Scenario of Cropping Pattern and Crop Diversification: A Study of Gokak Taluk in Belgaum District, Karnataka, India

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Abstract: The cropping pattern has important implications for the growth of agriculture in general and food security and livelihood of millions of farmers in particular in a country like India. In addition to agro-ecological conditions and different socio-economic and institutional factors, the farmers exposure to various risks influences their cropping pattern decision. The production risk arises due to supply shocks that originate from diseases of crops, pests, weather-related conditions, such as rainfall, flood and drought. In contrast, price risk arises due to fluctuations in price of the produce that may be caused by changes in demand as well as supply conditions. While contract farming may help farmers mitigate price risk by offering an assured market of their produce and also inputs of production, crop insurance may be quite useful in minimizing production risk arising out of weather shocks. However, their scope is very limited in a developing country. On many occasions, therefore, the farmers try to cope with risks in their own capacities by making adjustments in the cropping pattern across crops as well as seasons. In this paper analyses the scenario of cropping pattern and crop diversification in terms of area of land utilized by farmers to grown different type crops in the study area.

Keywords: Crop, Cropping pattern, Crop diversification and Irrigation

I. INTRODUCTION

Crop activities go on all the year-round in India, provided water is available for crops. The village revenue officials keep plot-wise record of crops grown in each season. These are annually compiled district-wise, state-wise and on all-India basis. From these records one could calculate the relative abundance of a crop or a group of crops in a region. These crops are grown sole or mixed (mixed-cropping), or in a definite sequence (rotational cropping). The land may be occupied by one crop during one season (mono-cropping), or by two crops (double-cropping) which may be grown in a year in sequence. Of late, the trend is even more than two crops (multiple-cropping) in a year. These intensive cropping may be done either in sequence or even there may be relay-cropping—one crop under sown in a standing crop. With wide-rowed slow growing cropping patterns, companion crops may be grown. Nevertheless, the decision on cropping system is further narrowed down under the influence of several other forces related to infrastructure facilities, socioeconomic factors, and technological developments. These are all operating interactively at the local and micro-level. At the farmer’s level, potential productivity and monetary benefits act as guiding principles while opting for a particular crop/cropping system. Taking into consideration all these factors, including the cost-benefit and economic viability of the crops in the local agro-climatic condition, farmers intend to diversify their cultivation toward the crops that give them higher economic returns. In the process, agricultural diversification toward high-value crops can potentially increase farm incomes, where demand for high-value food products has increased more quickly than that of the cereal crops. However, speedy diversification through these crops is constrained, by and large, by the smallholder-dominated of the country (Kalaiselvi V.2012).

Cropping Pattern to some agricultural economists means the proportion of the area under various crops at point in time as indicated by cropping intensity in percentage. Kanwar (1971) defined cropping pattern as the time and space sequence of crops. Another term “cropping system is used for sequential cropping, relay cropping inter-crops only. As cropping intensities and cropping systems collectively form the cropping patterns, therefore, the term cropping patterns can be defined as the proportion of time for different crops. In other words, it is the rational allocation of land and time among different crops for maximizing agricultural production and income of the farmers. In this paper discussed about scenario cropping pattern and crop diversification of Gokak taluk in Belgaum district.

Importance of the study

As per 2010-2011 Agriculture Census Report, Gokak taluk have 82 km length of canals, Gross irrigated 31615 acre and Net irrigated 18020 acre. 10 tanks are covered 30 acre land, and wells 8975, Gross irrigated 43480 acre and Net irrigated 37350 acre. Tube wells 2920, Gross irrigated 37274 acre and Net irrigated 27730 acre. Lift irrigation 7, Gross irrigated 345 acre and Net irrigated 284 acre. Gokak taluk total irrigation
128088 acres. Principal crops cereals like Paddy, Jowar, Bajra, Maize, Wheat, and other minor Millets grown in 67834 hectare area. Pulses like as Tur, Horse Gram, Black Gram, Green Gram, Avar, Cowpea, Bengal Gram its covered 2675 hectare area. Oil seeds Ground Nut, Sun Flower, Safflower, Castor, Sesamum, Niger Seeds its grown in 9172 hectare area. Commercial crops Cotton, Sugar Cane, Tobacco total commercial crops grown in 56414 hectare area. Cropping pattern of Gokak Taluk, cropping pattern is growing cereals, oil seeds and fibre crops during Kharif season and pulses and jowar during Rabi season. The cereal crops include maize, jowar and bajra. The oil seeds include soya bean and groundnut. The pulses are red gram and green gram. The fiber crops include jute and cotton, which extend into rabi season. Recently the farmers have started the cultivation of sugarcane along the Ghataprabha River by lift irrigation.

