CHAPTER-I

INTRODUCTION
INTRODUCTION

Oat (*Avena sativa* L.), one of the important cereals, is a dual-purpose crop of temperate and sub-tropical areas. Being a highly nutritious cereal, it is used for human consumption as well as feed and fodder for dairy and other animals. In India, oat is exclusively grown for fodder in western Uttar Pradesh, Haryana and Punjab. It is also grown on limited scale in some parts of Maharashtra, Madhya Pradesh, Gujarat, Orissa, Bihar and West Bengal. Among winter forages, it contains relatively higher dry matter content with 7-10 per cent protein and resistance to diseases and is most suited for silage. With minimum irrigation it gives high fodder yield per unit area per unit time due to its multicut nature which ensures regular supply of fodder over a long period of time (Solanki, 1977). With these merits and development of an intensive livestock industry in the country in recent years, it has now gained much importance as a forage crop. Performance of our livestock for milk, meat and wool is the lowest in the world inspite of 480 million of its population. The main reasons for the lowest performance of livestock in our country are due to poor genetic potential and under nutrition. However, the genetic potential of livestock has been improved to a larger extent but their under nutrition still persists.

The country accounts for 15 per cent of the world’s livestock population with only 2 per cent of the total world’s geographical area due to which the deficiency in the total forage availability is about 53 per cent for dry and about 68 per cent for green fodder (Paroda, 1992). This deficit is likely to increase further, because of the burgeoning livestock population and depleting land availability for forage crops. This has created a situation where animals are unable to get even one-third of what they need for maintenance ration of 6.0 kg
of roughage and 3.6 kg of green fodder per day for a body weight of 300 kg. Therefore, looking at the vast gap between the demand and supply position, development of superior varieties/hybrids offers solution to the problem of sustained and increased fodder supply per unit area and time particularly where economy of the farmer is based on mixed farming system.

There are high yielding fodder crops and grasses during kharif season to meet the requirement of fodder but during winter season, the scope is limited to berseem in irrigated areas and oats in areas where the irrigation facilities are limited. Oat like other forage crops is generally grown in varied agroclimatic and fertility conditions. The biomass productivity of forages including oat by and large, fluctuates with the change of environment. In order to have consistency in forage yield performance of a variety over environments, development of stable genotypes associated with high production potential appears to be obligatory. Perkins and Jinks (1968a) proposed joint regression analysis which has been a widely acceptable approach for finding out the stability of genotypes.

To boost up further productivity of forage oats, it has been envisaged that hybridization and exploitation of heterosis may play significant role in coming years. For developing better genotypes through hybridization, the choice of suitable parents is a matter of great concern to the plant breeders. For this purpose, it is essential to quantify the genetic diversity among the parents. The more diverse the parents, the greater are the chances of achieving heterotic F₁’s and wide spectrum of transgressive segregants in segregating generations. There are various reports indicating that the genetic diversity may not be associated with geographical diversity. Mahalanobis D² statistics is adopted to identify the diverse groups of genotypes for hybridization purposes.
To initiate effective selection programme at early stages for further advancement in fodder yield of oat, it is necessary to know about interrelationship among fodder yield components and quality traits in order to discard the undesirable types based on these traits and to include those traits as a selection criteria in forage oat improvement programme. The detailed information on genetic divergence, association and phenotypic stability in forage oats is hardly available. In view of this, the present investigation was conducted in forage oats with the following objectives:

1. To study the variability and genetic divergence amongst various strains of different geographical origin using $D^2$ statistics.
2. To investigate the associations of different characters among themselves and their direct and indirect effects on fodder yield.
3. To identify the differential response of various genotypes over different environments and to find out stable genotypes.