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On the feasibility of an agricultural revolution: Sri Lanka's move to go 100% organic

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Abstract

In April 2021, the Sri Lankan Government banned imports of agrochemicals, including chemical fertilizers, to make Sri Lanka the first fully organic and chemical fertilizer-free country globally. The ban was justified by human and environmental health concerns, such as many cases of kidney failure in the central parts of Sri Lanka. While previous policies had envisioned a stepwise transition, the sudden ban jolted the agriculture sector. However, it was aligned with the emerging national economic crisis with drastically declining foreign exchange reserves that restricted the import of commodities, including fertilizer for distribution at subsidized prices. The ban was also opportune because fertilizer prices peaked on international markets in 2022.
Without any transitional time, the thrust for organic fertilizers failed to satisfy demand or obtain the required crop nutrients resulting in severe agricultural losses. After the first data on decreasing yields were revealed, the government lifted the chemical fertilizer ban on December 1, 2021, but it was too late as the cropping season had arrived. Without financial reserves to import fertilizer, the donor community was urged to assist.

This paper addresses: (1) justification of the ban, (2) the feasibility of transitioning to organic fertilizers based on the available biomass to replace chemical fertilizers; and (3) the related cost implications. The scenarios focus on irrigated paddy rice and the plantation sector that underpin the national economy. Undervalued nutrient sources are also considered as well as the constraints to and implications of such a transition beyond Sri Lanka's frontiers.

Key words: Organic fertilizer, chemical fertilizer, Sri Lanka, fertilizer ban, paddy rice, tea

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Introduction

Facing a significant decline in foreign currency income and reserves, exacerbated by Covid-19 travel restrictions, the Sri Lankan Government limited imports to essential items since 2020. In April 2021, an immediate ban on importing agrochemicals that were perceived to threaten human and environmental health was announced. Sri Lanka was then declared the first fully organic and chemical fertilizer-free country globally (Farzan 2021). Public health concerns focused on chronic kidney disease of unknown

etiology (CKDu) and overuse of fertilizers, facilitated by government fertilizer subsidies. The sudden ban jolted the agriculture sector but helped the government to save about at least USD 300 million on annual fertilizer imports (Kumar 2021).

While the public and government media applauded the strategy, the scientific community was divided but afraid to openly challenge the government policy. Following the ban, chemical fertilizer supplies quickly ran out and farmers protested as they struggled with the situation. Even the Sri Lankan champions of organic farming raised concerns about the abrupt change (Figeczky and Kariyawasam 2022) because farmers had received no warning and their soils were unprepared for the change. The private sector seized a business opportunity and the number of registered organic fertilizer producers jumped rapidly from about 30 to over 200, all competing for the same feedstock. Consequently, also inferior organic material was sourced and sold, which aggravated farmers. The government asked the military to assist in organic fertilizer production and tried to import shiploads from India and China for help. However, this resulted in quality concerns and delays, and eventually did not help the important paddy rice and tea plantation sectors.

Facing severe agricultural losses and under mounting protests, the government eventually lifted the ban on December 1, 2021. Without financial reserves to import fertilizer, the donor community was urged to assist, but too late for start of the forthcoming cropping season.

The failed ban posed various questions related to transformative processes, especially the best institutional pathways for such a volatile transition, possible alternatives and the overall costs and benefits. But there were also questions on the reasoning and the actual feasibility of such a change.

This four-pager summaries results on three research questions: (1) Was the ban on chemical fertilizers scientifically justified? (2) To what extent could Sri Lanka's organic fertilizer pool replace the nutrients supplied by imported chemical fertilizers? (3) Would the change save the government money?

Methodology

Question 1: Scopus, Google Scholar as well as national project reports and earlier CKDu reviews were sourced (Noble et al. 2014). As this study addressed topical events, academic papers were only just emerging, and personal observations, stakeholder interviews and news reports became the primary means of information.

Question 2: The initial focus was on the nitrogen (N) demand of the main stable crop, irrigated paddy rice, covering the two annual growing seasons; subsequently, other nutrients and important plantation crops were added, comparing nutrient demands and different supply scenarios. Crop residues, composts from different providers, livestock manure, fecal sludge and the biomass of invasive plants were also considered in the contexts of alternative uses and geographical distances.

The baseline scenario represented an average year before the ban. Scenario 1 simulated the events of 2021, i.e. the rush to use all the municipal solid waste compost, private sector produced compost, manure from intensively reared animals and all paddy straw. Scenario 2 awarded the government more time to establish additional compost plants, fecal sludge treatment facilities and larger fleets of trucks for collecting organic waste to obtain the optimal amount of organic fertilizer.

Question 3: The costs of chemical and organic fertilizers, standardized on their N content, were compared with the amounts needed to match crop demand.

Results and Discussion

Question 1 results showed that several CKDu studies had identified elevated levels of certain elements in areas affected by the disease, but often without data to show if this was also common in disease-free areas. More comprehensive and peer-reviewed studies using control sites and/or groups showed that agrochemicals are a possible risk factor (Jayasumana et al. 2013); but any causal linkages to the disease

could not be confirmed (Balasubramanya et al. 2020). Several studies concluded that it is very unlikely that arsenic, cadmium, lead or chromium cause CKDu (Herath et al. 2018; Wickramarathna et al. 2017, among others). Therefore, the normal management response would be to promote good agricultural practices and rework the fertilizer subsidy system to mitigate agrochemical misuse while supporting organic soil amendments. None of the studies provided evidence to consider or justify a nation-wide ban on agrochemicals.

