ranking coefficient, the higher the level of agricultural productivity and vice-versa.

FINDINGS:

Agricultural Productivity Regions:

Using the technique of Jasbir Singh (1976) agriculture productivity indices were calculated for each of the 15 talukas of the region. In order to reveal the spatio-temporal variations in agricultural productivity the index values obtained are arranged and divided into three broad categories like high, medium, and low, (Table No. 3) which are used to differentiate agricultural productivity regions in the study region.

Table No. 1 and 2 portraits the distributional patterns of agricultural productivity in Belgaum district and their regional differences can be explained with reference to diversions in physio-socio and economic variables. In the areas of better conditions, the productivity is high, while in areas of constraints it is low. The study reveals that, the productivity index values vary from 3.05 to 8.5 during 1983-84 and 3.7 to 9.3 during 2013-14.

High Productivity Regions: Spatial variation in productivity is marked in the district depending upon the nature of relief, shape, drainage, and soil, as well as the level of diffusion of agricultural innovations. The high agricultural productivity during 1983-84 was observed in four talukas viz.

Athani, Bailhongal, Gokak and Soundatti with an index value of less than 5.0, whereas, in the year 2013-14, Athani, Bailhongal and Soundatti continued to have high agricultural productivity and Ramdurg taluka is added in this category, with an index value of less than 5.0. It is because of development in irrigational facilities, increase in the percentage of high yield varieties of seeds, and better socio-economic facilities.

Medium Productivity Regions: During the year 1983-84 there were about four talukas (viz.Hukkeri, Chikodi, Raibag and Ramdurg) that fall in the category of medium productivity regions, with an index value of 5.1 to 6.0. Whereas, in 2013-14 number of talukas decreased to three (viz. Gokak, Hukkeri and Raibag) with an index value lies between 5.1 and 6.0. This is mainly due to lesser amount of rainfall received by these talukas, limited water supply through bore wells, and tube wells, and lesser amount of water supply through canals, and soil fertility status, size of land holding, costly fertilizers and biocides etc., are the factors, which are responsible for the medium productivity in the region.

Low Productivity Regions: In the year 1983-84 the low productivity regions were observed only in Belgaum and Khanapur taluka of the district, with an index value of more than 6.0. Whereas in 2013-14 the number of talukas in this category increased by one. Belgaum and Khanapur talukas continued to remain in the same catergory and Chikkodi taluka is added in this category with the index value remains more than 6.0. This prevalence of low agricultural productivity was mainly due to environmental constraints (rainfall and topography), poor soil quality, poor irrigation (water management), small land holding, farmer's failure to use the recommended seeds, Lack of High Yielding Variety (HYV) seeds, followed by fertilizers, and methods of cultivation, problems of pests and diseases of crops, etc.

CONCLUSION :

Agricultural development is an important component of inclusive growth approach. Agricultural growth of 4% and above is a necessary condition for inclusive growth. Inclusive growth places emphasis away from mere increase in growth rates, to improvement in productivity and standards of living of the poor. This calls for the following: • electricity, storage facilities, agro-processing, irrigation infrastructure and improved land and water management in agricultural areas and growth corridors; and • That institutional reforms place priority on linking remote areas and communities to markets, as a proven approach to promoting agricultural production and productivity. It is also important as it brings in price stability, food security and income and livelihood of the majority. The Department of Agriculture should implement various schemes for the overall welfare of the farming community particularly small and marginal farmers, landless labourers and ensures timely supply of essential inputs i.e. high quality seeds, fertilizers, plant protection chemicals, farm equipments along with effective transfer of technology through demonstrations to achieve maximum productivity from the available natural resources viz. soil, water etc. in the district where the productivity is low. This in turn leads to improvement in the economic status of the farming community and food grain needs of the people.

YIELD AND CONCENTRATION INDICES OF CROPS IN BELGAUM DISTRICT DURING 1983-84

(Kendall's Ranking Co-Efficient Method)

