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EDITORIAL

Oil palm industry in Sri Lanka: Its production potential and current status, and future prospects

Among different types of vegetable oil, palm oil produce from oil palm (*Elaeis guineensis*) seeds, is unparalleled in terms of productivity, and is an important and versatile oil that is used as a raw material for both food and non-food industries. Palm oil is used for food applications such as cooking, margarine, spreads, confectionary fats, ice cream, and emulsifiers (Pande *et al.,* 2012). Though the origin of oil palm is in Africa, due to its high oil production potential under tropical wet climatic conditions (Chung, 2012), the highest extent of commercial cultivation is now in the South Asian region (Sheil *et al.,* 2009). The oil palm plantations in Indonesia, Malaysia, and Thailand produce almost 90% of global palm oil production (Corley and Tinker, 2008). The total extent of the oil palm cultivated land in the world is 19 million hectares in 2018 (World Bank, 2018), and it covers about 6% of the total cultivated lands globally, contributing about 35% of the world's vegetable oil demand. Palm oil is one of the major edible oil used in the world as cooking or frying oil, and supplying about 40% of the total traded vegetable oil in the world.

Oil palm is a tropical plant species, thus it grows best in stable-warm areas with sufficient soil moisture all year round in the tropical belt (latitude range of 10^0 North and South of the equator) (Verheye, 2010). For optimum growth, development and production, it needs 5-6 hours of bright daily sunshine (16–17 MJ m^{-2} day^{-1}), annual rainfall of 2,000–4,000 mm, low vapor pressure deficit and mean maximum temperatures of 29–33 °C and mean minimum of 22–24 °C (Uning *et al.,* 2020). Under optimum growing conditions Oil Palm can potentially produce 8-10 MT oil ha^{-1} $year^{-1}$.

Oil palm was introduced to the Southern part of Sri Lanka in 1968, where the required soil, warmer temperatures (24-32^0C) and rainfall (>2,500 mm annual) conditions prevail. Since establishing for the first time at Nakiyadeniya estate of the State Plantation Corporation, other Plantation Companies of Agalawatta, Namunukula, Elpitiya, Kotagala, Kegalle and Bogawanthalawe also converted their marginal rubber and tea lands to oil palm expanding the total extent to about 11,132 ha by 2018, and became one of the most profitable plantation crops in the region.

Oil palm cultivation is vital in Sri Lanka as an edible oil-producing crop. In 2020, the total edible oil production of Sri Lanka was 44,326 MT. Coconut oil production was 19,759 MT, and crude palm oil and palm kernel oil production was 24,567 MT (Coconut Development Authority, 2020). In the year 2020, the quantity of fats and oil imported to the country was 219,295 MT. The total foreign exchange outflow in 2020 was LKR 37,378 million for edible oil imports (Ministry of Plantation, 2020). If the shortfall amount is produced within the country, a significant amount of foreign currency can be saved. If coconut is used to fulfill the oil shortfall within the country, an additional cultivation extent of 271,000 ha is needed. The average oil yield of coconut lands is around 0.8 MT/ha/yr. However, Oil palm produces an average of over 2-3 MT/ha/yr oil in Sri Lanka. However, it has the potential to produce 8-12 MT/ha/yr oil yield under good management, thus needing only 50,000 ha of oil palm cultivated land to meet the national oil demand. The oil yield of oil palm is approximately 5 times more than the coconut palm oil yield (Solidaridad, 2021). Therefore, oil palm cultivation is crucial to a developing country like Sri Lanka as a way of saving the foreign currency, while fulfilling the national vegetable oil shortfall and any excess production can be exported. A Policy decision was taken by the Ministry of Plantation in 2014 to expand oil palm cultivation considering the crop diversification program, with Regional Plantation Companies (RPC) subjected to special guidelines. Under that program, the maximum allowable extent is 20,000 ha (Senavirathne *et al.,* 2018). The government's intention of this expansion was to reduce the import cost of edible oil and to accomplish the national edible oil requirement within the country.

However, the oil palm industry has been criticized by environmental activists, some social and religious groups and politicians considering its impacts on the biodiversity, usage of large quantity of water that could result in depletion of ground- and surface-water resources, soil degradation, environmental pollution and some social impacts as well, which challenge the further expanding of the industry. Most of these criticisms are opinion based, and are not based on credible scientific investigations at local level. There is a severe dearth of research on oil palm cultivation and its resource utilization, and social and environmental impacts of oil palm cultivation in Sri Lanka. However, several long-term research studies related to environmental impacts of oil palm cultivation have been carried out in many other oil palm growing countries. According to them, the crop water usage for an one hectare oil palm cultivation is somewhat comparable to the requirements of a rubber cultivation of a same extent. According to Solidaridad Network (2021), coconut, rubber, and oil palm consume 130, 63 and 249 liters of water per day per plant. Considering the per hectare average plant densities of 160, 520 and 143 for coconut, rubber and oil palm, the amount of water consume in liters per day per hectare by each crop was 20,800, 32,760 and 35,607liters of water per ha per day, respectively. Thus, results indicated that higher water use efficiencies for oil palm and no considerable difference in total water usage per unit land area (ha) between oil palm and rubber.

According to the guidelines of the Coconut Research

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Institute of Sri Lanka (CRI), oil palm can be grown successfully in the low country wet zone agro-ecological regions where the annual rainfall is >2,500 mm and well distributed. Environmental concerns on soil erosion and soil water status are rather management dependent, thus by implementing proper soil conservation measures, soil erosion could be minimized. Pest and disease incidences are relatively less in oil palm relative to tea and rubber, thus pesticide usage and associated environmental pollution can be low. Similar to rubber and coconut, complete eradication of weeds is not practiced in oil palm cultivations. Though understory vegetation can be maintained through periodical weeding, it is not expected to have higher floral diversity comparable to natural forests. Chamara et al. (2016) reported that soil properties (organic carbon, N, P, K) and floral diversity of different age classes of rubber and oil palm fields at Nakiadeniya estate were similar. Due to the higher productivity [>18 MT/ha/year of fresh fruit bunches (FFB)] and associated higher removal of nutrients with the harvest compared to rubber and coconut, higher rate of fertilizer application is needed. Higher rate of leaf photosynthesis, lower light saturation and higher leaf area index (LAI) attributed for greater canopy photosynthesis and yield. It was reported that oil palm is highly efficient in converting sunlight, nutrients and water into photo-assimilate and provide good ground cover, so that soil erosion can be minimized under well-established fields. For the overall FFB production at the field level and different product development at the factory level, the water footprint values are relatively low for oil palm, and also generate less grey water compared to rubber. Oil Palm vegetation sequesters atmospheric CO_2 and act as a carbon sink during its rotation period of 30 years, providing valuable ecosystem service. Since marginal rubber lands and abounded lands can be converted to oil palm cultivations, there is no threat of deforestation as well.

Due to the continued pressure, sometimes politically motivated, from social groups and NGOs, present Sri Lankan government has banned oil palm cultivation in 2020 and even ordered plantation companies to remove trees in a phased-out manner and replace with rubber. These decisions were taken based on unscientific opinions including the high-water usage of oil palm trees that could result in depleting groundwater table and leading to biodiversity losses and soil degradation. These ad hoc decisions not only have disrupted the palm oil industry locally, but globally as well by impacting other leading palm oil producing countries like Indonesia, Malaysia and Thailand negatively, and creating doubts among the consumers.

Therefore, it is the responsibility of the scientific community to critically and comprehensively analyze all such issues raised and provide transparent evidence-based answers against opinion-based views, and find sustainable solutions for the betterment of the entire plantation industry.

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