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Scenario of Land Diversification to Words Apple Orchards in Jammu and Kashmir-India

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Abstract
In this paper an attempt has been made to understand the patterns and determinants of crop diversification in Jammu and Kashmir agriculture. The State is depended on subsistence farming without any positive response, but from last few decades a great change has taken place in the variety of crops like Apples. Its Cultivation is dominant occupation in the state, directly or indirectly supports about 81% of total population of the state, which shows the over dependence of the state on agriculture. The cropping pattern is influenced by Geographical, physical, technological and institutional factors like land reformation, consolidation of holdings and credit facilities, price structure, procurement policies and storage facilities. The study revealed that the crop sector of Jammu and Kashmir agriculture at an aggregate level is gradually diversifying in favor of high-value crops like Apples.
Keywords: Agriculture, Diversification, Apples, Dependency,

Introduction

In the state of Jammu and Kashmir, agriculture is the key sector for employment and income generation, because large scale industrialization is not ecologically desirable, and the infrastructure is too poor to attract industries. Therefore, horticulture sector continues to remain the important sector for socio-economic development of the people. With serious constrains on area expansion and declining scope of other sources of growth of agriculture output, the diversification of agriculture towards non-food grains and high value cash crops including fruits and vegetables, compatible with the comparative advantage of the region is suggested as a viable solution. These crops have potential of income augmentation, employment generation, poverty alleviation and export promotion. According to a study, in the state of Jammu and Kashmir, the scope to raise output through diversification is highest in the country as one per cent shift in area from food grains to non-food grains entails more than 3 per cent growth rate in crop output.

The cultivated Apple (Malus borkh) is considered as one of the most important and widely growth fruit in temperate zones of the world with regard to its acreage, production, economic returns and nutritive, value and popularity. The tree is small and deciduous reaching 3 to 12 meter tall with broad, often density twiggy crown blossoms are produced in spring simultaneously with the budding of the leaves. The fruit matures in autumn and is typically 5 to 9 cm's in diameter enriched with nutrients; the apple is fourth widely produced fruit in the world after Banana, orange & graphs. In spite of certain problems the comparative feasibility and profitability in apple production has proved to be better as compared to the other farm enterprise during the last one and a half a decades or so. The area under apples has increased significantly and this result to higher production.

Objective of the paper

Considering the above discussion, the present study is an attempt to examine the diversification to words fruits/vegetable cultivation (Apple) in Jammu and Kashmir, also to analyses the impact of increased size of land to words the apple production. Study will also highlight the possible reasons to words this diversification and has been under taken to give possible solutions related or faced by this sector in the state.

Methodology used

Keeping in view the objective of the study, the secondary date has been used by using simple statistical and economic techniques. Time series data have been collected on area, Production and other socio-economic parameters from the secondary sources of the state government determents as well as research publications. Also we used the various websites, and the relevant material in the form of books. Analytical tools were basically tabular analyses, percentage analyses, compound growth rate and regression analyses

Discussion and Results

Land Holding

As per the 8th Agriculture census (2005-06) of the State, the total number of operational holders has been worked out to be 1377808 and average size of operational holding was found out to be 0.67 Hectare. About 94% of the operational holders fall in the category of Marginal and Small farmers. About 5% of the operational holders fall in semi-medium category holding, only 1% of the operational holders fall in the Medium category holding and only 0.04% of the operational holders fall in the large category holding

Table No: 1.1 **Agriculture Holding Size in Jammu and Kashmir**

Categories of Holding	No. of Operation Holding(in000)	Area operated (000 Hec)	Average size of Operation holding (in Hec)
1. Marginal (Less than 1 Hec.)	1122.97 (81.5)	406.00	0.36
2. Small (1.0 to 2.0 Hec.)	169.17 (12.28)	237.00	1.40
3. Semi-Medium (2.0 to 4.0 Hec.)	71.40 (5.18)	193	2.70
4. Medium (4.0 to 10.0 Hec.)	4. 1365 (0.99)	74.00	5.42
5. Large (10.0 and above)	50.62 (0.04)	12.00	19.35
All Holding	1377.81	922.00	0.67