**Need of the Study**

Land and Water are the two most important natural resources in the development of Agriculture. The success of the agriculture mainly depends on proper and scientific utilisation of these resources. Crop productivity can be best optimised on watershed basis when these resources interact in a synergetic manner. Changing climate conditions and degradation of environment is results are effect to scarcity of availability of water. Crop diversification is intended to give a wider choice in the production of a variety of crops in a given area so as to expand production related activities on various crops and also to lessen risk. Crop diversification in India is generally viewed as a shift from traditionally grown less remunerative crops to more remunerative crops. The crop diversification also takes place due to governmental policies and thrust on some crops over a given time, for example creation of the Technology Mission on Oilseeds (TMO) to give thrust on oilseeds production as a national need for the country's requirement for less dependency on imports. Market infrastructure development and certain other price related supports also induce crop shift. Often low volume high-value crops like spices also aid in crop diversification. Higher profitability and also the resilience/stability in production also induce crop diversification, for example sugar cane replacing rice and wheat. Crop diversification and also the growing of large number of crops are practiced in rain fed lands to reduce the risk factor of crop failures due to drought or fewer rains. Crop substitution and shift are also taking place in the areas with distinct soil problems in the study area.

**II. REVIEW OF LITERATURE**

1) Kalaiselvi V. (2012) in his “Pattern of Crop Diversification in Indian Scenario” assessed the crop diversification in India is generally viewed as a shift from traditionally grown less remunerative crops to more remunerative crops. The crop shift(diversification) also takes place due to Government policies and thrust on some crops over a given time, for example creation of the Technology Mission on Oilseeds (TMO) to give thrust on oilseeds production as a national need for the country's requirement for less dependency on imports. Market infrastructure development and certain other price related supports also induce crop shift. Often low volume high-value crops like spices also aid in crop diversification. Higher profitability and also the resilience/stability in production also induce crop diversification, for example sugar cane replacing rice and wheat. Crop diversification and also the growing of large number of crops are practiced in rain fed lands to reduce the risk factor of crop failures due to drought or fewer rains. Crop substitution and shift are also taking place in the areas with distinct soil problems in the study area.

2) Nagesh and Biradar (2013), conducted a study “Crop Combination Regions in Bailhongal Taluk Belgaum District Karnataka State” attempted to evaluate that agriculture is tilling crops and herding animals to produce many necessities of life, especially food for survival and fiber for the body protection. The researcher has made an attempt to find out the agricultural crop combination regions of Bailhongal taluk with help of J. C. Weaver’s Method. The result shows the in-depth investigation uncovers the dominating influence of soil and rainfall. Cotton, hybrid Jowar, Sugarcane and Paddy are cultivated predominantly in medium to deep black soil in kharif season. Other two crops horse gram and groundnut and kusabi are produced in middle and northern part of the study area (in Rabi Season). The coarse texture of soil in the west necessitates the raising of crop in combination. Three and Six crop combination over the largest area in combination of cotton with hybrid jowar and horse gram. Cotton in a large measure is cultivated on the fertile black soil, as it gives a higher yield per hectares on this soil.

