A PROLOGUE ON THE RESEARCH THEME
Agriculture is the most important primary economic activity of the people especially in the developing countries like India. The history of agriculture is inextricably interwoven with the process of civilization because it was the taking up of agriculture that made it possible for primitive man to live in selected areas, forming a society, and growing his food nearby. This is the beginning of the village or agricultural economy (Vasant Desai, 1990). The alarming growth of population and consequent increase in the demand for food on one hand and the development of science and technology coupled with rich culture and civilization on the other hand moulded this primary economic activity into much more complex, diversified and dynamic. Hence, it is imperative to measure the complex and composite nature of agriculture for comprehensive understanding and valid agricultural planning and development.

In the recent past, manifestations of the changing trends of population pressure, the rapid pace of its growth, unprecedented
records of uneven distribution and nodes of huge concentration at a particular place, etc., could be noticed which have an unaccountable effect on the land use in general and agricultural land in particular. All the agriculturally developing nations including India have been experiencing such trends.

The varied inter-related problems such as population explosion, eco-generation, environmental pollution, energy crisis, urbanization, exodus of rural people etc., are assuming alarming dimensions. In addition, the world-community is confronted with the other problems of no less significance. Among them the natural hazards of floods and droughts are important and the magnitude of which is staggering. The uneven growth and development of science and technology in the developed and developing nations is also no less significant. All these are directly or indirectly related to the age old and yet phenomenal human activity. Hence, agriculture in the multiple manifestations including its types, systems, surplus/deficit areas, trade, transportation, specialization, malnutrition, dietary structure and habits, intensity and intensiveness, techniques and technological innovations, associations with plants and animals, numerous natural phenomena and elements etc., do need immediate attention of the world community today. (Sharma, 1991).

It is beyond doubt that the inter disciplinary nature and character of the field of agriculture with its historic role and world-wide distribution could clearly indicate how and to what extent it has engaged humanity in its pursuit for prosperity and betterment. This vast area of knowledge
has even remained an indisputable domain for not only natural and social scientists in general but even for geographers in particular. It dragged the attention of specialists like technocrats, trading community, politicians colonialists and archaeologists.

Though nature and character of geography as a discipline draws its subject matter from natural and social sciences, the geographers with their varied background and specific training are able to cover in its fold the multitudinal facets of the ever widening and inter-disciplinary field of agriculture.

The scope of geographical studies is getting widened because the spatial, structural and taxonomical character of agriculture has attracted the attention of geographers, who with this sharpened tools and technology background have been engaged in studying the various aspects and dimensions of agriculture at macro (global) and micro (local) levels during the last few centuries. But, many studies have been focussed on cropping pattern, land use, irrigation types, crop productivity patterns and systems of livestock breeding, etc., which help in describing and discerning the spatio-temporal distributional aspects of agriculture. But the modern innovative techniques/quantified approaches which are of immense help to understand agricultural dimensions in its multiple facets remained untouched until recently.

The deliberations and contributions of specialist geographers from all parts of the world under the auspices of I.G.U. Commission on 'Agricultural Typology' and the dynamic leadership of eminent specialists like Kostrowicki (1976) were considered a major breakthrough
in 'Agricultural Geography'. Apart from encompassing the varied and multiple components of agricultural attributes such as social, organizational, operational, productional and structural features, the multi-feature framework adopted by Kostrowicki and other untiring collaborators facilitated scientifically determining various forms and types of agriculture. Olmsted (1970) has rightly summarised this situation as: "the agriculture as a whole should not be considered as a simple sum of its components but as a set of highly inter-related phenomena and processes; it can be treated as a complex system in terms of system approach". The development of more sophisticated and reliable tools of investigation and analysis in the taxonomy of agriculture has added a new dimension to the field of agricultural geography. It also helped in acquiring a stable status like many other specialized branches of geography.

**AGRICULTURAL TYPOLOGY: CONCEPT, MEANING AND OBJECTIVE**

Agricultural typology would imply classification of complex nature of agriculture into types and resultantly it holds the key to agricultural planning. It is being identified as one of the most recent methodological tools not only to identify the inherent agricultural characteristics but also the tendencies in changing the spatial organization of agriculture at different hierarchical levels. In otherwords, 'agricultural typology' helps in better understanding of agriculture as a complex phenomenon on a world, continental and national scale and thereby, helps in understanding the similarities and dissimilarities between various agricultural systems in time and space.
The concept was, indeed, the brain child of eminent geographers at International Geographical Union (I.G.U.) Commission (1980) who evolved its definition and application by means of which regions are typified with reference to agricultural labour force, character of land and output. According to Kostrowicki (1972), agricultural typology helps to classify agriculture in relation to social and ownership characteristics, organizational and technical characteristics, production and structural characteristics.