Table No. 1

S. No.	Talukas		Rice	Jowar	Bajra	Wheat	Maize	Tur	Green Gram	Cotton	Sugar-cane	Ground-nut	Total rank score	Yield & concen-tration index	Ranking coefficient indices
1.	Athani	Ci	0.29 (9)	28.68 (1)	43.99 (1)	12.41 (4)	6.89 (3)	17.32 (2)	4.67 (6)	4.08 (5)	14.78 (2)	10.20 (5)	38	3.8	3.05
		Yi	33.82 (7)	855.34 (1)	577.14 (1)	45.00 (3)	48.57 (4)	198.22 (1)	324.00 (1)	53.45 (2)	16.45 (2)	236.85 (1)	23	2.3	
2.	Bailhongal	Ci	12.98 (3)	8.44 (6)	0.78 (8)	9.56 (5)	0.50 (9)	13.31 (3)	15.07 (3)	28.87 (2)	11.51 (5)	8.46 (7)	51	5.1	4.75
		Yi	162.91 (3)	672.82 (5)	73.14 (8)	66.59 (1)	13.62 (9)	158.18 (3)	83.00 (4)	50.21 (3)	11.24 (5)	128.33 (3)	44	4.4	
3.	Belgaum	Ci	38.62 (1)	4.38 (8)	-	3.83 (7)	1.16 (8)	10.15 (5)	2.32 (7)	0.30 (8)	7.72 (7)	5.13 (8)	59	6.56	6.53
		Yi	190.91(2)	187.38 (8)	36.57 (9)	5.45 (7)	15.71 (8)	78.10 (8)	168.33 (2)	30.62 (5)	10.09 (7)	56.48 (9)	65	6.5	
4.	Chikkodi	Ci	3.70 (5)	8.98 (5)	5.72 (6)	3.24 (8)	3.26 (5)	9.55 (6)	7.60 (5)	0.37 (7)	12.16 (4)	22.12 (1)	52	5.2	5.55
		Yi	52.00 (6)	781.55 (3)	117.14 (6)	4.77 (8)	65.29 (3)	160.65 (2)	65.50 (6)	17.10 (8)	3.32 (10)	91.30 (7)	59	5.9	
5.	Gokak	Ci	0.76 (6)	13.63 (3)	12.61 (3)	18.52 (2)	42.60 (1)	10.49 (4)	11.05 (4)	10.89 (3)	14.63 (3)	12.09 (3)	32	3.2	3.5
		Yi	109.09 (5)	831.55 (2)	367.43 (3)	39.43 (4)	107.14 (1)	153.62 (4)	40.50 (8)	37.45 (4)	13.78 (3)	122.96 (4)	38	3.8	
6.	Hukkeri	Ci	4.22 (4)	5.83 (7)	1.55 (7)	1.96 (9)	2.28 (6)	8.20 (7)	3.09 (8)	0.07 (9)	6.67 (8)	16.76 (2)	67	6.7	5.95
		Yi	115.64 (4)	439.32 (7)	251.43 (4)	4.32 (9)	42.29 (5)	127.65 (6)	166.33 (2)	30.55 (6)	19.75 (1)	79.26 (8)	52	5.2	
7.	Khanapur	Ci	38.39 (2)	0.62 (10)	0.01 (9)	1.09 (10)	0.21 (10)	0.75 (10)	0.66 (10)	-	8.85 (6)	0.93 (10)	77	8.56	8.53
		Yi	229.09 (1)	112.62 (9)	9.14 (10)	3.41 (10)	4.67 (10)	3.77 (9)	1.83 (9)	14.14 (9)	8.73 (8)	17.22 (10)	85	8.5	
8.	Raibag	Ci	0.50 (7)	2.56 (9)	17.60 (2)	9.38 (6)	34.86 (2)	3.37 (9)	1.77 (9)	3.50 (6)	20.56 (1)	5.10 (9)	60	6.0	5.5
		Yi	13.09 (8)	490.29 (6)	413.71 (2)	32.50 (6)	79.33 (2)	144.30 (5)	68.58 (5)	24.66 (7)	12.51 (4)	100.56 (6)	50	5.0	
9.	Ramdurg	Ci	0.21 (10)	12.95 (4)	7.77 (5)	13.38 (3)	1.90 (7)	7.66 (8)	19.88 (2)	10.86 (4)	2.25 (9)	10.62 (4)	56	5.6	5.5
		Yi	6.73 (10)	733.01 (4)	167.43 (5)	63.41 (2)	23.62 (7)	104.66 (7)	120.83 (3)	53.45 (2)	7.06 (9)	117.22 (5)	54	5.4	
10.	Soundatti	Ci	0.33 (8)	13.94 (2)	9.97 (4)	26.62 (1)	6.33 (4)	19.20 (1)	33.89 (1)	41.05 (1)	0.87 (10)	8.60 (6)	38	3.8	4.5
		Yi	8.91 (9)	733.01 (4)	110.00 (7)	33.86 (5)	33.33 (6)	144.30 (5)	55.67 (7)	69.66 (1)	10.51 (6)	147.78 (2)	52	5.2	

* Note : Computed by Author

YIELD AND CONCENTRATION INDICES OF CROPS IN BELGAUM DISTRICT DURING 2013-14

(Kendall's Ranking Co-Efficient Method)