3) Gomatee (2012) conducted study on “A Geographical analysis of Changing Cropping Pattern from the Traditional Crops to Market Oriented Value Added Crops in Bulandshahr district, Uttar Pradesh” making an observation on agriculture of India, it is found that the agricultural sector of India has undergone wide-ranging changes in term of cropping pattern, cultivation practices, productivity and intensity of cultivation during the past four decades. In earlier times, the choice of cropping pattern was guided by agronomic considerations and consumption needs of the people but the technological advancement in crop varieties and other yield increasing factor, due to green revolution, influenced the farmer’s behavior and it seems that mainly market forces determine the emerging trend. This study focused on different crops like Wheat, Rice, Sugarcane, Coarse Cereals, Pulses, Potato, Oilseeds and other vegetables. The study reveals that in the study area the prices of all crops registered an increase during last twenty years. But this increase in prices is not always related w
4) Gatade and Pol (2012) in their study “Crop Combination in Sangli District (Maharashtra): A Geographical Analysis” studied agriculture is a basic activity, which accounts one fourth of the National income and provides employment to 65% of working population, and still Indian agriculture gambles with the monsoon as inadequate water resource aggregate about 40% area. The Indian agriculture is totally depending upon the southwest monsoon, which is uncertain, causes high fluctuations in the agricultural production. The result reveals that the natural, socio-economic cropping and other technological factors affect the cropping pattern of any area. The Sangli district falls in drought prone area which affects the cropping in resulting to the one crop to three crop combination. The rain fed crops are the major crops in eastern dry zone of study area i.e. Kharif Jowar, Rabbi Jowa, Bajara, and other pulses. The cropping pattern of this area hampered frequently through the frequent drought conditions. High percent of the cultivated land is under irrigation by means of wells, tube wells, tank irrigation and canal. Specially middle and western part f the study area and soyabean or sugar is dominant crop.

5) Das (2001) his study “Cropping Pattern (Agriculture and Horticulture) in Different Zones, their Average yields in Comparison to National Average/Critical/reason Identified and yield Potential” studied the cropping systems of a region are decided by and large, by a number of soil and climate parameters which determine overall agro-ecological setting for nourishment and appropriateness of a crop or set of crops for cultivation. Nevertheless, at farmer’s level, potential productivity and monetary benefits act as guiding principles while opting for a particular crop/cropping system. These decisions with respect to choice of crops and cropping systems are further narrowed down under influence of several other forces related to infrastructure facilities, socio-economic factors and technological development all operating interactivity at micro level. It has been estimated that more than 250 double cropping system are followed throughout the country and based on rationale of spread of crops in each district in the country 30 important cropping systems have been identified.

Statement of the problem:

The cultivators or the farmers who are engaged in agricultural activities for the purpose of their livelihood have been facing the choice of crops to be grown or the size of the land to be earmarked for particular crop i.e., food-grain crop v/s non-food-grain crops (Commercial crops) To be specific, the question is how to allocate the land for different crops. The cultivator must judiciously allocate the land so that their interest is safeguarded without affecting the government policy of cropping pattern in economic growth of our country. This problem of choice of the crops to be grown is a social, economic and political issue. Therefore, there is an ample scope in the study to come out with a balanced cropping pattern by giving fair play for food-grain and non-food-grain crops.

Objectives
1. To analysis combination of crops in cropping system in the study area.
2. To study the different level of land used for different type crops in the study area.
3. To evaluate the land use pattern and soil quality determine the cropping pattern and crop diversification in the study area.

III. METHODOLOGY

The secondary data have been collected from district at a glance report Belgaum2010-1, books, journals, magazines, publications research papers and reports.

Present Scenario of Gokak taluk:

In the Table 01 shows Land details in Gokak taluk, here Fallow Land area is 25464 hectare; this land is not useful for any type cultivation. Area of Sown 144257 hectare it is depending upon well rain fall, and total irrigation in the taluk is 12088 hectare area. In the whole year agriculture production is possible, irrigation facilities such as Canals, Tanks, Wells, Tube Wells, and Lift irrigation. Principal Crops or Traditional Crops are Cereals, total production of these crops are 67834 hectare area. Pulses are 2675 hectare area, Oil seeds are 9172 hectare area. Commercial Crops are 56414 hectare area of land. Commercial crops are very dominant crops in Gokak taluk, highest rate of land utilize for commercial.

