

# Can organic farming practices increase N use efficiency and decrease N losses in tea plantations in Sri Lanka?

Mashita Chiewattanakul<sup>1</sup>, Srimal Rathnayaka<sup>2</sup>, Jananey Balasubramaniam<sup>2,3</sup>, Deepthi Amarasena<sup>3</sup>, Astrid Oberson<sup>1</sup>, Keerthi Mohotti<sup>3</sup>, Janaki Mohotti<sup>2</sup>, Emmanuel Frossard<sup>1</sup>

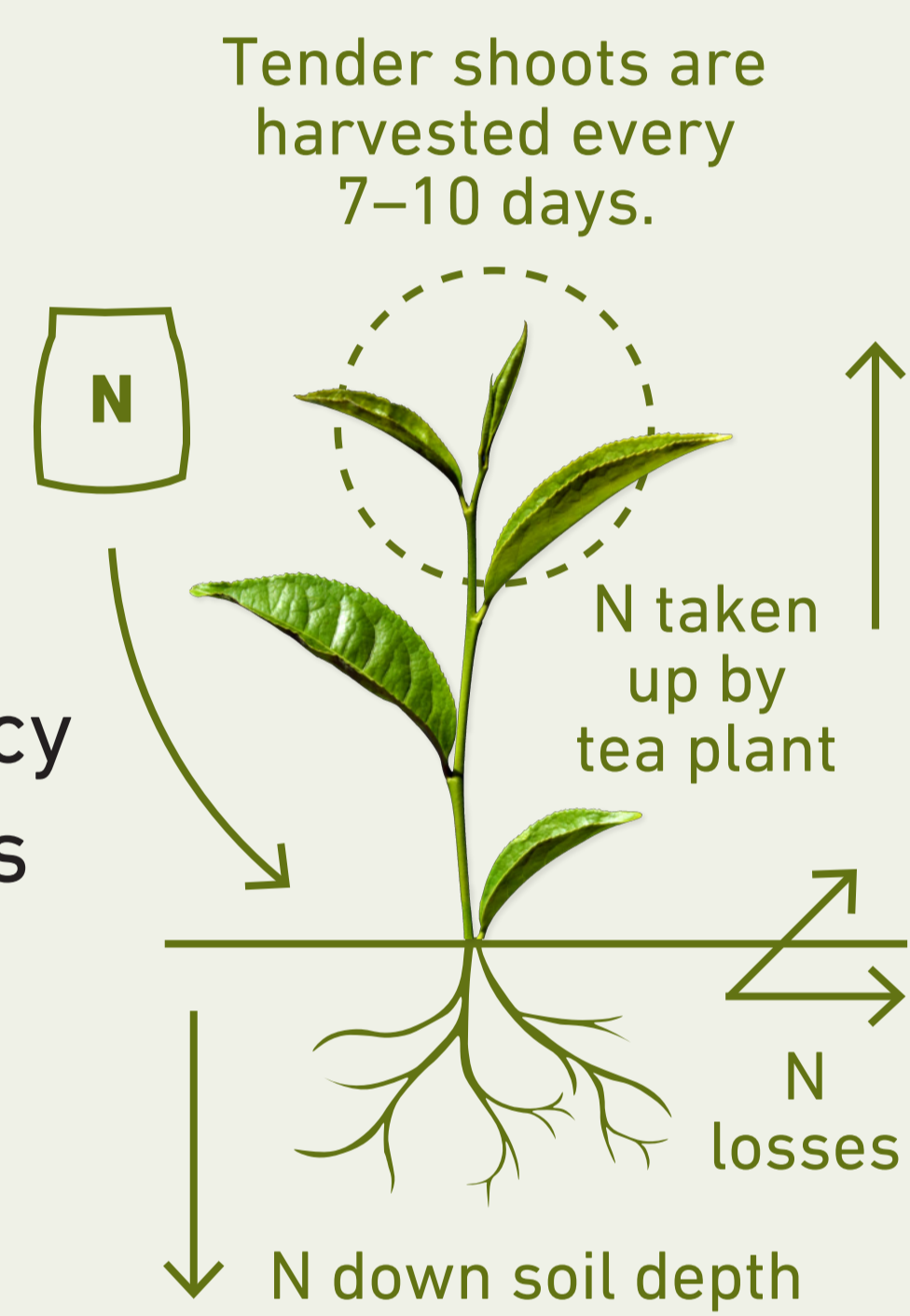
<sup>1</sup>Group of Plant Nutrition, ETH Zurich; <sup>2</sup>University of Peradeniya; <sup>3</sup>Tea Research Institute of Sri Lanka