Table No. 2

S. No.	Talukas		Rice	Jowar	Bajra	Wheat	Maize	Tur	Green Gram	Cotton	Sugar-cane	Ground-nut	Total rank score	Yield & concen-tration index	Ranking coefficient indices
1.	Athani	Ci	0.08 (6)	24.85 (1)	33.99 (1)	27.53 (2)	14.32 (4)	9.20 (5)	9.96 (3)	2.45 (10)	20.15 (2)	4.62 (8)	42	4.2	3.7
		Yi	15.93 (9)	261.60 (1)	495.71 (2)	43.13 (5)	43.57 (5)	137.07 (1)	156.11 (2)	50.00 (3)	15.21 (4)	144.99 1)	33	3.3	
2.	Bailhongal	Ci	8.35 (3)	12.86 (4)	0.99 (8)	9.57 (4)	5.54 (7)	13.79 (4)	9.40 (4)	32.35 (1)	4.38 (7)	9.10 (5)	47	4.7	4.8
		Yi	101.38 (3)	136.00 (7)	86.90 (8)	108.70 (1)	17.36 (8)	126.40 (2)	59.24 (5)	45.31 (5)	11.62 (7)	76.07 (3)	49	4.9	
3.	Belgaum	Ci	38.20 (2)	3.97 (8)	0.21 (9)	0.86 (9)	0.02 (10)	5.67 (8)	0.40 (9)	10.67 (4)	3.09 (9)	8.06 (6)	74	7.4	6.8
		Yi	202.75 (1)	89.33 (9)	46.43 (9)	50.96 (3)	14.64 (9)	65.87 (9)	137.84 (3)	28.23 (8)	16.18 (2)	39.52 (9)	62	6.2	
4.	Chikkodi	Ci	1.46 (5)	5.78 (7)	1.81 (6)	3.35 (7)	6.28 (6)	6.87 (6)	2.19 (6)	3.66 (9)	15.47 (4)	18.19 (2)	58	5.8	9.3
		Yi	94.13 (5)	134.67 (8)	138.57 (6)	12.70 (9)	56.11 (4)	116.67 (3)	55.46 (6)	18.23 (10)	4.70 (10)	51.22 (7)	128	12.8	
5.	Gokak	Ci	0.06 (7)	11.02 (5)	12.16 (5)	7.75 (5)	18.57 (2)	15.62 (3)	7.44 (5)	9.04 (5)	16.35 (3)	3.06 (9)	49	4.9	5..2
		Yi	77.84 (7)	136.67 (6)	349.52 (4)	38.78 (7)	80.36 (1)	108.00 (6)	47.89 (9)	53.89 (6)	14.29 (5)	73.05 (5)	56	5.6	
6.	Hukkeri	Ci	2.83 (4)	6.99 (6)	1.51 (7)	2.74 (8)	4.24 (8)	6.34 (7)	1.00 (7)	11.47 (3)	6.72 (5)	14.78 (4)	59	5.9	5.3
		Yi	100.29 (4)	140.80 (5)	257.14 (5)	33.91 (8)	69.64 (2)	105.87 (7)	156.54 (1)	42.46 (6)	18.73 (1)	50.65 (8)	47	4.7	
7.	Khanapur	Ci	48.90 (1)	0.40 (10)	-	0.03 (10)	0.31 (9)	0.13 (10)	0.35 (10)	3.98 (8)	4.61 (6)	6.12 (7)	71	7.9	8.3
		Yi	105.00 (2)	51.47 (10)	21.90 (10)	4.00 (10)	4.57 (10)	4.53 (10)	6.59 (10)	40.29 (7)	9.87 (9)	11.41 (10)	88	8.8	
8.	Raibag	Ci	0.04 (8)	1.26 (9)	8.08 (4)	13.83 (3)	27.69 (1)	5.16 (9)	0.65 (8)	5.11 (7)	23.65 (1)	0.97 (10)	60	6.0	5.8
		Yi	92.32 (6)	171.47 (4)	368.57 (3)	40.00 (6)	66.71 (3)	112.40 (4)	55.30 (7)	23.29 (9)	11.40 (8)	59.52 (6)	56	5.6	
9.	Ramdurg	Ci	0.06 (7)	16.81 (2)	23.87 (2)	6.75 (6)	8.10 (5)	16.15 (2)	15.11 (2)	8.51 (6)	1.46 (10)	16.38 (3)	45	4.5	4.5
		Yi	77.84 (7)	216.80 (3)	1687.14 (1)	59.65 (2)	21.29 (7)	97.07 (8)	101.62 (4)	47.43 (4)	13.56 (6)	75.11 (4)	46	4.6	
10.	Soundatti	Ci	0.02 (9)	16.05 (3)	17.38 (3)	27.58 (1)	14.94 (3)	21.07 (1)	53.49 (1)	12.75 (2)	4.12 (8)	18.72 (1)	32	3.2	3.9
		Yi	48.95 (8)	233.33 (2)	115.48 (7)	43.30 (4)	31.64 (6)	110.40 (5)	48.54 (8)	63.43 (1)	15.87 (3)	80.00 (2)	46	4.6	

* Note : Computed by Author

BELGAUM DISTRICT
AGRICULTURAL PRODUCTIVITY REGIONS
1983-84 TO 2013-14

Table No. 3

Sl. No	Category	Range of Index	1983-84		2013-14	
			No. of Talukas	Name of the Talukas	No. of Talukas	Name of Talukas
1.	Low	<5	04	Athani, Bailhongal, Gokak and Soundatti	04	Bailhongal, Ramdurg, Soundatti and Athani
2.	Medium	5.1 to 6	04	Hukkeri, Chikkodi, Raibag and Ramdurg	03	Gokak, Raibag and Hukkeri
3.	High	> 6.1	02	Belgaum and Khanapur	03	Chikkodi, Khanapur and Belgaum