Table1: Gokak taluk Agriculture Land Utilization (In Hectares)

<table>
<thead>
<tr>
<th>Particulars of land utilization</th>
<th>Acres of land (in hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fallow Land</td>
<td>25464</td>
</tr>
<tr>
<td>Area Sown</td>
<td>144257</td>
</tr>
<tr>
<td>Irrigation area</td>
<td>12088</td>
</tr>
<tr>
<td>Area of Principal Crops (cereals)</td>
<td>67834</td>
</tr>
<tr>
<td>(Pulses)</td>
<td>2675</td>
</tr>
<tr>
<td>(Oil Seeds)</td>
<td>9172</td>
</tr>
<tr>
<td>Commercial Crops</td>
<td>56414</td>
</tr>
</tbody>
</table>

Sources: D. A. G. Report 2010-11, Belgaum District.
Crops like sugar cane, Cotton, Tobbaco. Growth of technology skills are helps to increase the production. Fertilizer, Pesticides, HIV Seeds are origin from advanced technology and farmers also taken advantages and it increases the Goss National Domestic Production. In 1950 to 1990 four decades cropping pattern such as, Oil seeds-Pulses. Pulses-Oil seeds and Oil seeds-Pulses-Cereals. After globalization cropping pattern were totally diversified shift from traditional crops to commercial crops.

**Physiographic and Drainage**

The major part of the command area is almost a gentle undulating landscape with a linear string of hills running in almost east- west direction dividing the region into two halves. The region has gentle easterly slope forming largely a plain interspersed with isolated low hills. The drainage pattern is parallel to sub-parallel draining into Ghapraprabha River. This area forms a part of Ghapraprabha sub-catchment in main Krishna above the confluence of Bhima catchment of Krishna basin. Ghapraprabha River originates in Sundergad of Western Ghats. Major tributaries joining it are Tamraparani near Shedihal, Hiranyakeshi in Chikodi taluk and Markandeya near Gokak town. Density of the network varies widely between 0.5km/sq.km to 2.5km/sq.km. It is observed that the less resistant rocks confined in the western part of the catchment has the higher drainage density than that of the flat areas in the central part.

**Land Use Pattern**

Land use pattern has a significant influence on the quality and quantity of runoff available from it. It plays an important role in determining the various hydrological phenomena like Infiltration rate, overland flow, evaporation and interception. There are four different types of land uses in the Ghapraprabha river basin. Agricultural land covers about 42.8% of the total catchment area. Generally, the type of land use is governed by social and socio-economic factors besides characteristics of the soil. In this case, except in the western part of the basin, other parts are known for agricultural production. A part of the catchment area remains as barren/fallow land. This is due to the lack of water supply either by rainfall or irrigation. Fallow lands can be brought under irrigation by providing small irrigation tanks or by exploring the ground water availability in the region.

**Soil Quality**

The major soil groups found in the catchment area are Laterite soils (coarse shallow soil, 22.3%, and medium deep soil, 21.40%), Coarse shallow black soil, (10.70%) and Medium black soil (45.80%). Laterite soils include both coarse shallow soil and medium deep soil. These deep soils are found on undulating rolling plains to gently sloping topography occupying areas, in parts of Belgaum district coming under the dry agro-climatic region. The laterites are found under heavy rainfall and high temperature conditions, resulting in intensive weathering, leaching of bases and silica. The rate of infiltration for this type of soil is found to vary between 9 cm/hr and 12.6 cm/hr, depending upon the land use pattern. The crops grown in these soils are jowar, groundnut, pulses, sunflower, linsed and other millets. Under irrigation, the crops grown are paddy, sugarcane, chilly, turmeric and vegetables. Coarse Shallow black soils are found on undulating ridges in the Deccan hard rock region occupying areas in the north and northwest parts of Belgaum and Kolhapur districts. They are shallow with depths less than 23 cm, dark grayish brown, and dark brown to dark reddish brown in colour and calcareous, with gravels, clay loam to clay in texture. This soil is neutral to weakly alkaline and have moderate to high water holding capacity with high cation exchange capacity. The infiltration capacity of the soils range from 1.2 cm/hr to 10.8 cm/hr and they are very susceptible to erosion. The crops grown under rain fed conditions in these soils are jowar, bajra, millet and pulses. However, crop yield is poor owing to shallow rooting depths and scanty rainfall. Medium black soils occur usually on very gently sloping midlands of the Deccan traps and on the schist, limestone and shale regions of the Belgaum district. They are moderately well drained with low permeability.