## 1 Motivation and Method

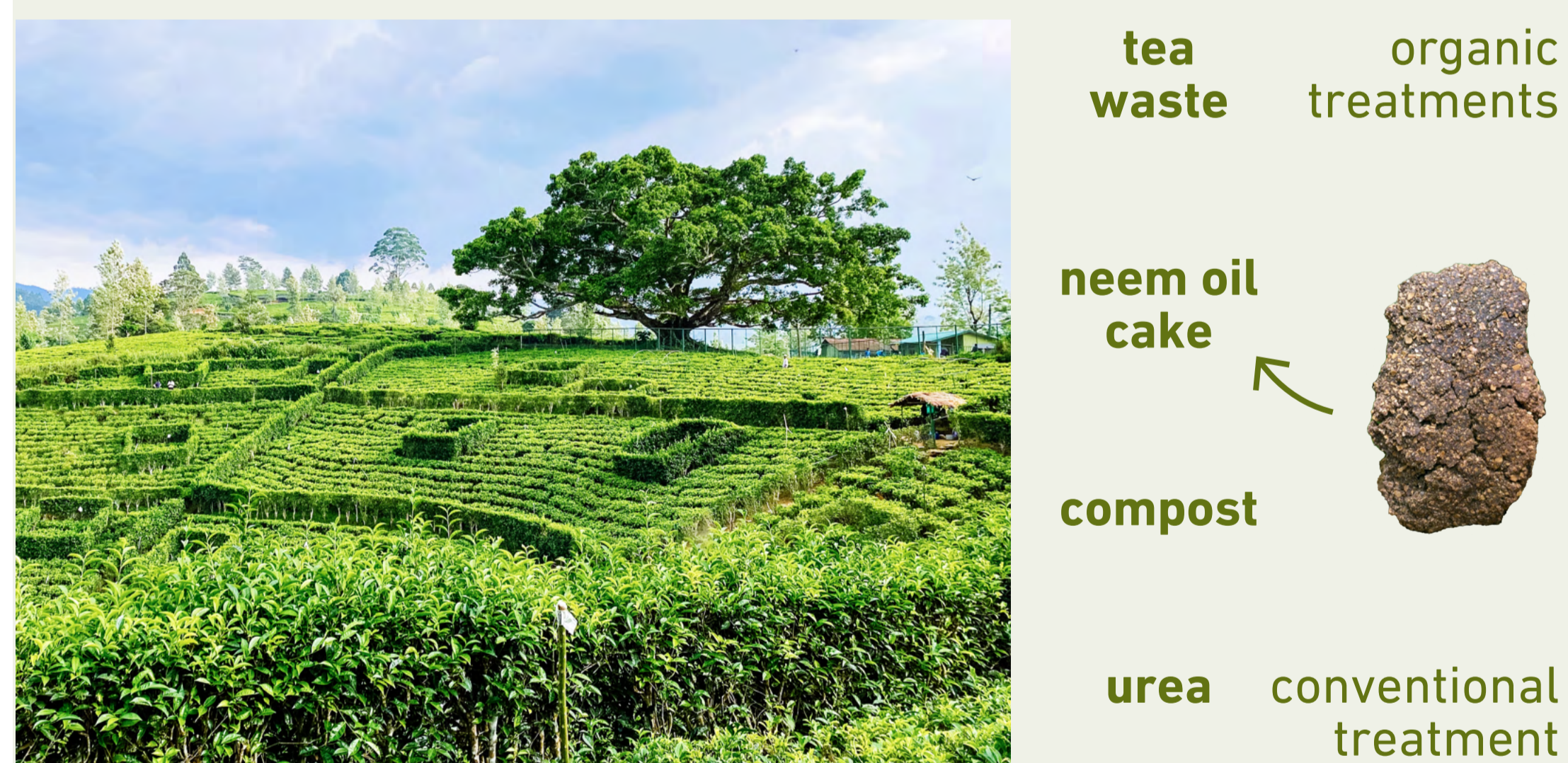
-As the world's most popular manufactured drink, **tea** often receives excess mineral N fertilisers for increased yields – resulting in losses to adjacent environments.