*** Note** : Index Values are categorized on the basis of mean and standard deviation method.
: Lower the index value higher will be the productivity and vice-versa

References:

1. Bharadwaj B. K. (1981): Components and determinants of Agricultural Productivity: A case study of Gurgaon District, Unpublished thesis Department of Geography, J. N. University, New Delhi, pp. 10-23.
2. Clark, Colin and Margaret Haswell (1967): The Economics of Subsistence Agriculture Development and Productivity, The John Hupins Press, pp.104-135.
3. Dayal Edison (1984): Agricultural Productivity in India, A spatial analysis, Annals Association, American Geographer, vol. 74, No. 1, pp. 98-123.
4. Kendall M. G. (1939): The Geographical Distribution of Crop Productivity in England, Journal of Royal Stastical Society, vol. 162, pp.
5. Shafi M. (1984): Agricultural Productivity and Regional imbalances – A case study of Uttar Pradesh, Concept, New Delhi.
6. Sharma T. C. and Coutinho O. (1974): An analysis of the changes in area Production and productivity of Jowar in Karnataka from 1961-62 to 1972-73 Agricultural situation in India, vol. 40, No. 9, December, pp. 637-47.
7. Shinde S. D. (1978): Agricultural Productivity in Maharashtra Plateau – A Geographical Analysis, National Geographers, vol. 13, pp. 35-41.
8. Singh Jasbir (1972): Spatio-temporal developments in landuse efficiency in Haryana
9. Singh Jasbir (1976): Regional Imbalances in the level of food crop production, An Agricultural Geography of Haryana.
10. Government of India (2011), Faster, Sustainable and More Inclusive Growth: An *Approach to the 12th Five Year Plan (2012-2017)*, Planning Commission, New Delhi: Government of India.

IMPACT OF MODERN AGRICULTURE SYSTEM ON HUMAN HEALTH -A CASE STUDY OF BELGAUM DIST

Dr. M.S. Kurani[1] Shri. Prasanna B. Joshi[2] Dr. Abhay M. Patil[3]

1. *Asst. Professor, Dept. of Geography, R.P.D. College Belgaum, Karnataka*
2. *Asst. Professor & Head, Dept. of Economics, R.P.D. College Belgaum, Karnataka*
3. *Asst. Professor& Head Dept. of Geography, R.P.D. College Belgaum, Karnataka*

Abstract

The agriculture is the chief source of livelihood for millions of people in the world particularly for Indians. Spectacular breakthrough in agriculture research, technology, develop and dissemination under the umbrella of Green Revolution have been the major factors in increa both agricultural production and productivity (Chaudhary 1972). In the last few decades the w has witnessed considerable increase in the crop production due to agricultural innovations. G revolution helped to reach self-sufficiency in food production. However excessive use of a agricultural innovations like irrigational practices, chemical fertilizers, pesticides, insecticide have cast an adverse impact over the environment. The area under study is located between 1 to 16^0 58' North latitude and 75^0 5' to 75^0 8' East longitude. The total Geographical area o district is 13,415 Sq Km, which is 6.99 percent of the total Geographical area of the Karnataka S As per the 2011 Census, Belgaum district population is about 4778439 persons. The present pa aims to analyze the impact of modern agricultural practices and its impact on human health a surrounding environment in the different talukas of the district. The data for the present st analysis have been obtained from primary and secondary sources. The data collected have b classified, processed and presented in the form of tables ,charts and appropriate cartograph diagrams. The degradation of the land and excess use of chemical fertilizers and pesticides h caused the health problems in study area mainly diseases like asthma, bronchitis and allerg problems.

Keywords: Agricultural Technology, Modern Agricultural Practices, Human Health

Introduction

World population continues to grow and is predicted to reach about nine billion in 2050. T demand for agricultural produce will continue to grow, needing to double the production by 20 driven by population growth and changing food habits. An increase in demand for bio-fuels co further increase pressure on inputs, prices of agricultural produce, land, and water. The increas the agricultural production leads to various impacts on the environment, some of them closely re to water processes. The water-related environmental problems of agriculture are connected w mechanical treatment of soil and use of fertilizers, pesticides, and other chemicals, and are mainl closely related to irrigation. The components of the environment most damaged by agricultu practices are soil and waters pollution.

Agriculture is a land-based primary industry that directly depends on natural resources such as land, water, and a diversity of plants and animals. It is supported by the application of human knowledge, both traditional and scientific, and human effort, skills and Endeavour. Following the global food and energy crisis in 2007–2008, and growing awareness of the challenges posed by climate change, interest in agriculture, after a period of neglect, has been reinstated as a key area of international and national policies

In the last few decades the world have witnessed considerable increase in the crop production due to agricultural innovations. Green revolution helped to reach self-sufficiency in food production. However excessive use of all the agricultural innovations like irrigational practices, chemical fertilizers, pesticides, insecticides etc have cast an adverse impact over the environment.

