Chapter - 1

INTRODUCTION
Chapter I

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India is a country of about one billion people. More than 70 percent of India's population lives in rural areas where the main occupation is agriculture. Indian agriculture is characterized by small farm holdings. The average farm size is only 1.57 hectares. Around 93 percent of farmers have land holdings smaller than 4 ha and they cultivate nearly 55 percent of the arable land. On the other hand, only 1.6 of the farmers have operational land holdings above 10 ha and they utilize 17.4 percent of the total cultivated land.

Agriculture occupies a very important and distinguished position in the economy of India. Our country has been giving due importance to agriculture in its various plans. In fact, in almost all the plans nearly one fourth of the total outlay has been earmarked for the agricultural sector. This massive investment combined with the execution of plans in agricultural sector has resulted in impressive achievements on agricultural production front.

1.1 The problem under Investigation

Crop shifting 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. Cropping pattern 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 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. Crop production occurs in a dynamic environment. It
has been experienced that cropping system of a region is the mirror of socio
economic condition of farmers, irrigation network, marketing and processing
infrastructure of the area and ultimately agriculture scenario of the state. The
information of crop cover in a growing period with the use of internal and
external resources can be used to intensify the cropping system or to adjust
additional crop to make cropping system more profitable. The productivity of
crop increased at national level due to increase in irrigated area; Introduction of
HYV and improve management practices. But it is not true in case of Eastern
India as a whole and Chhattisgarh as particular due to diverse crop growing
environment, land situation, physiographic and socio economic condition of
farmers. The agriculture situation in Chhattisgarh also calls for concerted efforts
and emphasis to accelerate the production. This may be borne out by the fact
that Chhattisgarh with a total area of 5.17 million hectares under food grains
produced 4.36 million tonnes with an average productivity of 843 kg/ha which
is quite low in comparison to the national average of 1601.0 kg/ha in 1998-99.

Chhattisgarh State is a predominantly an agriculture State where 70
percent population depends upon agriculture directly or indirectly. About 39
percent of total income of the State comes from agriculture including livestock.
Chhattisgarh has recorded 5.13 million Lakh tonnes production of food grains
during 2002-03. But, the alarming rate of increasing population, depleting
natural resources and attaining plateau in productivity in the State necessitates
the identification of suitable cropping patterns, which are productive, profitable and stable over a period of time.

The cropping pattern is the outcome of internal farm resource restrictions within the external frame work of socio-economic aid physical environments (Kahlon and Johl, 1965). The planning of cropping pattern thus means the selection of crops, crop combinations and rotations programmes consistent with frame work of internal and external envisaged and followed over a period, on individual farm units or an the aggregate area of a village, district, state or the country as a whole. According to some agricultural economists cropping pattern means the proportion of area under various crops at a time. Cropping pattern has been conceived by Ramasubban (1963) as the "distribution of acreages expressed in percentages of total cropped area". It is calculated by dividing the area under each crop by the total cropped area multiplied by 100 (Kanwar, 1972 and Singh and Singh, 1983).

A change in cropping pattern implies changes in the proportion of area under different crops that in turn depends upon many variables such as soil productivity, water availability, climate, market facilities, etc. These influencing factors are always subject to change. As a result, cropping pattern goes on changing across area and over a period of time.

There is a lot of variation in the cropping pattern among different districts of Chhattisgarh State. Moreover, this region has experienced lot of changes in its agricultural scenario wherein the gross irrigated area as percent of the gross cropped area has gone up to 18 per cent in 1970-71 to 21 per cent in 2000-01.
1.2 Importance

The net sown area in the State is decreasing gradually; the state of agriculture would depend upon the extent of modernization in the techniques of crop production. The old method of single and double cropping fails to meet basic needs of human beings, animals and the farm family remains idle for many months in a year. In the future, the size of holdings will diminish further and call for a systematic and scientific study of the various aspects of agriculture. This is the challenge of the future for the farmers and agricultural scientists.

Therefore, it would be interesting to analyze statistically the shifting distribution of land among various crops. This type of problem is more important as land holdings are becoming the most limited resources. Moreover, simple analysis of the shift in cropping pattern alone is not sufficient. Cropping pattern analyses is essential for studying the sustainability of agriculture. Hence, it seems essential to statistically analyze the impact of these shifts on production and productivity of the crops.

1.3 Objective

The present study is designed to study the existing cropping pattern of Chhattisgarh State with the following specific objectives:

1. To study the shifts in area, production and productivity under the principal crops in three zones of Chhattisgarh State by applying cluster analysis and principal component approach.
2. To study the shifts in area, production and productivity with regards to principal crops corresponding to Chhattisgarh as a whole State by using both the approaches.

3. Comparison of results of cluster analysis approach and principal approach in identifying the shifts.

1.4 The brief description of chapters

This thesis is divided into six chapters. In Chapter I is an introductory with an outline of literature survey on statistical tools for analyzing shifting, growth rate, and instability tools. Chapter II contains the frame work and research design along with the introduction of Agroclimatic zone and data collection

Chapter III & IV, devoted to the study of growth rate and instability aspect. It is now widely accepted that progress of an economy is adequately described by the growth rates of the economy over a period of time at national, State or district level. Moreover, there are some studies conducted by Mehra (1981), Hazell (1982, 1984), Ray (1983), Walker (1984), Pal and Sirohi (1989) which reveal that new technology has increased instability in crop production. The problem of growth and instability in agriculture has engaged the attention of research workers and planners in India since the celebrated work of Sen (1967) who first presented his paper as a technical key-note address on the occasion of 20th anniversary of Indian Society of Agricultural Statistics. Since then a number of attempts have been made to examine the nature and extent of instability in crop production. Ray (1999) has pointed out that the subject of growth and instability in agriculture has acquired an added importance and has become the subject of more serious investigation after the
introduction of new technologies both in India and abroad. In this chapter attempt has been made to analyze Compound growth rate and instability for all the three zones of Chhattisgarh along with Chhattisgarh state as whole under Rabi and Kharif season. In chapter III we develop the tools on the basis of peak and trough lines in order to calculate nature of instability.

In Chapter V, devote to study of shifting in cropping pattern among the Rabi and Kharif tools in three zones of Chhattisgarh along with Chhattisgarh state as a whole.

In this various cluster and principal techniques have been discussed and Wards minimum variance and Principal component analysis has been carried out for analyzing 33 years time series data on area, production and productivity for the three zones as well as Chhattisgarh state as whole.

In chapter VI, summarizes the conclusion arrived at after the detailed analysis of compound growth rate and nature of instability, cluster and principal component analysis during Kharif and Rabi season in different zones of Chhattisgarh and Chhattisgarh state as whole have been discussed.