The I.G.U. Commission's report on the world types of agriculture envisages that (Kostrowicki, 1976):

1. Agriculture is a highly complex system of inter-related and inter-dependent phenomena and hence, can not be considered as a simple sum of components.

2. The concept of agricultural typology is of a systematic or taxonomic character, resulting from mutual relations of all the distinctive features of agriculture such as social, operational, production and structural.

3. As a hierarchical concept it encompasses all types of various orders stretching itself from the individual agricultural holding through administrative units like villages, etc., to the highest order world/global type of agriculture.

4. The concept is highly dynamic in character and hence, changes in an evolutionary and revolutionary way along with a change of its basic attributes.

5. The study of typology is dependent on adequate and consistent choice of variables, representing the features of agriculture, so that, for any diagnostic analysis these variables cover all aspects of agriculture.

It is clear that the general concept of agricultural typology should give adequate and systematic explanation of various attributes of agriculture in different regions. Identification or classification of
the real type of agriculture should certainly be in the backdrop of the socio-environmental set up of a region.

Typology is very often confused with regionalization. Though both type and region are synthetic concepts, they belonged to two different categories. While type is of a systematic or taxonomic character, where as region is defined as a spatial or territorial concept based upon the differences between individual areas rather than on the similarities or affinities. The region is a contiguous portion of the earth's surface. It extends within determined limits and is characterized by a peculiar association of attributes which differ from others.

Hence, the procedure for identifying various types and regions do not necessarily be similar. One should identify 'agricultural types' on the basis of inherent or endogenous attributes of agriculture despite the fact that exogenous attributes are equally important to explain as to why in a particular place and time, the individual types of agriculture have developed. In the typological procedure, the external attributes can never be merged with the internal attributes as this would be both illogical and erroneous. Kostrowicki (1976) viewed that the merger of endogenous with exogenous attributes is futile since it presupposes rather than proves the impact of internal and external forces on the formation of agricultural types. This impact can be better proved by way of analysing separately the interrelations between agricultural types and the conditions of their development.

But, it is to be remembered that both 'Type' and 'Region'
are of hierarchical character. Individual types of lower order could be grouped together into types of higher order on the basis of their similarities. On the other hand, the regions of a lower order do always form territorial parts of higher order region. The typification of agriculture constitutes a sound base for agricultural regionalization irrespective of either similarities or dissimilarities that exist in the concept and methodology of a type and region. Hence, an agricultural typology is considered to be the most important complementary tool to the regionalization of agriculture.

METHODS AND TECHNIQUES OF AGRICULTURAL TYPOLOGY:

It is only after quantitative revolution, geography in general and agricultural geography in particular did undergo a significant change in its concepts, methods and techniques of analysis and interpretations. The outcome of such a change can be visualised in the emergence of methodology and technique of agricultural typology as a corollary of several studies undertaken by the International Geographical Union (IGU). The erstwhile approaches were questioned and there has been the substitution of quantitative approaches to the problems formerly treated in descriptive ways (Board, chorlay, Haggett and Stoddart, 1969). The empirical findings of the I.G.U. Commission indicate that the identification of the type of agriculture should be based solely on inherent characteristics or attributes of agriculture. These may be classified into the following:

1. Social attributes
2. Operational attributes
3. Production attributes
4. Structural attributes
Social attributes are generally those which can indicate who is the producer, and what is his relation to the land and to the others working in the land. The size of landholding also forms a part of social attributes since the social status of a farmer is important and is measured by his possession of farm. It is to be noted that from the methodic point of view social attributes can never be expressed in quantitative indices. It is imperative to establish the uniform classification of world tenure systems with a view to expressing the social attributes in structures or in formulas. They would be highly desirable and helpful in typological studies.

The Operational and technical attributes are those that respond to the question of how a produce is obtained and what means and practices are applied to achieve agricultural production. Though many a property could be expressed either by indices or structures as a result of using various conventional units such as land, manurial, power and animal units, there are, however, others which could not be presented in a quantitative way. Whatever systems of classification are enunciated it is always safe and desirable that they are tested as to their objectives, bases, universality, practicability etc., before they are applied in agricultural typology (Kostrowicki, 1970).

