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Application of cleaner production technique in small scale tea industry in Sri Lanka

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This study explored the cleaner production techniques that can be used in the small and medium-scale tea sector in Sri Lanka. Sustainability of the sector has become a big question due to persisting climate change, socioeconomic changes, unstable financial positions, and the lack of knowledge of modern technology. This paper investigates the possibility of adopting Cleaner Production (CP) practices in the small and medium-sized tea industry from the land preparation stage to the manufacturing stage along with the tea supply chain. The paper reviewed the material and energy flow analysis of the Sri Lankan tea industry in order to identify CP opportunities and make recommendations to minimize negative environmental impacts. Data were collected from small-scale (less than 0.8 ha) tea farmers, transporters/drivers involved in tea leaf transportation, and small and medium scale (SME) factories in the southern Province of Sri Lanka. The sample consists of 100 farmers, 60 tea transporters and 5 SME factories. To gather data from farmers and transporters, questionnaires were used. Interviews also were conducted and observations were made to gather information from selected factories. The results show that the monthly average raw tea leaf yield per hectare was 1233 kg. Further, to produce 1 kg of black tea, generally, 4.5 kg of fresh tea leaves, less than 20 mins. of human energy, and 0.89 kWh of energy (electricity) is required. Besides, an average of 819.5 kg of chemical fertilizers is used per ha per year. Results indicate that opportunities are available to adopt five cleaner production options to reduce the environmental footprint of small-scale tea industry of Sri Lanka. They include growing tea with seeds instead of vegetatively propagated basket tea plants, using machines to pluck tea, automate movement of tea from withering to rolling section, improve knowledge of tea cultivators on more effective cultivation and caring techniques, ensure worker safety and opportunities to acquire better skills relevant to tea industry, introducing mechanisms to improve the link between raw leaf suppliers and the factory, introduce environmentally friendly inputs such as organic fertilizer and recycled organic waste and water and use of biodegradable material instead of polythene. These measures may contribute to optimize material energy and water usage by small and medium scale sector and therefore to environmental sustainability,

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