-Organic practices offer an emerging solution, but their effectiveness is yet to be evaluated.

-Improving N use efficiency in tea cultivation systems requires understanding N dynamics in the plant and soil compartments.



To address these gaps, we will investigate the sources and use of N by tea plants and soil in a **long-term trial** in Sri Lanka (TRIORCON, 1996), starting with basic chemical characterisation.



The TRIORCON field trial in Talawakelle, Sri Lanka. (Image: M.Chiewattanakul, January 2022).

## 4 Contribution to Sustainable Food Systems

Improved N management in agriculture can alleviate the harmful impacts of current food systems on our planet. Our work also engages with the **UN Global Campaign on Sustainable Nitrogen Management**, aiming to halve N losses by 2030.

## 2 Preliminary Results

**Natural <sup>15</sup>N abundance** values ( $\delta^{15}\text{N}$ ) in soils and plants tend to reflect N sources and transformation processes in the system.

Table 1. Natural abundance  $\delta^{15}\text{N}$  values of fertiliser inputs and soil at 0-15 cm from the TRIORCON trial. (Brackets are SD; n=4).

Treatment	$\delta^{15}\text{N}$ ‰ fertiliser	$\delta^{15}\text{N}$ ‰ topsoil
Tea waste	2.9 (0.02)	6.8 (0.4)
Neem oil cake	7.9 (0.03)	8.7 (0.2)
Compost	4.3 (0.05)	7.2 (0.3)
Urea	TBD*	7.8 (0.5)
Fallow	-	6.8 (0.0)

\*To be determined.

