CHAPTER 1

INTRODUCTION

1.1 Background of the problem

Textile wastewater contains a large variety of dyes and chemical substances that make the environmental challenge for textile industry not only as liquid waste but also in its chemical composition (Alen and Vinodha, 2014). Basically, the main pollution contributed by textile wastewater comes from dyeing and finishing processes. Water is used as the principal medium to apply dyes and various chemicals for finishes and since all of them are not contained in the final product, they eventually became waste and caused disposal problems. Among major pollutants in textile wastewaters are known as high suspended solids, chemical oxygen demand, heat, colour, acidity, and other soluble substances, which need to be removed from textile wastewater are COD, BOD, nitrogen, heavy metals and dyestuffs.

The textile wastewater is a complex and variable mixture of polluting substances like inorganic, organic, elemental and polymeric products (Brown and Laboureur, 1983). The textile wastewater containing dye substances is not only toxic to the biological world, its dark colour blocks sunlight that leads to severe problems to the ecosystem (Choi et al., 2004). Due to low biodegradation of dyes, conventional biological treatment process is not very effective in treating dye wastes. The usual treatment processes like physical and chemical methods such as coagulation,
flocculation, adsorption, membrane filtration and irradiation. (Robinson et al., 2001) achieve good decolorizing efficiency but they are high cost and the production of the significant amount of sludge material requires final disposal again. Among all the methods, adsorption is one of the most effective methods of removing dyes from waste sewage (Deans and Dixon, 1992 and Nigam et al., 2000). The process of adsorption has an advantage over the other methods due to its sludge free operation and complete removal of dyes even from dilute solutions. Activated carbons have been extensively utilized in various industrial adsorption and separation processes because of its efficient adsorption of the organic compound.

Recently, a considerable amount of research has been undertaken to find cheaper substitutions to activated carbon. Recent developments of new strategies of making use of low cost, easily available biological and agricultural waste materials for the adsorption process is gaining much importance to replace activated carbon. Some of the low cost adsorbents that are tested for the dye sorption process are rice husk (Manoj kumar, 2013), bark, hair and coal (Ho and McKay, 1999), wood dust (Garg et al., 2004), tree bark powder (Paul Egwunwu, 2013), peat (Fernandes et al., 2006), lignin (Cotoruelo et al., 2010), wheat bran (Ata et al., 2012 and Ozer and Dursun, 2007), brown sea weed (Vijayaraghavan and Yun, 2008), banana and orange peel (Annadurai et al., 2002), fly ash (Janos et al., 2003), pineapple stem waste (Hameed et al., 2009), water hyacinth pulp powder, tuberous pulp, sugarcane pulp, and coconut pulp (Pramanik et al., 2011).
1.2 Problem Statement

Recently, the problems created by textile wastewater getting more serious concerns especially in developing country. This is due to low biodegradation of dye and chemical used in commercial textile are hazardous and danger to the environment. Approximately 10000 different dyes mainly used in the dying and printing industries are produced annually worldwide (Zollinger, H. 1978) and (Robinson, T., McMullan, G., Marchant, R., & Nigam, P. 2001). Due to low biodegradation of dyes, conventional biological treatment process is not very effective in treating dye wastes. In order to overcome these problems, the research for environmental friendly and low cost treatment is essential. It is thought that adsorption processes by seaweed biomass is comparatively effective for the removal of dye from wastewater (Suzuki, Y., Kametani, T., & Maruyama, T. 2005). However, none has been reported on the dye removal by using our local seaweed through adsorption process. Furthermore, Malaysia has abundance of seaweed.

1.3 Objectives

There objectives of this research are as the followings:

1. To study the equilibrium time of dye removal by Malaysia seaweed biomass.
2. To investigate the effect of Malaysia seaweed mass on the performance of its adsorption.
3. To study the effect of initial concentration to the dye removal by Malaysia seaweed biomass.
4. To compare the performance of dye removal by Eucheuma Spinosum, Kappaphycus Alvarezii, Kappaphycus Striatum and Sargassum Polycystum.