**Diversification of Cropping Pattern**

The Cropping Pattern in India underwent several changes with the advent of modern agricultural technology, especially during the period of the Green Revolution in the late sixties and early seventies. There is a continuous surge for diversified agriculture in terms of crops, primarily on economic considerations. The crop pattern changes, however, are the outcome of the interactive effect of many factors which can be broadly categorized into the following five groups:

**Following five groups**

I. Resource related factors covering irrigation, rainfall and soil fertility.
II. Technology related factors covering not only seed, fertilizer, and water technologies but also those related to marketing, storage and processing.
III. Household related factors covering food and fodder self-sufficiency requirement as well as investment capacity.
IV. Price related factors covering output and input prices as well as trade policies and other economic policies that affect these prices either directly or indirectly.
V. Institutional and infrastructure related factors covering farm size and tenancy arrangements, research, extension and marketing systems and government regulatory policies.
These factors are not watertight but inter-related. For instance, the adoption of crop technologies is influenced not only by resource related factors but also by institutional and infrastructure factors. Similarly, government policies - both supportive and regulatory in nature - affect both the input and output prices. Likewise, special government programmes also affect area allocation and crop composition. More importantly, both the economic liberalization policies as well as the globalization process are also exerting strong pressures on the area allocation decision of farmers, essentially through their impact on the relative prices of inputs and outputs. Although the factors that influence the area allocation decision of farmers are all important, they obviously differ in terms of the relative importance both across farm groups and resource regions. While factors such as food and fodder self-sufficiency, farm size, and investment constraints are important in influencing the area allocation pattern among smaller farms, larger farmers with an ability to circumvent resources constraints usually go more by economic considerations based on relative crop prices than by other non-economic considerations. Similarly, economic factors play a relatively stronger role in influencing the crop pattern in areas with a better irrigation and infrastructure potential. In such areas, commercialization and market networks evolve to make the farmers more dynamic and highly responsive to economic impulses.

IV. CONCLUSION

Cropping pattern of Gokak taluka varies and, study shows the some technical aspects and Government policies are influenced to increase production capacity and diversification of crop combinations. Rational farmer’s takes all benefits and grown the multiple crops in a year. In Gokak Taluka major Crop is Sugar Cane which benefitted. With the growth of technology, modernization, and changes in consumption pattern and agriculture in the taluka has undergone a major shift in the recent past, moving away from the cereal to non-cereal crops cultivation.

Limitations of the Study

In the study area have well water resources compared others taluks in Belgaum district, commercial crops like sugarcane, turmeric, tobacco, cotton are dominant crops. But shortage of rainfall is intends to diversified cropping system. This study covered different crops in cropping pattern in the study area, and crops grown under different type irrigation methods.

Directions for Future Research

Becoming water scarcity farmers facing more problems and increased food demand result of this create problem the food security. Regarding this water resources are most important valuable resource for human beings, and utilizes modern technology, seeds, fertilizers and pesticides are decline food nutrients. Lack of nutrients adverse effects on human health. Therefore, regarding this changing environment conditions plan, policy and important measures support to farmers’ risks influences their cropping pattern decision in agriculture sector. In the view of sustainable agriculture farmers welfare schemes and research is most important.

V. REFERENCES


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