Intensity of agriculture would mean the amount of labour and capital inputs applied to get an agricultural output. It is very important typological criterion. But its actual meaning and content has been of much confusion. It is often equated with productivity
whereas it refers to the intensity of means and practices applied to get an agricultural output. The output depends upon the natural properties of land and also on labour, capital and technological inputs. However, none of these are capable of measuring the symptoms of intensity. Thus, until a definite formula is arrived at, some partial or indirect methods should be tested as to their applicability to agricultural typology. In other words the measurement of agriculture should take into account several Physico-socio-economic factors of the region.

Production attributes of agriculture respond to the question of how much, what and what for it is produced. In this case, the first methodological question that arises is in what units the agricultural production is to be measured. It is naturally preferred to have a common measure as products are different and cannot be measured in natural units such as weight or capacity. The monetary units are frequently used since they are easy to manage but they could bring in unpromising results when applied to spatial studies. In order to overcome the difficulties a number of conventional units have been introduced in various countries. Since all units of aggregate production, when used in areal studies, present certain merits and demerits, a special study is required to compare the results of using all those measures in typological studies to decide which one of them or, in some particular cases, more than one, should be chosen to measure agricultural production. The second question is what production is to be used to define various production characteristics of agriculture i.e. gross production or final production.
In the ultimate analysis, therefore, effort should be made to assess approximately, the total agricultural production for the areas under study. Productivity and commercialization are considered as the most important features of agriculture production. The indices such as land productivity, labour productivity and commercial productivity are made use of to express agricultural productivity.

Structural attributes are those which indicate the percentage of land under perennial crops grasslands/food crops to the total agricultural land. Apart from emphasizing general commercial production, the structural attributes would lay emphasis on the proportion of animal production to the actual commercial production and also the proportion of industrial crops to the gross production. The explanation of social, organizational and production variables constitute the overall structural framework of the agricultural type. The infrastructure of agricultural economy is determined by the various elements of the agricultural attributes. The marked orientation of one particular type is attributed to various components like perennial crops, permanent grasslands, primary food production in structural set up.

Each of the above sectors of agriculture was made up of number of variables. The variables considered by Kostrowicki (1980) for the study of agricultural typology were very significant in that they were flexible and could be modified as and when new data came to the forefront. This is certainly relevant because a typology with modified profiles was indeed a better local version of the agricultural type. While therefore, the selection of variables, in this context
was very important. Equally important was the method of grouping of multi-feature units. Kostrowicki has considered 28 variables, representing internal and inherent characteristics of agriculture, characterizing each of the above 4 groups with seven variables. Groupwise, they can be arranged as follows.

**GROUP I SOCIAL ATTRIBUTES WITH SEVEN VARIABLES**

1. Percentage of agricultural land (i.e. land under temporary or perennial crops, permanent grassland and fallow land) owned, controlled or held in common (by a group of people) under traditional customary rights of tenure in the total agricultural land.

2. Percentage of agricultural land operated under servile, labour or share tenancy (share cropping) in the total agricultural land.

3. Percentage of agricultural land owned (or held in owner like possession) as an individual, joint or corporate private property

4. Percentage of agricultural land operated by collective or state enterprises.

5. Size of operation in terms of the number of people engaged in agriculture per agricultural holding.

6. Size of operation in terms of total amount of agricultural land (in hectares) per agricultural holding.

7. Size of operation in terms of gross agricultural output (in conventional units) per agricultural holding.

**GROUP II - OPERATIONAL ATTRIBUTES WITH SEVEN VARIABLES**

8. Inputs of labour in terms of the number of people engaged in agriculture per 100 hectares of agricultural land.

9. Inputs of animal power in terms of the number of conventional draught units per 100 hectares of cultivated land (i.e. land under temporary and perennial crops as well as cultivated grass land).
10. Inputs of mechanical power in terms of the number of H.P. of tractors and other self-propelling machinery (combine harvesters) per 100 hectares of cultivated land.

11. Chemical fertilizing in terms of the amount of chemical fertilizers in pure content (NPK) in Kilograms per hectare of cultivated land in agriculture.

12. Irrigation measured by the percentage of irrigated land in the total cultivated land.

13. Intensity of crop land use in terms of the percentage of harvested land under temporary crops in the total land under temporary crops including fallow.

14. Intensity of livestock breeding for production purposes in terms of the number of farm animals in conventional (large) animal units per 100 hectares of agricultural land.

