

**Assessment of Environmental Consequence of Nitrogenous Fertilizer Leaching in Farmer Paddy Fields through Grey Water Footprint Concept****Palliyaguru M.P.G.N.M.<sup>1\*</sup>, Navaratne C.M.<sup>2</sup>, Wickramasinghe D.D.<sup>3</sup>, Nanayakkara C.M.<sup>4</sup>**<sup>1</sup>*Sri Lanka Standards Institution, Elvitigala Mawatha, Colombo 08, Sri Lanka*<sup>2</sup>*Department of Agricultural Engineering, Faculty of Agriculture, University of Ruhuna, Sri Lanka*<sup>3</sup>*Department of Zoology, Faculty of Science, University of Colombo, Colombo 07, Sri Lanka*<sup>4</sup>*Department of Plant Science, Faculty of Science, University of Colombo, Sri Lanka**\*nilu.palliyaguru@gmail.com***Abstract**

Rice is one of the important food crop for growing population which demands high levels of nitrogen typically supplied in the form of nitrogen base straight chemical fertilisers. Nitrate which is the most significant and common nitrogen leaching form mainly occurs in paddy cultivation, that leaches below the crop root zone represents economically and environmentally undesirable by directly elevating nitrate levels in shallow ground water in diffuse way. By the way, Grey Water Footprint (GWF) which is a quantitative arithmetic method is favorable in understanding the ecological impact and disastrous way the freshwater gets polluted. This study was designed to quantify the leaching losses of nitrate and grey water footprint. In order to obtain high yield with the availability of excess fertilizer with subsidy, farmers normally do not follow the department recommendation of fertilizer application. Therefore, a field experiment was carried out in a selected farmer paddy field in Kurunegala District, which is one of major paddy cultivation areas in the Low Country Intermediate Zone, Sri Lanka. The leachate from the study plots were collected using non-weighable lysimeter arranged in a randomized block design with three replicates at the upper and lower ends of the site and analyzed for nitrate ( $\text{NO}_3^-$ ) content. Drained water was collected from each lysimeter just below the root zone at 7 to 14 day intervals and analyzed for nitrate content in 2015 and 2016, for four consecutive cropping seasons. The study revealed that the highest concentration of nitrate in leached water was not exceed 12 mg/L which is below the threshold value of drinking water, 50 mg/L (as  $\text{NO}_3^-$ ). The quantified leached nitrate amount 3 kg/ha for each cropping season represent the 3% of total applied nitrogen without showing statistical significant differences. Though Nitrate leached from paddy cultivation in the given settings did not exceed the maximum permissible level, it contributes the considerable amount of leaching losses of nitrogen to the shallow ground water in diffuse way. The quantified leaching run-off fraction of 0.15424 value related fertilizer induced Grey water footprint values were 209 and 191  $\text{m}^3/\text{ton}$  for 2015 and 2016 correspondingly. The GWF values emphasize that if leached water itself from paddy fields to be contaminated with the water resources without adding above said amount of fresh water to the leached water to assimilate pollutants, it would be adversely affected to the nearby water resources.

**Keywords:** Grey water footprint, Paddy, Nitrate leaching**Acknowledgement:** Rice Research and Development Institute and Coconut Development Authority.