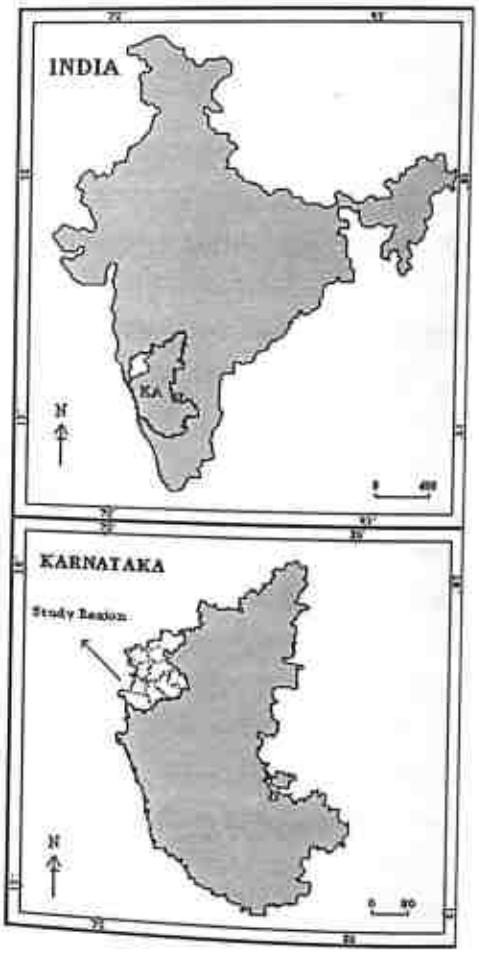
Most of the inputs of modern agriculture such as fertilizers, pesticides and farm machinery were developed in Europe and USA. The entire package of modern agriculture was developed by the middle of the 20th century. In the late 60s the fertilizer consumption in some of the European countries was above 500kg/ha(N+P2O5+K2O) and this is started creating environmental problems such as nitrate enrichment of groundwater, eutrophication of lakes and release of large amount of ammonia to the atmosphere resulting in acid rains (Kathapal T.S 1993). Population There is a clear relationship between growth, agricultural stagnation and environmental degradation. While population has increased rapidly to reach 6.7 billion today, the agricultural growth rates have often not kept pace. Conversion of forest land to agricultural land in the humid and sub humid regions, as well as the increased use of marginal lands for cropping in the semiarid and arid tropical regions, have also contributed to land degradation and desertification. Modern agriculture is capable of producing greater yields than ever before, but intensification of agriculture does come at a price. This comprehensive volume examines the environmental impact made by agriculture in the 21st Century, looking forward to the future with the lessons of the past. which includes impacts of agriculture upon soil quality, water-borne pathogens, surface water chemistry, groundwater, agricultural pesticides and the environment, balancing the environmental consequences of agriculture with the needs for food security and positive and negative aspects of agricultural production *of bio-fuels.*

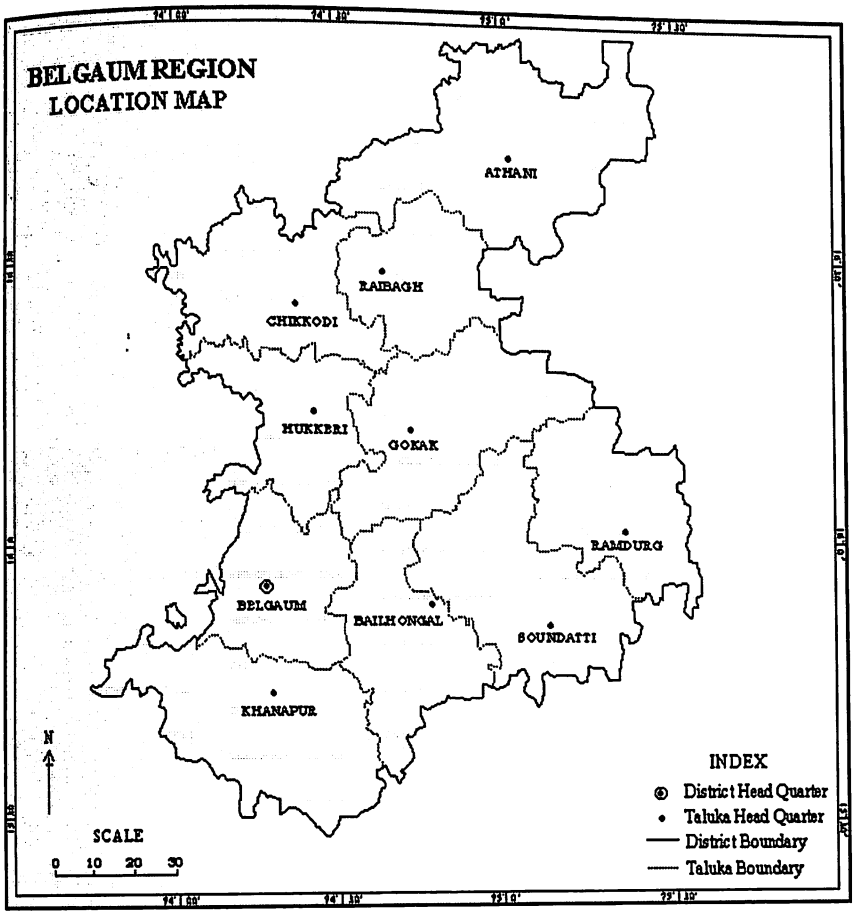
Many of the world's agricultural processes take place in rural and economically disadvantaged areas where regulations are lacking and health standards are not enforced. For these reasons, pesticides are often improperly used and stored, and workers are often not fully aware of and protected from the dangers that pesticide exposure and contamination can cause. In addition, due to lax regulations, low cost, and the effectiveness of certain hazardous pesticidesThus, agricultural workers and their families are more severely affected by dangerous pesticide chemicals and contamination in these regions than in higher-income countries with tighter regulations. , sustained use of banned pesticides is an ongoing problem in many low-income rural areas.