* Figures in bracket indicate the percentages Source: Financial Commission (Rev), J&K (Agriculture census 2005-06)

Agriculture also plays a very prominent role for development of economy State. Around 70% of the population in the State gets livelihood directly or indirectly from the Agriculture and allied Sectors. The State comprises of three regions namely Jammu, Kashmir and Ladakh having distinct geographical outlook and agro climatic zones. Each zone having its own characteristics that largely determines the cropping pattern and productivity of crops. Paddy is the main crop of Kashmir, followed by maize, oilseeds, pulses, vegetables, fodder and wheat. In Jammu region, wheat is the predominant crop followed by maize, paddy, pulses, oilseeds, fodder, vegetables and other crops while in Ladakh, barley is the major cereal crop followed by wheat. State also has the honour of being amongst the world's few places where quality saffron is cultivated. Saffron is also grown, though on a limited scale in Kishtwar district of Jammu region. Saffron crop is being introduced in temperate areas of other districts as well and significant success has been reported from some areas of Doda and Udhampur districts. Traditional Basmati rice of R.S. Pura, Jammu and Rajmash of Bhaderwah, Kishtwar, Bani and other temperate areas are gaining economic significance through various departmental interventions in quality improvement, productivity enhancement, marketing etc. The production of three major crops paddy, maize and wheat in J&K state is more than 90% of the total food grain production of all crops and rest is shared by other cereals and pulses.

Paradigm shift to words Apple Cultivation

The state has the largest potential for production of quality temperate horticulture crops. It has created niche production of apple, pears & dry fruits, among temperature fruits Apple rank first position in terms of production and productivity.

The annual production of apple in the state is about 9.09 lacks tone at an average yield of 10.09 tons per hectare. However the production & productivity of apple crop has been fluctuating during last two decades this is due to drought or some other conditions. In spite of this apple production has increase from just 6000 metric tons in 1950.51 to more than 9 lacks tone in 2001-02 are increased from 7000 hectares to more than 90 thousand hectors. Yield per hectors in Jammu & Kashmir State is highest in the country. Productivity is much higher than national average of 6.86 ton/ha. It is also compares well with the world average of 10.82 tone/hec or China (9.93 tone/he) which is World's highest producer of apple.

Table No: 1.2 Cultivable area of land under main food crops in J&K state (000 Hec)

Year	Rice	Maize	wheat	Fruits/Veg	Total food crops
1955-56	196	203	150	18	689
1960-61	226	216	172	21	759
1965-66	212	255	154	22	747
1968-69	240	245	188	25	813
1974-75	237	265.3	191	34	833.6
1980-81	264.58	275.19	201.98	55.11	890.55
1985-86	265.55	286.98	224.01	53.63	918.81
1990-91	274.49	294.9	245.12	60.04	955.53
1995-96	273.08	303.87	243.81	63.01	955.94
1999-00	250.63	317.3	245.75	66.3	950.88
2000-01	244.05	330.21	280.96	67.26	992.4
2001-02	249.8	326.48	259.6	73.78	978.82
2002-03	236.2	329.46	248.3	74.98	959.14
2003-04	259.82	321.19	254.66	76.3	981.82
2004-05	250.04	322.7	252.78	76.86	980.91
2005-06	259.01	320.92	252.83	76.5	980.57
2006-07	252.52	323.6	266.11	83.65	1002.52
2007-08	263.25	302.44	278.3	88.37	1006.45
2008-09	257.63	315.81	278.72	87.42	1014.03
2009-10	259.89	311.02	288.94	89.32	1023.45
2010-11	261.35	308.22	290.72	87.19	1018.36
Total Growth rate	**25%**	**34.1%**	**48.40%**	**79.35%**	**32.34%**

Source:Digest of stasticts Govt. of jammu & kashmir

TableNo.1.3 Regression coefficients estimate (Data Analyses is from 2000 to 2011)

