

Screening of Some Indigenous Ghanaian Coastal and Inland Plant Species for Use in the Phytoremediation Oil Contaminated Soil

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ABSTRACT

This study was designed to investigate the potential some coastal and inland plant species of Ghana for phytoremediation of oil contaminated sites. A total of ten (10) different plants consisting of: *Crinum odatum*, *Bothriochloa bladhii*, *Cyperus ligularis* and *Commelina erecta* as coastal species and *Fimbristylis miliacea*, *Sporobolus pyramidalis*, *Cyperus immature*, *Sorghum arundinaceum*, *Torulinium odoratum* and *Mariscus umbellatus* as inland plant species were screened in the first phase of the study (phase I) at the Department of Botany, University of Ghana after which three (3) namely: *Cyperus ligularis*, *Commelina erecta* and *Bothriochloa bladhii* were selected as the best coastal representatives for phytoremediation whereas three (3) other plants: *Mariscus umbellatus*, *Fimbristylis miliacea* and *Torulinium odoratum* were also selected as the inland plants with the best potential for phytoremediation. The selection was based on the uptake and accumulation of hydrocarbons (THC) within the plant tissues. The total hydrocarbon accumulation in the inland plants were significantly higher ($P < 0.05$) compared to the accumulation of hydrocarbons in the tissues of the coastal plant species. *Torilium odoratum* had the highest THC accumulation of 0.288 ± 0.001 mg/ml followed by *Mariscus umbellatus* (0.273 ± 0.001 mg/ml) and *Fimbristylis miliacea* (0.261 ± 0.001 mg/ml) for the inland plant species whereas the THC *Commelina erecta* (0.237 ± 0.001 mg/ml) was the highest for the coastal plants followed by *Bothriochloa bladhii* (0.236 ± 0.001 mg/ml) and *Cyperus ligularis* (0.052 ± 0.001 mg/ml). Other parameters that were studied in Phase II were leaf chlorophyll concentration (i.e. total leaf chlorophyll concentration, Chlorophyll A concentration and chlorophyll B concentration) and dry weights of the plants (i.e. total dry weights, shoot dry weights and root dry weights). The trend of variation in total

chlorophyll content was different from that of THC. *Fimbristylis miliacea* had the highest value of 13.256 ± 0.011 ug/g followed by *Torulinium odoratum* (5.337 ± 0.011 ug/g) and *Mariscus umbellatus* (4.367 ± 0.011 μ g/g) for inland plant species whereas for the coastal plants, the trend was *Bothriochloa bladhii* (16.968 ± 0.011 ug/g) > *Cyperus ligularis* (5.567 ± 0.011 μ g/g) > *Commelina erecta* (4.665 ± 0.011 μ g/g). The trend in dry weight of the test plants was also different from that of THC and chlorophyll concentration and can be represented as follows: *Torulinium odoratum* (5.127 ± 0.005 g) > *Mariscus umbellatus* (2.480 ± 0.005 g) > *Fimbristylis miliacea* (1.620 ± 0.005 g) for the inland plants and; *Cyperus ligularis* (4.695 ± 0.005 g) > *Commelina erecta* (3.476 ± 0.005 g) > *Bothriochloa bladhii* (2.464 ± 0.005 g). Based on the above trends, *Mariscus umbellatus*, *Fimbristylis miliacea* and *Torulinium odoratum* as well as *Commelina erecta* and *Bothriochloa bladhii* are the recommended species with phytoremediation potential for the inland and coastal species, respectively. The coastal species *Cyperus ligularis* is not recommended for phytoremediation based on the results of this study.

Supervisor

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