STUDY AREA:

The area under study is located between 15^0 23' to 16^0 58' North latitude and 7 East longitude, The total Geographical area of the district is 13,415 Sq Km, which ac percent of the total Geographical area of the Karnataka State. As per the 2011 Cen population of the district is about 4778439 persons, of which 2427104 male and 235 population. The district has 35 hoblis,1255 villages,485 gram panchayats,18 town municip district is drained by three important rivers namely Krishna, Ghataprabha and Malapra tributaries. The general slope of the district is from Northwest to Southeast its averag above the mean sea level varies from 450 to 500 Mtrs.

FIG NO 1 .LOCATION OF BELGAUM DISTRICT





OBJECTIVES OF THE STUDY.

The present study has following objectives-

1. To understand the consumption of chemical fertilizers in the study area.
2. To examine the effects of excessive use of fertilizers and pesticides on human health.
3. To suggest remedial measures to overcome the health and environmental problems in the study area.

DATA BASE AND METHODOLOGY

In the present study, we have made an attempt analyze the impact of modern agricultural practices on human health and surrounding environment in different talukas of the district. The study is based on both primary and secondary sources of data. To study the consumption of fertilizers and pesticides and also its effect on human health and environment a primary survey will be conducted through questionnaire which will covered about 100 farmers in selected villages in 5 talukas of the district. 10% of the farmers from each villages will be interviewed on the basis of stratified random sample technique. The required secondary data have been obtained from the Office of Joint Director of Agriculture Belgaum district, District Statistical Office, Belgaum, CADA Belgaum and Village

Panchayats.The data collected have been classified, processed and presented in the form of ,charts and appropriate cartographical diagrams.

CONSUMPTION OF CHEMICAL FERTILIZERS IN THE DISTRICT

Fertilizers have been used for a long time in agriculture land, since the old era. Currently, becau the high consumption of chemical fertilizers used to meet the human demand, degradation to the is occurring. The main objective for applying pesticides to agriculture land is to protect productivity of the crops and also balance the yield in farmers' agricultural land. On the other the impacts of chemicals are long-term persistent and also long-period impacts to the agricultural and also the predominant cause of soil degradation.

Table no 1CONSUMPTION OF CHEMICAL FERTILIZERS IN BELGAUM DIST

Sl No	year	Consumption (000kgs)
01	1971	26200
02	1981	48300
03	1991	66433
04	2001	131964
06	2011	941911.39

Table no 1 depicts, The total consumption of chemical fertilizers in the district from 1971 to 20 During 1971 the total consumption of fertilizers (NPK) in the district was 26200 metric tons it rose 48300 metric tons by 1981.During 1991 the total consumption of fertilizers in the district was 66 met tons it rose to 131964 during 2001 and **9,41,911** by 2011.The consumption of NPK in Belg has increased more than 7 times during 2001 and 2011.

Table no 2. CONSUMPTION OF CHEMICAL FERTILIZERS IN BELGAUM DISTRICT (In metric tons) DURING 2001-2011

In this part ,an attempt an attempt has been made to analyze consumption of chemical fertilizers different talukas of the district during 2001 and 2011.