Variables Detail	Area Irrigated (per.thousand ha)	Road length (per thousand Ha)	Area under Cultivable land(000 Ha)	Fertilizer Consumption (per.thousand crop hectares)	R^2	Adjusted R^2	Compound Growth rate in Area
1 Diversification to,Words Apple cultivation	"t" value = (-1.63)	"t" value = (2.43)	"t" value = (1.58)	"t" value = (-0.53)	(0.89)	(0.83)	79.35%
2 Diversification to Words Rice cultivation	"t" value = (1.22)	"t" value = (1.83)	"t" value = (0.48)	"t" value = (-1.71)	(0.66)	(0.44)	25%

Source: Computed by authors on the basis of data obtained from office of the Financial Commissioner, Digest of statistics Govt. of Jammu and Kashmir

A regression analysis is undertaken to assess the determinants of diversification. The linear regression analysis was done using cross section data from secondary sources regarding area under fruits (Apple) and rice crops. In order to assess the determinants of diversification, measures of diversification were calculated and these were regressed on different explanatory variables. The estimated results with respect to the tabulated variables are presented in above table. With the increase in area under roads one would expect diversification to increase. It can be seen that diversification in case of fruits/vegetables with respect to roads shows positive relation as, t=2.43> table value of t=2.22 and shows significant relationship. The overall impact of other variables like irrigation, available total area under cultivation, fertilizes consumption seams good on diversification to words fruits/vegetables as our calculated adjusted R^2 is equal to 83 % and the calculated compound growth rate is 79.35%, which indicates there is much more scope for diversification to words horticulture cash crops.

But the impact of roads, available cultivable land, irrigation facility, and fertilizer consumption to words diversification of rice cultivation does not shows much more significance, as our calculated value of R^2 is

44% and the compound growth rate is only 25 % this indicates that this average is just for self-consumption purposes without any much more profit with respect to Apple cultivation in the state,
Thus our results in this model indicates that there is much more diversification to words fruit/vegetables (Apple) cultivation in the state having good comparative advantage

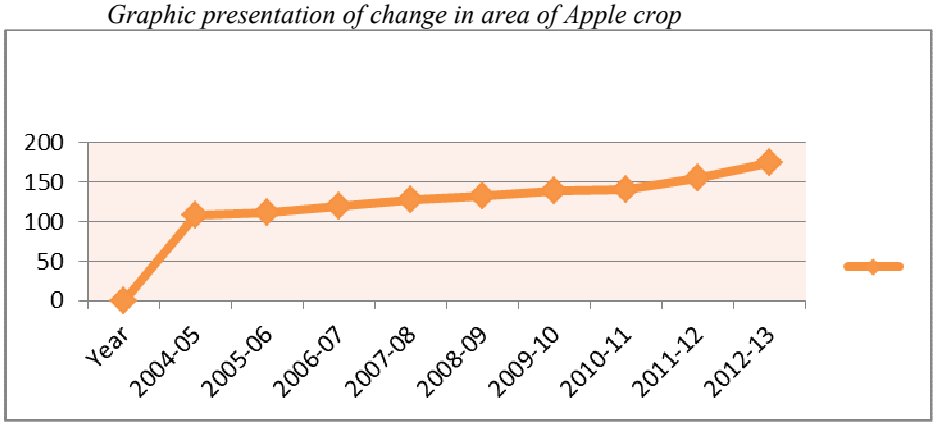
Table No: 1.4 Comparative productivity of Apple and Rice cultivation in J&K state

