CHAPTER - I

GENERAL INTRODUCTION
An individual is the product of its heredity and environment. The former is decided at the stage of zygote itself while the latter controls optimal expression at different ontogenetic stages of growth and development, concentrating chiefly on the role of environment. Clements (1920) wrote, “Every Plant” is a measure of the conditions under which it grows. To this extent, it is a measure of soil and climate, “Besides, he developed a detailed appreciation of plants as indicators of the environmental variable after applying the principles of plant physiology for the purpose. Thus species with specific genotype may have variations under different sets of environmental complex. Turesson (1922) pioneered the studies on this aspect and stressed the importance of different environmental races of the same species differing with respect to variations of temperature, light and soil etc. He noted that some of these phenotypes may have better adoptabilities and have a higher survival value over their parents. Workers like Dobzhansky (1970), Sanaydon (1973) and Harper (1977), have supported these observations. Harper (1982) stresses, plants of a single species, sampled from a wide range of habitats and grown together in an experimental garden, differ often profoundly in features of growth-form and life cycle”. Thus it is widely agreed that physiological
studies of environmental modifications are made relevant as they are frequently adaptive. Heslop Harrison (1964) has reported that these all are of much evolutionary significance and can also be utilized in comparing the taxa on behavioural attributes as suggested by Davis and Heywood (1963) in their recent approach to taxonomy (Experimental Taxonomy).

Harper et al. (1961) provided an insight into the taxonomic relationship on the one hand, and useful informations are derived on their ecophysiological adaptations on the other hand. They are of much agronomic value when applied on the crop plants. In such studies, one or more of these environmental variables are, at one time experimentally allowed to vary while others are kept constant and the behaviour of plants in terms of various growth attributes are judged. These investigations, conducted in controlled or semi-controlled environments can aim at complete descriptions of physiological responses in relation to the specific edapho-climatic conditions prevailing in the region. It also contributes to our understanding of magnitude of adaptive changes required for a species to broaden its tolerance under different habits. Therefore, an understanding of the physiological behaviour of plants under different ecological perspectives, is needed to enhance the agricultural productions which constitute the main sources of food for human being and domesticated animals. In the background of the
above noted facts the two species of *Alysicarpus*, namely *A. monilifer* DC. and *A. rugosus* DC. have been taken for investigating their comparative performance under different conditions of light intensities, soil moisture stress, varying sowing dates and competition after growing them in the semi control environments. The species of *Alysicarpus* are perennial herbs, distributed throughout the tropics of the old world and naturalised. All the species are good as nutritive fodder. In India *A. monilifer* is used as a common fodder. *A. rugosus* is also an excellent fodder and is often sold in the market. It requires soil of medium to high fertility and is resistant to soil alkalinity. It is fed to cattle after chopping in admixture with bhusa or other dry fodder.

In view of these specialities it was considered worth while to compare the performance of *A. monilifer* and *A. rugosus*, under varying soil moisture, varying sowing dates and competition with respect to well established parameters of growth including dry matter and leaf area, relative growth rate, net assimilation rate, leaf area ratio, specific leaf area, leaf weight ratio and shoot/root ratio. Scores were also made on germination to understand the critical conditions of establishments which provide a suitable initial condition for the introduction, survival and maintenance as component of the community of which they form a part. They are autogamous plants and hence, show genetic purity of the stock.
Some pertinent reasons for selecting these plants as experimental materials were (1) These species are very commonly grown throughout India including the edapho-climatic conditions for this region. (2) Reports on the comparative biology of these plants in which the growth attributes like RGR, NAR, LAR, SLA, LWR and S/R ratio have been compared are scanty. (3) Data on comparative performance of two closely allied species are recently being sought for wide group of taxa is considered much useful towards achieving a "general purpose" classification (Davis and Heywood, 1963). This classification can be used not only by taxonomists but also by ecologists, physiologists, geneticists and biochemists (Snyadon, 1973). Blackman (1919) and Briggs et al. (1920) were the pioneers to start the concept of growth analysis for measuring the behaviour of plants under different environmental conditions. Workers including Heath and Gregory (1933). Williams (1946). Watson (1947), Blackman and Black (1959), Coonise (1960), Hughes and Evans (1962), Whitehead and Myercough (1962), Myercough and Whitehead (1967), Wilson (1981). Fisher and Edwards (1982) have contributed much towards the understanding and elaboration of growth analysis technique on various plants. In India, Asana (1950) applied the concept on sugarcane crop. Since then several workers also have contributed towards the understanding of growth and productive bahaviour of various crops under different stresses of
abiotic and biotic factors (Chency and Nanda, 1951; Misra, 1956; Sinha, 1965; Ramkrishan and Kumar, 1971; Marwah and Ambasht, 1972; Pandey, 1976; Dua and Sharma. 1977; Singh et al., 1981; Goel, 1983; Kumar, 1986; Lallan. 1988 etc.

In this context, it is worth noting that several reports (Teidjens, 1928; Danielson, 1944; Fukushima et al., 1968; Matsumato et al., 1981; Chung et al., 1982; Bengtsoson and Jensen, 1983) are there in which the effects of various factors on some of the yield components and certain agronomic characters have been dealt with on these two forage legumes. However, no significant information, particularly from this agroclimatic condition, is available, in which the analysis of growth have been made under the influence of varying environmental conditions noted above. As such, the present work has been undertaken for estimating their range of tolerance and adaptability.

The present study deals with the “Ecological studies of two herbaceous species around Orai (Jalaun) in Bundelkhand region.” The thesis has been divided in nine chapters. Each chapter has been divided in introduction, materials and methods, results and discussion. Chapter I deals with General Introduction. Chapter II gives an account of site description, climate and soil. Chapter III describes the biodata, phytogeography and economic importance of Alysicarpus. This is followed by Chapter IV giving an account of
seed germination. Chapter V throws light on biomass, productivity and energy dynamics. Chapter VI deals with effect of shading on growth. Chapter VII gives an account of effect of soil moisture on growth. Chapter VIII describes the intraspecific competition. This is followed by Chapter IX containing summary. The thesis ends with a list of references.