INTRODUCTION

INTRODUCTION

Systematic Pomology is an advanced horticulture subject. It deals not merely with the identification and naming of plant species and varieties but also with their logical classification **(Zielinski, 1955).** Knowledge of cultivar genetic relationships helps breeders make decision on the cross combination in breeding programs and cultivar identification is important for protection of breeders right **(Cao *et al*, 2002).**

Using morphological traits, it is difficult to distinguish between many citrus taxa because some taxa are distinguishable only by fruits traits and citrus trees usually do not bear fruits until 3-4 years after planting **(Abdel-Tawab *et al* 2008)**

Studies of chemical variation have been suggested to be one of the growing points in the field of taxonomy. Chemotaxonomy has gained an important status in recent years. Chemical characters may have a particularly high taxonomic value when they can be shown to be stable, unambiguous and not easily changeable. **(Naik 1984).**

The genus citrus is divided into two distinct sub – genera, *Eucitrus* and *Papeda*. The sub – genus *Eucitrus* includes all the commercially cultivated species which have pulp – vesicles filled with flavourful juice and they are free from oil droplets, all the species of papeda are inedible with pulp vesicles containing droplets of acrid oil giving the juice a disagreeable and bitter flavor. The genus *Poncirus* is monotypic and is known horticulturally as the Trifoliate orange. The genus *Fortunella* resembles citrus in general appearance of the plant but differ in a number of botanical characters such as position of the ovary, fewer number of

locules only 2 ovules in each lecule, morphology of stigma, small weet fruits and pulpy skin. **(Zielinski 1955).**

Chemotaxonomic study of citrus volatile leaf oil by Gas liquid chromatography was made to determine the chemical composition of leaf oils and to show how the differences and variations in composition may be used as means for identification of citrus genera, species and varieties. Such studies are scientific and applied importance to be used for subsequent studies on rootstock compatibility, taxonomic relationships and biological control patterns. **(Scora and Tarrisi, 1965).** Gas liquid chromatography of leaf oil of citrus has been used recently in studies aimed to determine the range of oil components present, their relation to taxonomic, genetic and environmental factors and possible biochemical interrelationship **(Scora *et al* 1968).**

Variation can be evaluated on the phenotypic and genotypic levels. To overcome the limitations of morphological determination limits, other markers have been developed at both the protein level and DNA level. Protein markers are also limited by being influenced by the environment and changes at in different development stages. **(De Vicente and Fulton, 2003)**.

DNA- based assays are robust, speedily, information may be obtained from little amount of plant materials at any stage of development and it is not affected by environmental condition. **(Sergio and Giani, 2005)**

DNA markers techniques for a great potential as a tool for a wide range of areas in Citrus improvement **(Cabrita *et al* 2001)** ISSR markers involve PCR amplification of DNA using a simple primer composed of a micro satellite repeated sequence.

Inter-simple sequence repeats (ISSR) and other molecular markers are considered as molecular typing approaches that have been used to detect variation among plants. Each method has been used extensively to identify and determine relationships at the species and cultivar levels These methods are widely applicable because they are rapid, inexpensive, simple to perform, do not require prior knowledge of DNA sequence and require very little starting DNA template. Inter-simple sequence repeats (ISSR) has become a useful tool for the characterization of germplasm collections in annual and perennial crops. Especially for vegetatively propagated wood species, such molecular markers provide a quick and secure methodology for evaluating genetic relationships **(Martins *et al.*, 2003).**

The main objective of these studies is to find genetic analysis system to classify and distinguish some citrus genera, citrus species and citrus varieties belongs three genera, ***Citrus, Poncirus*** and ***Fortunella*** {Family Rutaceae, sub-family Aurantiodeae, tribe Citreae and sub tribe Citrinae.}