Year	Area under Apple (000 Hac)	Apple Production (000 Mt)	Productivity	Area underRice(000 Hac)	Rice Production (000 Qunt)	Productivity
2004-05	107.93	1093.33	10.12	250.04	4928	19.70
2005-06	111.88	1151.34	9.01	259.01	5574	21.52
2006-07	119.04	1222.18	9.51	252.52	5546	21.96
2007-08	127.80	1311.85	10.54	263.25	5620	21.34
2008-09	133.10	1332.81	8.99	257.63	5637	21.88
2009-10	138.19	1373.00	9.16	259.89	5011	19.28
2010-11	141.17	1852.41	10.15	261.35	5077	19.42
2011-12	154.72	1747.22	10.46	262.54	5045	19.21
2012-13	173.63	1500.25	9.5	262.56	5078	19.34

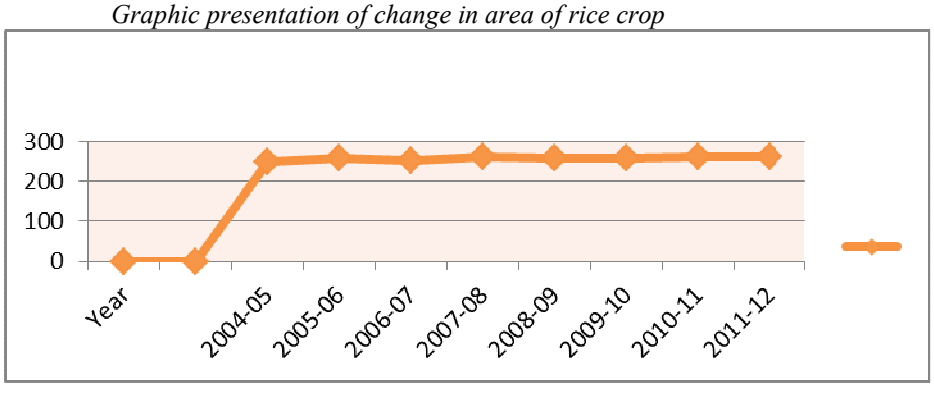
Source: Digest of statistics Jammu Kashmir, Financial Commission (Rev), J&K

- ***Compound Growth rate of Area under Apple cultivation and Apple production = 37% and 27%***
- ***Compound Growth rate of Area under Rice Cultivation and Rice production = 4.76% and 2.34%***

Graphic presentation of change in area of Apple crop



Graphic presentation of change in area of rice crop



Hypotheses:
H1: The Apple production is mainly depends on one and main factor land occupied under this crop
H0: There is not any significant relation between Apple production and area occupied under this crop.

In this model we consider other things remaining the same the impact of one factor i.e "land" put into test and the given results are shown in below table .A regression analysis is undertaken to assess the impact of land under

cultivation. The linear regression analysis was done using cross section data from secondary sources regarding area and production from 2004-2013 under Apple

Our resulted "t" value is equal to 2.72 at eight degree level of freedom and 5% level of significance and the calculated R^2 is equal too.445 or 44%.

t (calculated) =2.72> t(table value)= 2.30

Thus our above cited null hypotheses (H0) is rejected, so we can say there is good relationship between the Apple production and area increased under Apple cultivation ,also this factor has its 44% impact on the increased apple production in the state

Table No.1.5 Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Adjusted R square.
	B	Std. Error	Beta		
1 (Constant)	53.094	30.216		1.757	.445
Production of Apple	.058	.021	.717	2.723	

a. Dependent Variable: Land under Apple

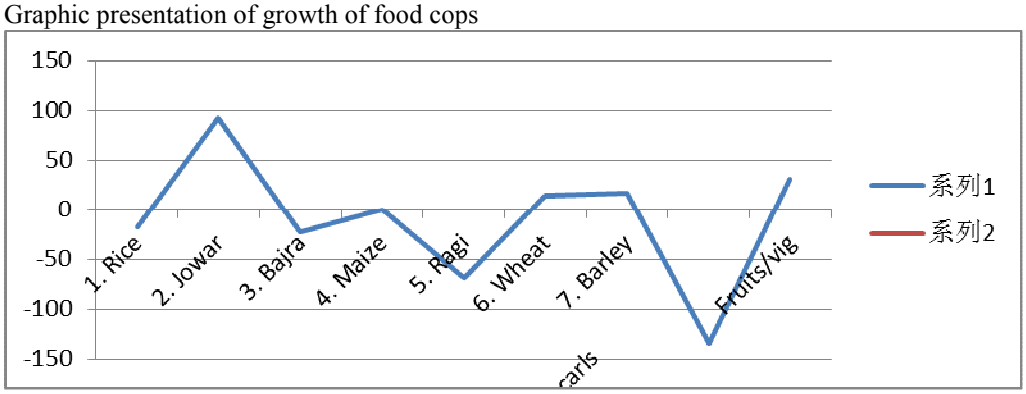
Diversification towards High Value Agriculture