GROUP III - PRODUCTION ATTRIBUTES WITH SEVEN VARIABLES

15. Land productivity in terms of gross agricultural output in conventional units per hectare of agricultural land.

16. Productivity of cultivated land in terms of gross agricultural output per hectare of actually cultivated land.

17. Labour productivity in terms of gross agricultural output per person engaged in agriculture.

18. Commercial labour productivity in terms of commercial (sold or delivered off farm) agricultural production (in conventional units) per persons engaged.

19. Degree of commercialization as the percentage of commercial production in gross agricultural output.

20. Commercial land productivity as the amount of commercial agricultural production per hectare of agricultural land.

21. Degree of specialization as a coefficient of the degree to which the commercial part of agricultural production is concentrated on the least number of items.

GROUP IV - STRUCTURAL ATTRIBUTES WITH SEVEN VARIABLES.

22. Percentage of land under perennial (trees, shrubs, vines) and
Semi-perennial (covering land without rotation for several years such as hop and sugar cane) crops in the total agricultural land.

23. Percentage of permanent grass land (including leys within field grass system and current fallows if used for grazing) in the total agricultural land.

24. Percentage of land under primary food crops (edible grains, tuber, root and bulbcrops, vegetables fruits) in the total agricultural land.


26. General commercial emphasis as a percentage of commercial animal products in commercial agricultural production.

27. Percentage of industrial crops (to be used only or chiefly after industrial processing) in gross agricultural output.

28. Percentage of herd (or herbivorous) animals in the total number of farm animals.

This has presented, to solve the dual problem of selecting variable of a manageable quantity and at the same time avoiding any omission to represent all important attributes of agriculture by selecting such reduced number of variables. By arranging variables in ratings or classes, the sum total of ratings which do not differ from each other by more than one tenth of the total possible variance can still be treated as representing the same type. All those types which vary from one another by at least 11 variance can be grouped under one category. Based on this assumption, the IGU commission evolved the fractional code method:

\[ T = S \text{-----} C \]

Where 'T' represents type of agriculture, S-social attributes,
O-operational attributes, P-production attributes and C-Structural attributes.

Generally two methodological problems come in the way of working out an agricultural typology of any order. They are i) choice and adequate expression of attributes and ii) choice of the relevant techniques for its selection of synthetic, universal and representative variables. The solution to the methodological riddle lay in reducing the number of variables to a manageable quantity.

REVIEW ON AGRICULTURAL TYPOLOGICAL STUDIES:

The agricultural typology holds the key to agricultural planning. In the recent past, studies concerning the inherent features of agriculture have engaged the attention of many researchers. But the results of those studies which were conducted on regional, national and global scale are hardly comparable due to variations in the principles, methods applied and agricultural statistics used. Hence, the generalizations derived from such studies are most often ineffective.

An attempt at acquisition of better knowledge of the inherent agricultural characteristics and analysis of tendencies in the spatial organization of agriculture was first initiated in Poland.

The terms "types" or "typology" of agriculture have been used in their classifications of world agriculture by Faucher (1949) and some notable American geographers (Zobler 1965, and Dicken and Pitts, 1970).

The typology concept which was elaborated by I.G.U. Com-
mission on 'Agricultural typology' in 1964-1976 and which encompasses all the earlier experiences, is the only one which introduces a completely new approach to agricultural classification.

A preliminary scheme of agriculture which was based on a broad discussion of the principles, criteria, techniques and methods of agricultural typology was presented by the I.G.U. Commission on Agricultural typology to the I.G.U. Regional Conferences held in Hungary in 1971 (Kostrowicki, 1971) and then to the XXIII International Geographical Congress, in Canada (Kostrowicki, 1972). A new and improved version of the scheme (Reeds, 1975) was further elaborated and published in 1974 (Kostrowicki, 1974). The discussion at the Seventh Commission Meeting at France led to the elaboration of a further improved version of the scheme of the world types of agriculture (Kostrowicki, 1976). The results of the application of that version in several countries were presented and discussed at the Eighth Meeting of the I.G.U. held in Odessa in 1976 (Kostrowicki and Tyszkiewicz, 1979).

A number of methodological and regional studies were published in the proceedings of the commission meetings marking the significant development of the concept and methods concerned. The significant contributions to this field have also been made by Kam-ichi-Kawachi (1957-59), Enyedi, (1965), Highsmith (1966), Vanzetti, C (1970), Reeds, L.G. (1972), Anderson (1973), Dongmo (1973), Gregor (1974), Jacimovic (1976), Bonnamour and Gillette (1980), Tyszkiewicz (1982), Hill (1983), Sharma B.L. (1983), Galczynska (1984), Hill (1986) and others.

