CHAPTER I
INTRODUCTION

Without copolymerization of other α-olefins to ethylene, two very different types of ethylene polymers can be made i.e. low-density polyethylene (LDPE), which is made at very high pressures using a free-radical initiator, and high-density polyethylene (HDPE), which is made using various metal-complex catalysts. The low-density polyethylene contains many short branches, mostly two to four carbons long and a few long branches of undetermined length, but long enough to have significant effect upon the melt properties, viscosity and elasticity. High-density polyethylene theoretically has no branches (although a few may be present due to oligomers formed by the catalyst and then copolymerized with the ethylene). On the other hand, copolymerization of ethylene and α-olefins, usually from C_3 to C_8 in length, gives a whole new family of polyethylene commonly referred to as linear low-density polyethylene (LLDPE).

Thermoplastic properties can be incorporated into natural rubber (NR) via blending of NR with a suitable thermoplastic such as polypropylene (PP) or polyethylene (PE). Such blends are generally termed thermoplastic natural rubber (TPNR) and the material, by the physical properties exhibited, is categorized as an elastomer lying between rubber and plastic. TPNR, which can be considered either as a rubber modified plastic or a plasticized rubber, has the advantage over NR of being processible utilizing any plastic processing machinery and at a comparatively lower temperature. NR, being a long chain natural polymer, is generally not very compatible with most synthetic polymers (Ibrahim *et al.*, 1995). The mixing of NR with polyolefin normally occurs in an internal mixer at tempertures (173-185^{0}C) exceeding the melting point of the plastic component. These NR-polyolefin blends have properties largely dependent on the ratio of the two components. Those with high NR content are rubbery and those with high proportions of polyolefin are semirigid. However, PP and PE are the two known thermoplastics which are highly compatible to NR. due to the similarity in the microstructures of the polymers.

High-density polyethylene will give a higher degree of elongation at break than will a polyethylene with a low density, both LDPE and LLDPE. Heterogeneous

LLDPEs with low density, 0.90 to 0.92, appear to have higher percent elongation than homogeneous LLDPE by about 100 to 200% (800% vs. 600%). For higher density LLDPEs, the presence of the "high density" fraction in heterogeneous resins has a greater effect at very low density.

Films for agriculture applications have some important characteristics to be concerned according to specific applications. Opacity of the film (how much light will pass through the plastic) will govern both the amount of radiation for heating the soil and the growth of weeds under the film. The last characteristic which growers have to decide is mulch color: black, white, silver, red, blue, IRT (infrared thermal), green IRT and yellow. Each of the colors will produce specific temperature (for both soil and ambient) and light modifications within the micro-environment of the raise-bed/plant canopy (Sharon et al., 2001).

The objectives of this works are to study the effect of molecular structure (long and short chains as indicated by MFI and molecular orientation by stretching process), NR content and ENR as coagent on the physical properties (thermal, mechanical, crystallinity, crystalline sturcture), morphology, O_2 permeability and UV-Vis absorption of the LLDPE films.