

Towards Viksit Bharat@2047 Technological Innovations and Policy Options for Eastern Region



ICAR Research Complex for Eastern Region

ICAR Parisar, P.O. Bihar Veterinary College
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Towards Viksit Bharat@2047: Technological Innovations and Policy Options for Eastern Region

Editors: Abhay Kumar, Anup Das, PC Chandran, SS Mali, DK Singh, P Bhavana, Kumari Shubha, Arti kumari and Sarfaraj Ahmad

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The Director,
ICAR-Research Complex for Eastern Region
ICAR Parisar, Patna- 800014, Bihar, India
Ph: +91-0612-2223962, FAX: +91-0612-2223956
E-mail: director.icar-rcer@icar.gov.in
Website: www.icarrcer.icar.gov.in

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Low-Cost Non-Weighing Lysimeter for Assessing Nutrient Leaching Loss

Period of Development: 2018 - 2023

Developers:

SK Naik, SS Mali

Background:

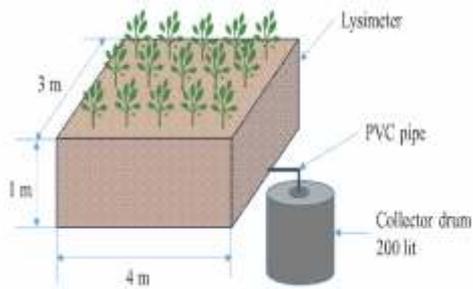
The major fertilizer inputs to agriculture in the form of nitrogen, phosphorus, and potassium applied to the soil, which undergoes series of transformations in soil by different physical, chemical, and biological processes leading to availability to the crops as well as vulnerability to leaching loss. The soils of Jharkhand have typically low levels of N, P, K, organic carbon and suffer from excessive run-off and leaching loss of nutrients. Because of the high permeability of the sandy soil, most of the applied fertilizers are susceptible to leaching loss through infiltrated water. The quantification of leaching loss of nutrients in the acidic soils of the eastern plateau and hill region of India has not been reported or very scanty.

Description of the technology:

The weighing type lysimeter is very cost intensive and is costing about 10 lakhs, which cannot be afforded by academicians, researchers and persons involved in nutrient management. Thus, the present low-cost non-weighing lysimeter (Rs 10000/unit) is developed for quantification of nutrient leaching loss and soil water balance studies. Non-weighing lysimeters were constructed by digging out the pits of size $4.0 \times 3.0 \times 1.0$ m (length \times width \times depth) in the field. Black polythene of 500-micron thickness was used for lining of each lysimeter to avoid inflows and outflows from the lysimeter boundaries. The excavated soils from different depths of 0–15, 15–30, 30–45, 45–60, 60–75, 75–90, and 90–100 cm of the pits were filled up in the lysimeters at their corresponding depths. A 63 mm diameter of PVC pipe was fitted at the bottom of pit to carry the leachate from lysimeter to the collector drum placed inside the collector-trench. Leaching losses of nutrients in winter crops of tomato and pea cultivated in acidic soils of eastern plateau and hill region were studied using non-weighing type lysimeters under different nutrient management practices. The treatment receiving 100% recommended dose of NPK as inorganic form recorded highest N, and K leaching loss of 22.1, 14.8 kg ha⁻¹ in tomato accounting 13.7 and 21.1% of applied fertilizer, while in pea, it was 9.14 and 10.8 kg ha⁻¹, respectively, accounting 20.3 and 20.4% of applied fertilizer.

Impact:

The leaching loss measurement in the developed lysimeter involves low cost and non-weighing type compared to the available lysimeter in the market, which is of weighing type and involves lot of manpower for installing in the field as well as for measurement of leaching loss of nutrients.



Non-weighing lysimeter for quantification of nutrient leaching loss and soil water balance study

Commercial potential:

This technology non-weighing Lysimeter can be outsourced in research organization, agricultural university farm and other non-governmental organization engaged in the quantification of leaching loss of nutrients from the soil and its further mitigation strategies.

Agro-ecoregions suitability:

All over India

Reference

Naik SK, Mali SS, Kumar O, Singh AK, Bhatt BP. 2021. Assessing Nutrient Leaching Loss Using Non-weighing Lysimeters in Acidic Soils of Eastern Plateau and Hill Region of India. *Communications in Soil Science and Plant Analysis*, 52 (9): 1023–1036.