

**IDENTIFY SUITABLE SUBSTITUTES FOR CALCIUM
NITRATE USAGE IN COIR SUBSTRATE INDUSTRY**

A dissertation submitted to the
Faculty of Animal Science and Export Agriculture
Uva Wellassa University

In partial fulfilment of the requirements for the award of
Bachelor of Science in Palm & Latex Technology and Value Addition

By

GAMAGE SEWWANDI KANCHANA

Palm & Latex Technology and Value Addition Degree Programme

Faculty of Animal Science and Export Agriculture

Uva Wellassa University of Sri Lanka

2021

ABSTRACT

Coco-peat based soilless plant growing substrates are with a high demand in agricultural sector around the world. To improve the fertility, buffering coco-peat is a practice prior to growing media preparation. Calcium nitrate is used as the buffering agent but it has been identified illegal to be used due to its negative effects on natural environment. Buffering adjusts the sodium, potassium, calcium ion concentrations through cation exchange capacity of coco-peat. Industries use 10 kg of Calcium nitrate for 1 ton of coco-peat. Objective of the present study was to identify suitable substitutes for Calcium nitrate usage in coir substrate industry. Based on a literature survey, Calcium carbonate, Calcium oxalate, Calcium citrate and Calcium bicarbonate were selected as the chemicals to be tested in buffering coco-peat. 1 kg of coco-peat was used for each trial. A series of 200 ml and 250 ml solutions were prepared using 10 g, 20 g, and 30 g of each. Control samples were treated with 200 ml and 250 ml solutions prepared with 10 g of Calcium nitrate. EDTA titrations and Flame Photometer analysis were used to identify calcium ion concentrations of buffered coco-peat. Mean calcium ion concentration of control samples was (1.03 ± 0.0168) % and mean pH was 6.485 ± 0.115 . Mean of EC was (1480 ± 0.051) mS/cm. Based on calcium ion concentrations, Calcium citrate and Calcium oxalate were identified with a mean calcium concentration near (1.03 ± 0.0168) %. pH values were beyond the pH of control samples. Mean EC values of samples treated with Calcium citrate and Calcium oxalate were (1600 ± 0.120) mS/cm and (1593 ± 0.1401) mS/cm respectively. Among the set of chemicals, a significant cost difference was not identified between Calcium nitrate and Calcium citrate. Overall results revealed that, further studies on the use of Calcium citrate as a buffering agent is required prior to substituting with Calcium nitrate. Moreover, further studies are required to use the natural resources which contain Calcium citrate to increase the efficacy of buffering coco-peat in an eco-friendly manner.

Keywords: Buffering, Calcium citrate, Calcium nitrate, Calcium oxalate, Coco-peat, Soilless plant growing media