During the last several years, diversification of Agriculture in State towards high value commodities, i.e. fruits, vegetables and livestock products is taking place at a faster pace and is reflected in the high share of High Value Commodities (HVCs) in agricultural production in a number of districts. Sustained economic and income growth, urbanization and globalization are fuelling, rapid growth in demand for high value commodities in the State, high value horticulture has a comparative advantage in production and labour absorption over staple food items and thus is reckoned as an important activity for small orchard holders equally important, the consumption of high value commodities (HVCs) is on rise, the evidence shows that by 2025, demand for fruits, vegetables, milk, egg, meat and fish would almost be doubled than that was in 2000.This sector is most vibrant sector for economic development in state. The percepta income of Jammu and Kashmir is 324 US dollar which is more the national average. The monthly expenditure of J&K is also higher than normal average. The urban/rural difference is lesser due to horticulture earning of the farmers. The increased income from horticulture crop has in diversification of cereal and to the horticulture crops.

Table No 1.6 Composition of Food in Jammu and Kashmir (Per cent of Gross Cropped Area)

Crops/year	***1980-85***	***1986-90***	***1991-95***	***1996-00***	***2001-05***	***2006-10***	*%Change*
1. Rice	26.77	25.64	25.49	24.81	22.85	22.75	-17.67
2. Jowar	0.015	0.0005	0.007	0.001	0.171	0.212	+92.92
3. Bajra	1.82	1.481	1.282	1.029	1.325	1.485	-22.5
4. Maize	27.45	27.944	27.68	28.81	29.51	27.63	+0.65
5. Ragi	0.87	0.706	0.839	0.799	0.742	0.515	-68.92
6. Wheat	21.24	22.66	22.99	22.68	23.09	24.65	+13.83
7. Barley	0.95	0.797	0.711	0.809	0.994	1.150	+17.40
8.Other carls	0.89	0.757	0.538	0.482	0.422	0.382	-134
9 Fruits/vig.	***5.30***	***5.462***	***5.932***	***6.024***	***6.891***	***7.665***	***+30.86***

Graphic presentation of growth of food cops



Conclusion

India, being a vast country of continental dimensions, presents wide variations in agro climatic conditions. Such variations have led to the evolution of regional niches for various crops. Historically, regions were often associated with the crops in which they specialize for various agronomic, climatic, hydro-geological, and even, historical reasons. But, in the aftermath of technological changes encompassing bio-chemical and irrigation technologies, the agronomic niches are undergoing significant changes. With the advent of irrigation and new farm technologies, the yield level of most crops-especially that of Apples has witnessed an upward shift making it possible to obtain a given level of output with reduced area or more output with a given level of area of creating thereby the condition for inter-crop area shift (diversification) without much disturbance in output level. Therefore, given the different agro-climatic conditions and coupled with different land holding sizes, state requires a different policy treatment. Further, an analysis of determinants that facilitated the process of crop diversification revealed all the factors considered under study have significantly more or less affected crop diversification. The results of the present study throw some light on policy instruments which can be used to augment the process of agricultural diversification in the state of Jammu and Kashmir. so decreasing the foreign dependent, our country should increase the local demand of all food items especially Apples which help the state to improve the economic and social conditions of dependent population which constitutes main food item all over world, Also said by Dr. M.S. Swaminathen "fruits and vegetables are the food of the future".

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