

(6.5) is suitable for cationic dyes. Adsorption capacity depends on the dye concentration in the solution and the adsorbent to solution ratio. Adsorption capacities of Nylosan blue and Malachite-Green at an adsorbent dose of 4 g/L for 30 mg/L solution concentrations were 3 and 6 mg/g for RRH and 6.5 and 7.5 mg/g for GAC respectively. BRH showed approximately 35% increase in adsorption capacity for anionic dye and 20% increase for cationic dye respectively compared to RRH. Rice husk treated with base appeared to remove base soluble materials on rice husk surface that might interfere with its adsorption capacity. However ARH showed a decrease in adsorption for both types of dyes compared to RRH. Surface functional groups on the rice husk and activated carbon were determined using Bohem titrations. Adsorption capacities of anionic and cationic dyes were in agreement with the numbers of acidic and basic functional groups on the adsorbent. Fixed bed column studies were conducted and breakthrough curves thus obtained were used for design of the industrial scale adsorption columns.

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Utilization of Fruit Waste Compost in Fruit Cultivation

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Fruit processing factories and fruit markets discharge large quantities of fruit wastes such as fruit flesh, peels, husks, seeds, crowns and rotten fruit. If it is not properly disposed the decomposing waste materials will contaminate water, air and soil causing environmental pollution. This paper describes an efficient method developed to convert fruit waste to compost and utilization of the compost in passion fruit cultivation and production of healthy planting materials of durian.

Raw materials used for composting were 1000 kg fruit waste containing 25% v/v pineapple crowns, 75 kg cow dung, 15 kg *Gliricidia sepium* leaves and 25 kg saw dust. Three aeration methods were tested and building the heap over a bamboo platform and mixing at 2 and 5 weeks after heap formation was the best among the tested aeration methods which took 64 days for full composting and produced a yield of 165.8 kg of compost. It was rich having 1.1% N, 0.7% P₂O₅, and 2.6% K₂O with 13.8% C. The compost was tested as organic manure for passion fruit. Application of 20 Mt/ha of fruit waste compost twice a year produced significantly higher fruit yields in the third year of production compared to cattle manure application or recommended NPK fertilizer application. In the first fruiting season, highest yield was obtained in vines treated with NPK fertilizer mixture while in the second year there were no differences in the yield levels of vines. Fruit waste compost application to grafted durian plants in the nursery showed that height of grafted plants was increased compared to other fertilizer treatments. Most importantly, application of compost reduced motility of young durian plants due to Phytophthora infection in roots. Thus the results of these experiments conclude that fruit waste compost can be successfully used in organic passion fruit production and improves the quality of durian planting materials.

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Growth and morphological alterations in *Spirulina* (*Arthrospira*) *platensis* under Cd²⁺ contaminated conditions

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Spirulina has gained a high economic value as it contains some fine compounds such as essential fatty acids and amino acids, vitamins and minerals etc. at relatively high concentrations. The species is thus cultured commercially in China and in some other parts of the world. The present study assessed the growth and morphological alterations in *Spirulina platensis* under Cd²⁺ contaminated conditions.

The species was cultured in Zarrouk liquid medium adjusted to pH 7.0 at 25 °C. The medium was supplemented with different concentrations of Cd²⁺ (0, 0.1, 0.2, 0.4, 0.6, 0.8 and 1 mg/mL). Cultures were gently stirred and illuminated with white light produced by neon tubes at the intensity of 90 mmol photon m⁻² s⁻¹ with a light/dark cycle of 14:10 h. The growth was routinely monitored by measuring the optical density at 560 nm. Microscopic observations were also made during the six-day incubation period. Results revealed that low concentrations of Cd²⁺ (0.1, 0.2, 0.4, 0.6 and 0.8 mg/mL) could stimulate the growth of *Spirulina platensis*, though

slight growth reduction was observed at 1 g/mL. However, no significant differences ($p \leq 0.05$) were found among the treatments. Furthermore, evident from light micrographs showed no morphological alterations also in any of the concentration. It could therefore be concluded that *S. platensis* can be cultured in contaminated waters with low concentrations of Cd^{2+} .

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Impact of organic mulches on soil properties in high grown tea soils

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Organic matter transformation and nutrient recycling in soil depends on the activity of soil organisms. Deterioration of soil fertility lowers the biological activity and it leads lower productivity. In the absence of adequate organic matter, the process of conversion of nutrients to available forms and their retention is very low. To enhance the activity of soil organisms, high quality organic matter addition is very important. Even though there are plenty of organic materials available in tea lands, there is inadequate information on their suitability and influence on biological properties of soil. Therefore, two trials were conducted to study the suitability of the commonly available mulching materials with varying C/N ratios and their influence on soil organisms at two growth stages of tea. The growth stages were young/immature tea and mature tea after pruning in the field. The objective was to determine the improvement on soil chemical and microbial properties in terms of functional group of microbes such as of bacteria, fungi. Soil microbial biomass carbon, soil respiration, soil organic carbon, soil pH, were measured one year after application of mulch. The materials tested were Refuse tea (25 tonnes ha⁻¹ year⁻¹), Mana grass (*Cymbopogon confertiflora* - 35 tonnes fresh weight ha⁻¹ year⁻¹), and Dadap legume (*Erythrina lithosperma* - 35 tonnes fresh weight ha⁻¹ year⁻¹). For young/immature and mature tea, Mana and Dadap were applied three times and Refuse tea two times during the first year after planting and after pruning respectively. The results indicated that Refuse tea and Dadap mulches enhanced soil pH, soil organic carbon, microbial biomass carbon, and soil respiration and also a suppression of gram negative bacteria those are mostly pathogenic one year after the application of treatments. The suitable mulching materials to accelerate the biological activity are those with C/N ratios below 20 and low in lignin and unoxidisable polyphenol content. Therefore, some of the most suitable materials for tea are Refuse tea and Dadap which improve the biological properties of tea soil.

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Adsorption of Chromate by suspended solids in Kelani River

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Heavy metals are anthropogenic pollutants discharged to water systems by many sources. Accumulation and dissolution of heavy metals in aquatic systems can seriously affect the human health. The Kelani River is the second largest watershed in Sri Lanka and flows through the most populated and economically developed administrative district, Colombo. A large number of tanneries which utilize chromium for their production processes are located along the shore of this river. The effluents of most of these industries discharge to the river without any treatment and hence chromium can be a potential water contaminant in this area. Therefore the adsorption patterns of chromate on the suspended solids in the Kelani River were modeled in different conditions to study the contamination potential. The results revealed that the adsorption density increased with the increase of chromate concentration but decreased with the increase of suspended solids. Further, the adsorption density increased in the acidic medium whilst it was very poor in the basic conditions. The activation energy, ΔG and ΔH are lower and the ΔS is higher in higher ionic strength conditions prevailing in the estuary area. This showed that the river suspended solids in the estuary area behave as an adsorbent for chromate in contaminated water.