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An alternative approach for assessing indirect land use change (ILUC) effects: Linking biomass availability, land cover and cropping intensity

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EU policies require a report on Indirect Land Use Change (ILUC) effects of biofuels. Existing approaches assessing ILUC are based on land cover and/or biomass availability but The ignore changes in biofuel cropping systems at large. This is a serious omission which neglects fluctuations in fallow and double cropping. We present an alternative approach which evaluates biofuel production, land cover, cropping practices and biomass availability. Land and biomass balances, calculated for 34 countries (USA, Brazil, EU, China, Malaysia, Indonesia, Mozambique and South Africa), provided a link between biofuel production and biomass availability, land cover, crop yield and area harvested. Cropping intensity of arable land was evaluated by calculating the Multiple Cropping Index (MCI). MCI, defined as the ratio of harvested crop area and the sum of all arable land, is a measure of harvesting frequency of arable land. Between 2000 -2010, biofuel production in the study area increased by 86 billion litres of ethanol and 15 billion litres of biodiesel. This required 324 million tonnes of extra biomass and generated 78 million tonnes of co-products mostly used as animal feed. Consequently, over 11 of the 25 million ha harvested area is associated with food production. Increases in MCI (double cropping) allowed farmers to harvest an additional 42 million ha of crops without the need to increase the amount of arable land. This is more than sufficient to compensate for the 14 million ha of extra harvested land associated with biofuel expansion.

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Morpho-Genetic diversity of selected medicinal plants

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Contemporary phytotherapy and modern allopathic medicine use raw materials from more than 50,000 plant species. In Nigeria, the bulk of these raw materials is harvested from the wild and is diminishing at a fast rate with no substantial conservation or breeding efforts made. This alarming situation, coupled with the dramatically increased interest in herbal medicine, is a real threat to the genetic diversity of many medicinal plant species. For any meaningful progress to be made in reversing this situation, the available variation in these crops must be ascertained. Thus, this research was to document the available genetic and morphological variations in different accessions of some selected indigenous medicinal plants, (Monodora myristica and Tetrapleura tetraptera) in Southern Nigeria. Their potential uses in pharmaceutical industries were also highlighted. Efforts were made to screen available accessions in Southeastern Nigeria with a view to identifying the distribution pattern of phytochemical constituents in these accessions. Efforts were also made at estimating the level of genetic diversity in these species to stimulate the breeding of these plants. Analysis of variance showed highly significant differences ($p<0.001$) in many of the agronomic and nutritional attributes studied. Principal Component Analysis showed that most of the agronomic and nutritional attributes contributed significantly to the total variation of 73.04% and 79.60% recorded in M. myristica and T. tetraptera respectively. Dendrograms generated from Cluster analysis grouped the accessions of M. myristica and T. tetraptera into 3 and 4 groups respectively. Molecular analysis using RAPD markers showed 3 to 13 polymorphic bands with mean polymorphic information content (PIC) of 0.673, indicating high genetic diversity among the accessions of M. myristica. Accessions AK1, AK3 CR2 and RV4 of M. myristica and AKA3, IKM1, AKP3, AKP5 and BOK1 of T. tetraptera were identified as superior based on multiple trait performance suggesting that selection of superior accessions may be carried out for more than one trait. GRS information on these accessions is available. The high performing accessions could be key targets for exploitation by pharmaceutical companies.

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