It is pertinent to state that not many studies been conducted
on agricultural typology in India. However a few geographers could make contributions to this field of agricultural typology. Among them Vijaya Ram Singh (1975), Singh, L.R. (1975), Pande (1974), Jasbir Singh (1983), Sharma (1983), Roy (1986) and Khatri (1989) deserve a special mentioning. Those works did throw light on typology of agriculture of India at macro-regional scale.

The present investigation is of paramount importance since it not only contributes something concrete on the virgin-field of agriculture of the State of Andhra Pradesh but also evolves a universally accepted methodology which helps in finding a place for agriculture of Andhra Pradesh in the world frame.

THE STUDY REGION:

Andhra Pradesh which is one of the Southern States of India forms the basis for the study. It is the fifth largest State both in terms of population and geographical area in the country. The State is divided into three regions viz., Rayalaseema, Coastal Andhra and Telangana comprising 4 districts, 9 districts and 10 districts in each region respectively.

The State presents a highly diversified systems of agro-geographical base with a significant variations in terrain, isohyetal, edaphic and hydrological conditions. The land use, irrigation, cropping pattern, crop and livestock production do present a diversified picture. There are inter and intra-regional variations which require a profound analysis of the agricultural typology in each region as well in the State as a whole. A study of agricultural typology in Andhra Pradesh
is of paramount importance to understand and examine the different forms of agriculture. So far nothing comprehensive and exclusive work has been attempted towards classification of agriculture into different forms and types in the State.

The economy of the State is predominantly agrarian in nature. About 65 per cent of the total working population depends upon the agriculture for their livelihood. The annual normal rainfall of the State is 982 mm. About 48 per cent of the geographical area of the State is under cultivation while 41 per cent of the cultivated area is under irrigation. The State produces larger quantities of oil seeds, paddy, jowar, sugarcane, cotton, tobacco, fruits and milk. The growth of the economy of the State lies in its agricultural growth. Hence, Andhra Pradesh State has been chosen for scientific investigation and evaluation of agricultural base which would be of immense help in designing regional agricultural planning.

OBJECTIVES OF THE STUDY:

The main objective of the present study is to make an attempt to systematically assess the complex and diversified nature of regional agriculture through the process of classification and typification. The most significant aspect of the study is the identification of agricultural types in different regions of Andhra Pradesh State at different hierarchical orders. It is a systematic and diagnostic study of synthesizing the distinguished inherent agricultural phenomena of different districts which provides the basis for agricultural planning and development.
DATA BASE:

The present study is based upon secondary data. The secondary data are collected for the years 1970-71, 1980-81 and 1990-91 pertaining to all the twenty eight diagnostic variables comprising social, operational, production and structural attributes as suggested by the I.G.U. Commission on agricultural typology. The secondary data are collected from different sources of Government records. In the agricultural studies, an agricultural holding is the best unit of investigation. But however, in the present study a district is taken as a unit for typological analysis.

The present study provides an opportunity to study inter and intra - regional/district variations in three periods viz., 1971, 1981 and 1991. The emerging trends in agricultural typology in each region/district could be studied over the period of three decades due to the availability of data.

SOURCES OF DATA:


METHODOLOGY:

The present study is based upon the method and techniques of the typology of world agriculture as evolved by the I.G.U. Commission on 'Agricultural Typology'. The detailed description of the method
and techniques of Agricultural Typology as prepared by I.G.U. Commission under the leadership of Kostrowicki are widely available and hence, they are not furnished here. In brief, it can be stated that the identification of the type of agriculture is based entirely on inherent characteristics of agriculture comprising 28 variables representing the most important social, operational, production and structural attributes of agriculture.

The agricultural types of 1st order, 2nd order and 3rd order are identified for 23 districts of Andhra Pradesh State. The Cartographic techniques are made use of with a view to presenting the changing spatial distributional pattern of the agricultural phenomena of the State.

CHAPTERIZATION :

The present study is classified into nine chapters as specified below:

I. A prologue on the Research Theme.
II. Locational and spatial aspects of Andhra Pradesh.
III. Changing spatial pattern of Social Attributes.
IV. Changing spatial distribution of Operational Attributes.
V. Changing Spatial Pattern of Production Attributes.
VI. Changing spatial distributional pattern of Structural Attributes.
VII. Typification of Agriculture and Delimitation of Typological Regions.
VIII. Changing Spatial Distribution of Agricultural Types and Agricultural Weak Links.
IX. Summary and Conclusion.