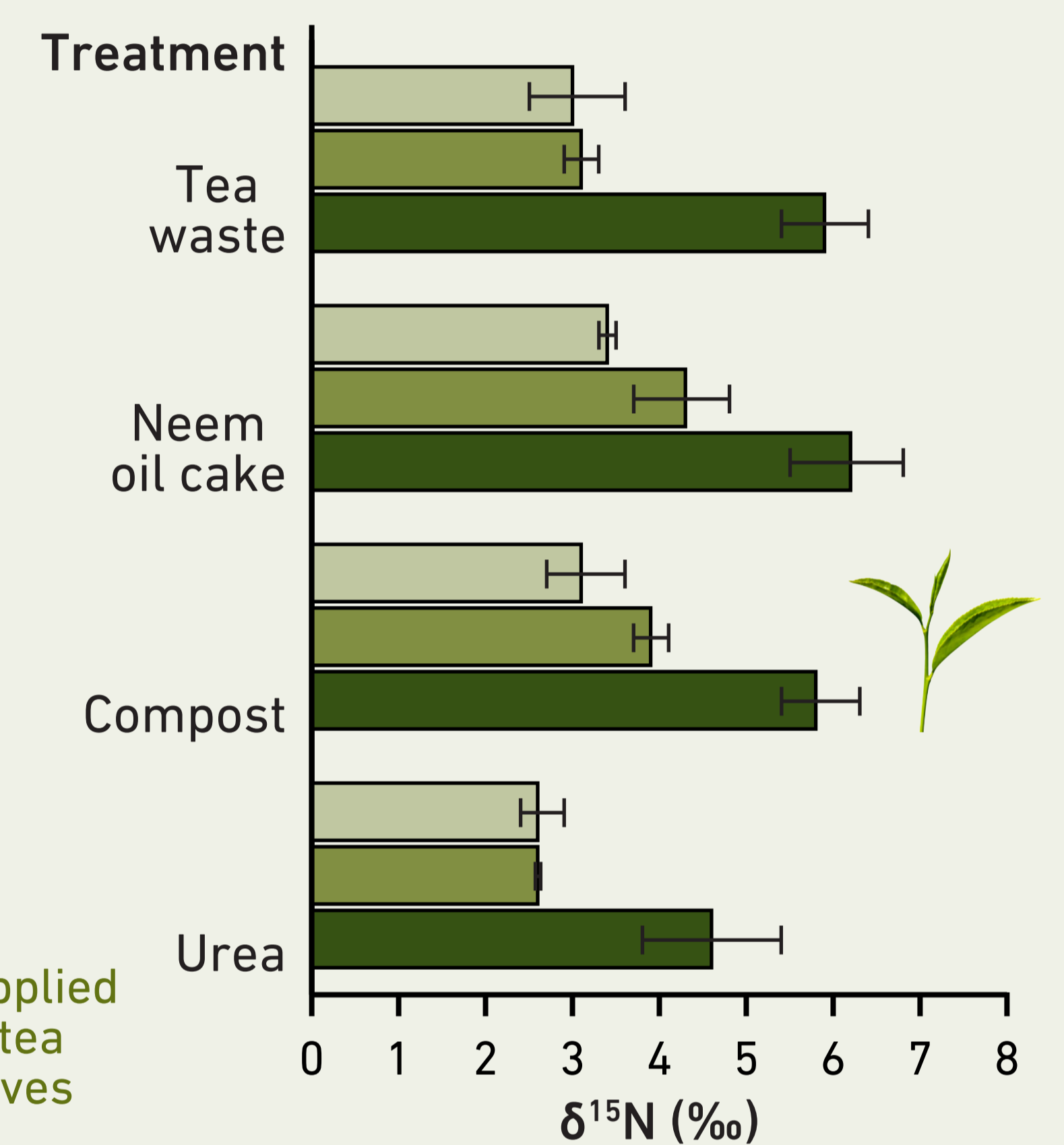
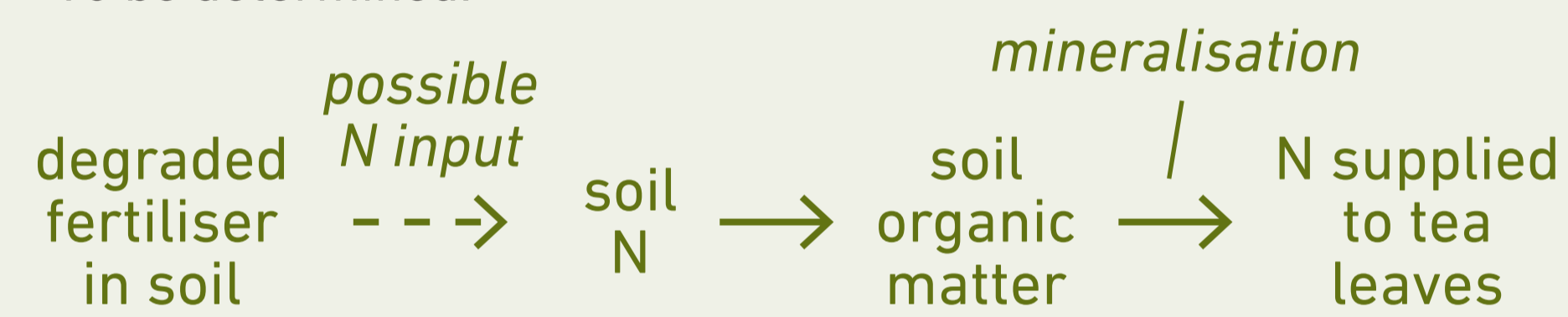


Figure 1. Natural abundance  $\delta^{15}\text{N}$  values of tea leaves from the TRIORCON trial. (Errors are SD; n=4).

□ = leaf litter □ = mature leaves □ = harvested tea shoots

## 3 Conclusion



A tea picker in Sri Lanka. (Image: A. Rathnayake, April 2022).

Soil chemical properties such as natural <sup>15</sup>N abundance help present a baseline study of the site. The **next step** is to explore N fluxes under organic and conventional practices to ultimately inform better N management strategies in tea cultivation.

Our research contributes to at least 6 UN SDGs.

