CHAPTER 1
INTRODUCTION

Water is essential for agricultural production systems so, drought can be considered a very serious problem. If plants lack water for a long period of time, due to shortage in irrigation, or delay of rain, they will permanently wilt and eventually die. This causes not only loss of income to the farmers, but also seriously affects the food chain and ecology. Since plants are producers, therefore no plants, no animals and no food for humans. This will tremendously affect the social as well as the economic system of a country, particularly an agrarian country, where most people have small scale farming as their occupation.

In order to be able to cultivate, even under unexpected environmental conditions, the prevention and solving of severe droughts must urgently be addressed by governments. Ever since the evolution of crop cultivation, people have tackled this problem by building dams as reservoirs for water, when it is seasonally abundant and to distribute it in a controlled way in times of shortage. However, building dams is considerably expensive and they require a lot of maintenance. It would take several decades to make a profit out of a dam. Furthermore, ecological damage to flora and fauna will happen and it might also change the local culture. However, these problems seem not as severe as being destroyed.

Numerous ways for resolving drought and drought related problems have been investigated. Scientifically a promising and popular method is to enhance the quality of soils by using Super Absorbent Polymers (SAPs) as soil additives. SAPs belong to a unique group of materials that can absorb water, hundreds of times their own weight, and do not release it easily, even under pressure. Consequently, these additives have the ability to improve the water absorption capacity, and water-retention within the soil. The artificially stored water will be released slowly and promotes plant growth and development (Bakass *et al.*, 2002). Even without any type of irrigation for an extended period of time, the crops can grow as usual, which, among agriculturalists, gives the material the name: "mini water tanks".

Recently, polyHIPE polymers have been used in agriculture, as soil additives. They posses superior outstanding characteristic features, like: controllable size, an

interconnected porous microstructure, the ability to include biologically or chemically active components, such as fertilizers, a manageable rigidity, and a good water adsorption capacity (Burke *et al.*, 2010).

In this study, we have tried to enhance the water adsorption capacity of soil additives, by investigating the effect of salt, aqueous ratio and comonomer content on water adsorption capacity of hydrophobic S/DVB polyHIPE foams, and then compare to the performance of hydrophilic S/EGDMA polyHIPE foams, under the same condition. It is expected that S/EGDMA will greatly improve the water adsorption capacity, which would lead to a field trial.