SL NO	TALUKAS	2001				2011			
-	-	NITROGEN	PHOS	POTASH	TOTAL (NPK)	NITROGEN	PHOS	POTASH	TOTAL(NPK)
01	Athani	6957	6684	1976	15617 (11.83 %)	6890.88	2991.	3056.06	12935.12 (1.37)
02	Bailhongl	2686	341	630	3657 (2.77)	3126.35	3319.83	1723.2	8169.44 (0.86%)

03	Belgaum	7197	13286	3427	23910 (18.11%)	28101.38	28015	19071	75188.11 (7.98)
04	Chikkodi	9009	6539	4326	19874 (15.06)	9002.7	4593	6876	20471.93 (2.17)
05	Gokak	14773	5311	4375	24459 (18.53)	15285.83	550123	6721	572130.76 (60.74)
06	Hukkeri	3970	5603	1408	10981 (8.32)	3700.03	152532	2214.25	158446.28 (16.82)
07	Khanapur	1792	1893	218	3903 (2.95)	1594.47	44167	310.83	46072.3 (4.89)
08	Raibag	8624	4599	2712	15935 (12.07)	14635.49	7689	13678	36003.7 (3.82)
09	Ramdurg	2551	1649	657	4857 (3.68)	2502.67	1059	867.71	4430.09 (0.47)
10	Saudatti	3496	3576	1699	8771 (6.64)	3297.01	2132	2633	8063.66 (0.85)
Dist Total	-	61055	49481	21428	131964	88136.81	796624 .05	57150.53	941911.39

SOURCE-Annual Reports Source Joint Director of Agriculture,

Table no 2 depicts, consumption of chemical fertilizers in different talukas of the district during 2001 and 2011. During 2001 the total consumption of fertilizers (NPK)in the district was 131964 metric tons.It has increased to 941911.39 metric tones by 2011.Athani ,Belgaum Hukkeri Raibag and Chikkodi talukas uses highest amount of fertilizers its mainly due to the good irrigational facilities and high standard of living of the farmers.and Bailhongal,Raibag and Ramdurg Talukas uses lowest amount of fertilizers during 2001 and 2011. Among all the Talukas **Gokak records highest amount of fertilizers** (NPK) consumption(**24459 mts and 572130 mts)** and **Bailhongal taluka records lowest amount** of fertilizers (3657 mts and 8169 mts) during 2001 and 2011

Table 3: Pesticide Consumption in Belgaum District 1971-2011.

SI.No	Year	Consumption ('000'kg)
1	1971	1800
2	1981	5000
3	1991	14000
4	2001	34500
5	2011	38000

SOURCE-Annual Reports Source Joint Director of Agriculture.

The total consumption of pesticides in the district was increased trememendously from the 197 2011.During 1971 the total amount of pesticides consumption was 1800 kgs.but it has rose to 3 kgs by 2011.The total consumption of pesticides in the district has increased nearly by 8 times more of it used to production of vegetables.

EFFECTS OF PESTICIDES AND FERTILIZERS ON HUMAN HEALTH.

The term "pesticide" describes a category of agrochemicals that are used to protect crops fr certain bacteria, insects, and other potentially damaging organisms. Pesticides include insecticid molluscicides, nematocides, fungicides, and herbicides and are intended to disrupt the ability certain species to harm crop yields by paralyzing or killing them. Though pesticides have be instrumental in contributing to global agricultural growth, they are often harmful to more than j their target species. Organophosphates and organ chlorine pesticides, for example, can cause dama to nervous systems by harming neurotransmitting enzymes and can be ingested by many differe types of creatures.

GLOBALCONTEXT

Some organ chlorine pesticides, including DDT, lindane, endosulfan, and chlordane, are disruptive and dangerous that many countries have banned their use and have classified them Highly Hazardous. Despite the risks associated with pesticide use, many forms of these chemicals a still widely used in low- and middle-income countries in a large variety of agricultural settings a have impacts far beyond the locations where they are sprayed. Studies have found that over 98 % of insecticides used in agricultural processes do not quickly degrade at the point of application and en up entering the larger environment, typically through rain and irrigation runoff, spray carry-over, residue retention on food.

The use of pesticides worldwide has grown significantly over the past sixty years, w approximately 2.3 million tons of industrial pesticides now used annually. With this boom has co larger crop yields and more secure and reliable food sources for growing populations. Many low-i middle-income countries have even been able to produce enough food to sustain a large agricultu export economy, as well as to better feed their own population. These successes have led to persistent demand for and use of pesticides. However, the mass application of these agrochemic has impacted human health depleted agriculture's natural resource base, and jeopardized fut productivity. The Food and Agriculture Organization of the United Nations launched "Save a Grow" in 2011 to reduce reliance on pesticides through a sustainable ecosystem approach.Many the world's agricultural processes take place in rural and economically disadvantaged areas wh regulations are lacking and health standards are not enforced. For these reasons, pesticides are o improperly used and stored, and workers are often not fully aware of and protected from the dange that pesticide exposure and contamination can cause. In addition, due to lax regulations, low-cost, a the effectiveness of certain hazardous pesticides, sustained use of banned pesticides is an ongo problem in many low-income rural areas.[24] Thus, agricultural workers and their families are

severely affected by dangerous pesticide chemicals and contamination in these regions than in higher-income countries with tighter regulations

