CHAPTER 1

INTRODUCTION

1.1 Research Background

*Ipomea Aquatica* is a common aquatic plant in Malaysia. In certain areas, both *Ipomea Aquatica* and water hyacinths thrive together (K. S. Low And C. K. Lee, 1981). Wood *et al.* (1976) used *Ipomea Aquatica* to remove wastes from rubber effluents. Its use as a bioagent for heavy metal removal has not been previously reported. *Ipomea Aquatica* is a common food eaten by all social groups. As mentioned by D. Austin (2007), there are several ways people consume these herbs, although the most frequent is a cooked vegetable. A common method is to lightly fry the young tips, including stems and leaves. However, tips are also eaten boiled, steamed, or added to soups, stews, curries, sambals, and even pickled.

As with many plants this is considered a food with medicinal effects, D. Austin (2007) stated that *Ipomea Aquatica* is considered a laxative, which is also recommended for piles and in certain nervous conditions with sleeplessness and head-ache. At one period, *Ipomea Aquatica* has been extremely important in Malaysia and also at western Indonesia. Many consider water spinach second in importance to Pak Choi, the ubiquitous Chinese vegetable (Tay & Toxopeus 1993).
For many years, landfills have been one of the most comprehensive forms of disposal of municipal solid waste because of the operative easiness and the low economic cost. Landfill material contains organic matter and plant nutrients such as nitrogen and phosphorus which is good for fertilizing agricultural soils (A. Kumar et al., 2009). These inorganic fertilizers are expensive and for farmers whom cannot afford to buy them, they will take the soil from landfill sites to use as fertilizer. Landfill site contains heavy metals, which could accumulate in the agricultural fields where the landfill material is applied. Moreover, I. Baranowska et al. (2002) mentioned that landfill sites also contain an amount of organic and inorganic pollutants include plastics, metals, glasses, fibers and heavy metals which can pollute the agricultural soils in the long term of period. Although these considered as pollution problems, there are still no awareness exists on the potential risk of invisible pollutants like heavy metals. As a matter of fact, heavy metals can be leached through the soil profile; either transported in drainage waters and may pollute groundwater or they can accumulate in the upper soil layer and can be toxic to plants and soil microbial mass (G. D. Laing et al., 2003). Heavy metals are not only accumulating in the soils but also in the aboveground parts of a plant. Hence, these
will give risks for the public health due to the potential exposure to pathogenic agents, toxic substances, gases.

Figure 1.2: Newly closed landfill in Ulu Tualang

A nursery is a place where plants are propagated and let to be grown to a usable size. Nursery also includes retail nurseries, wholesale nurseries. Retail nurseries manage plants that are going to be sold to the general public while wholesale nurseries only sell for business like other nurseries and for commercial. Another type of nursery is private nurseries which supply the needs of institutions or private estates (http://www.permacultureactivist.net/nurseries/PlntNursrys.htm, 2010). Despite selling plants, nursery also provides many choices of planting material such as soil, seeds, cuttings, tissue, etc depending on the tree species, the nature of soil and the degree of site preparation. Most of the nurseries apply a highly labor intensive which is mechanized and automated process in order to remain the material’s quality and to remain the same condition together. Other nurseries that