Question 2: Neither scenario shows that Sri Lanka's organic fertilizer pool could supply the rice sector and even less in addition the plantation sectors with sufficient nitrogen or other nutrients (Figure 1). For all scenarios, the government would have to facilitate the import of significant volumes of organic fertilizer to maintain crop yields.

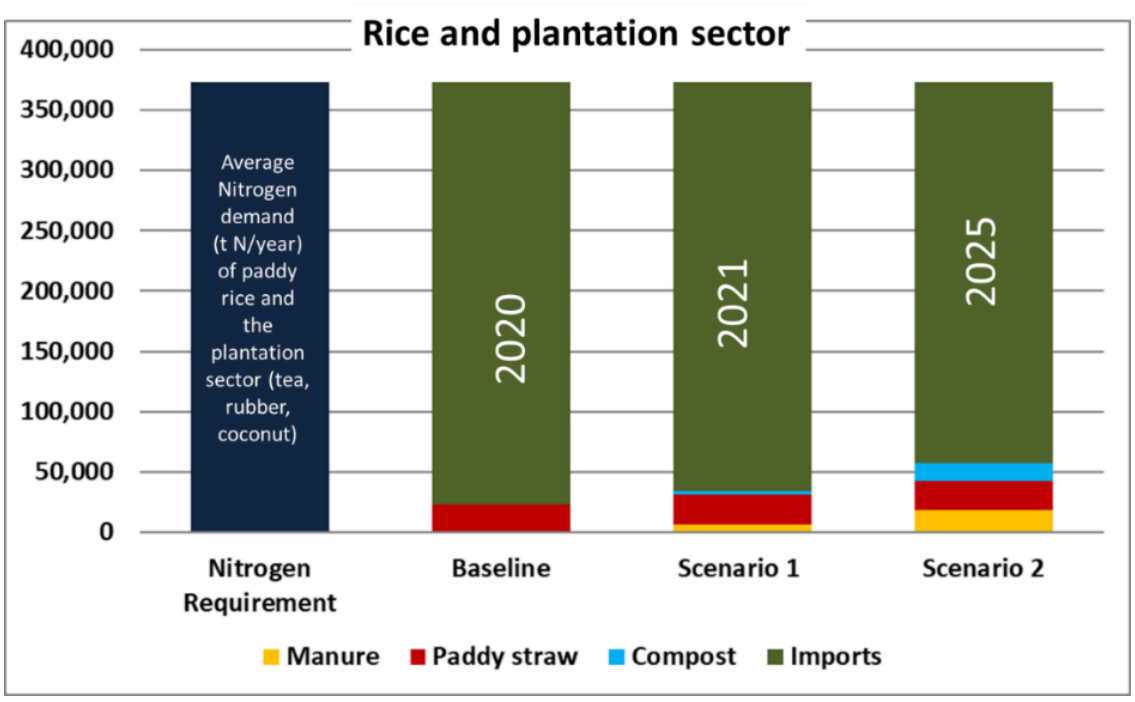

FIGURE 1. Nitrogen demand of paddy rice and the plantation sector under different scenarios.

The cost analysis targeted by **Question 3** showed that acquiring enough imported organic fertilizer would cost the government significantly more than just buying N in urea form. Even in the best scenario, going organic would cost the government more than chemical fertilizer imports before the ban, even if an exporter for organic replacement could be found offering half the price discussed with China and India in 2021. A minor advantage would be that the same organic fertilizer can cover also about 15% of the required Phosphorous (P) and Potassium (K) import.

Conclusions and Outlook

Overuse of agrochemicals, especially where they have been subsidized, is a common environmental challenge in many countries with implications for farm soils and human health (Mateo-Sagasta et al. 2018). In Sri Lanka, the challenge is associated with the extensive occurrence of kidney disease. However, the scientific evidence linking kidney disease to agrochemicals remains inconclusive. Going 100% organic was a visionary act supported by the need for saving hard currency needed to import even more crucial items. After the ban was introduced, the failure to provide organic fertilizer replacements resulted in a 37% drop in rice yields that contributed to the national food crisis. This was exacerbated by a general economic emergency with food inflation rates of up to 90% and food insecurity affecting 30% of

households (Gupta 2022). While there is a general consensus that a step-wise change would have been better for the overall system to adapt, the analysis shows that also in that scenario Sri Lanka would continue to be dependent on fertilizer imports, requiring much larger volumes than with chemical fertilizer and paying significantly more than for those.

The Department of Agriculture is now recommending agrochemical fertilizer and organic fertilizer use at rates of 70% and 30% respectively for paddy rice cultivation (Ministry of Agriculture 2022). The most successful outcome of the ban is that organic fertilizer will now be subsidized. However, after the low-quality compost many farmers saw in 2021 and the general related supply chaos, it will be challenging to persuade them another time to transition from chemical to organic fertilizer.

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