Table 4 Effects of pesticides and fertilizers on human health

SI. NO.	Taluka	Population (2001)	Health Problem (2012- 13)		
			Asthama	Allergy	Total
1	Athani	461862	NA	NA	NA
2	Bailhongal	356286	6835 (1.91)	342 (0.09)	7177 (2.01)
3	Belgaum	815581	120000 (14.71)	18000 (2.20)	138000 (16.92)
4	Chikkodi	567601	NA	NA	NA
5	Gokak	526092	5000 (0.95)	NA	5000 (0.95)
6	Hukkeri	357193	NA	NA	NA
7	Khanapur	243185	24300 (9.99)	2430 (0.99)	26730 (10.99)
8	Raibag	347600	NA	NA	NA
9	Ramdurg	227412	NA	NA	NA
10	saundatti	311693	NA	NA	NA

SOURCE--Belgaum District Health Office 2011

The Table no 4 depicts the effects of pesticides and fertilizers on human healthin Belgaum district. In Belgaum and Khanapur Talukas highest percentage of population suffering from Asthama and Allergy. About 14.71% of population is suffering from asthma in Belgaum and Khanapur taluka.It is nearly about 10% of the total population of the district. In the same year the percentage of population suffering from allergic disorder in Belgaum Taluka was 2.20% and 0.99% in Khanapur talukas .The other health problems caused by the use of pesticides like BHC and DDT are dieldringammaisomer in liver and lung, disorder of liver and neuropathic disorder like increased irritation and loss of memory. The pesticide residues in food harm liver tissue. There are instances of chronic liver disorder leading to cirrhosis.certain pesticides are not so dangerous but teir metabolites cause severe damage to hepatic parenchyma. pesticides also cause Neuropathy diseases. Other peculiar problem in the district are Chikangunya.which is very common in Hukkeri ,Chikkodi ,Athani and Raibag talukas.About 28.03% of the district people are suffering from acidity problems.

SUGGESTIONS

1. Minimize the use of chemical fertilizers and pesticides.
2. Encourages the organic farming and provide subsidy loan for organic farmers.
3. Implement the modern techniques in irrigation.
4. Training to the farmers.
5. Encourages the rainwater harvesting.
6. Creates awareness among the farming community about the effects of chemical fertilizers pesticides.
7. There is need to change the life style and outlook of farming community. Every farmers sh think that it is his sacred and patriotic duty to preserve our environment for the benefit of our all. One should develop a consciousness of the preservation is considered to be the highest s of civilization.

CONCLUSION

Agricultural production is one of the largest and most important economic activities in the w particularly in low- and middle-income countries, where agriculture has a significant impact on growth. Some of the largest agricultural sectors throughout the world include the production of (rice, wheat, corn, etc.), coffee, beans (soy, lentil, etc.), potatoes, and tea. A major factor agriculture over the last decades is the use of pesticides that protect crops from insects and pest may be harmful to crop quality and yields. Agrochemicals, which include pesticides, herbicides fertilizers, have been widely used since the 1940s in many low- and middle-income countries.

Unfortunately, many chemical pesticides, particularly those containing chlorinated compo are often persistent in the environment and can be toxic to human. These kinds of pesticide dangerous to many different forms of life, and their impacts can spread far beyond their produ and application point to even a global scale. Chemical pesticides can harm agricultural workers do not wear the proper safety gear and can also be dangerous for nearby communities. C pathways for human exposure include inhalation when pesticides are applied (particularly w applied through spraying), ingestion of contaminated foods, ingestion of contaminated (particularly children, who may not wash hands before eating after playing in dirt), and contamin of surface or groundwater and subsequent ingestion.

References

1. Aseno-Okyere, et al. "Advancing Agriculture in Developing Countries through Knowledge and Innovation." International Food Poli 2008. Available at: http://www.ifpri.org/sites/default/files/publications/oc59.pdf
2. De Campos, M. and Olszyna-Marzys, AE. "Contamination of human milk with chlorinated pesticides in Guatemala and in El Salvador" of Environmental Contamination and Toxicology, Vol. 8, No. 1 (1979): 43-58.
3. Miller, G.T. "Chapter 9." Sustaining the Earth. 6th ed. Pacific Grove, California: Thompson Learning, Inc., (2004): 211-216.
4. Mortan J.F-Impact of climate change on small holders and subsistence agriculture-Natinal Academic science 2007

5. Pesticide Action Network International. "Communities in Peril: Global Report on Health Impacts of Pesticide Use in Agriculture." 2010. Available at: http://www.pan-international.org/panint/files/PAN-Global-Report.pdf

6. Trewaves A- Urban myth of organic farming-Nature 2001,Nature.com

7. Tillman D- Agricultural sustainability and intensive production practices-Nature 2002

8. Wesseling, C., et al. "Agricultural Pesticide Use in Developing Countries: Health Effects and Research Needs." International Journal of Health Services, Vol. 27, No. 2 (1997): 273-30