International Journal of Botany Studies
www.botanyjournals.com
ISSN: 2455-541X
Received: 09-11-2021, Accepted: 25-11-2021, Published: 10-12-2021
Volume 6, Issue 6, 2021, Page No. 895-897

Studies on the effect of feather degraded soil on the minerals and vitamins content of *Centella asiatica* L

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Abstract
Centella asiatica L. (Vallarai) is a nutritionally important plant and a valued traditional medicine in South East Asia. In this study, the vitamins A, C and B6 and mineral composition like Calcium, Magnesium, Iron, Phosphorus and Sodium in *Centella asiatica* were analysed. Vitamin A was high in 75mg (MIRR 3) degraded feather treated soil which are cultivated in *C. asiatica* 0.35±0.08mg/100g. Vitamin C was highly found in 75mg (MIRR 3) degraded feather treated soil with plant 0.73±0.55mg/100g found to be recorded respectively. Vitamin B6 was observed in maximum from 75mg degraded feather treated soil on the cultivated *C. asiatica* 0.73±19.1mg/100g quantity represented. The Mineral content of calcium was found in maximum in the MIRR 3 (22.5±0.84mg/100g), Magnesium was found maximum in MIRR 3 (3.05±0.06mg/100g), Iron was maximum in MIRR3 (0.19±0.07mg/100g), phosphorus was high in MIRR 3 (2.94±0.05mg/100g) and Sodium was high in MIRR 3 (8.35±0.38mg/100g). Treated soil cultivated in *Centella asiatica* compared found to be observed respectively.

Keywords: feather degraded soil, *Centella asiatica*, concentration of feather, vitamins and minerals

Introduction
Over two millennia ago, the father of medicine, Hippocrates, mentioned about 400 medicinal plants and advocated "Let food be your medicine and medicine be your food". Medicinal usage may constitute the most common human use of biodiversity (Anonymous, 2002) [4].
Consumers are paying more attention to proper nutrition and the health effect of food. The green leafy vegetables (GLVs) make up a great portion of this diet and play a vital role to ensure food security and fulfill daily needs. The growing interest in GLVs is mainly due to health benefits associated with bioactive nutrients such as minerals, vitamins especially antioxidant vitamins (vitamins A, C and E), dietary fibers, and non-nutritive phytochemicals (Septembre *et al.*, 2018) [13].
Plants have been used for medicinal purposes long before prehistoric period. Plants are used both by traditional herbalists and pharmacists for synthetic preparations in the pharmaceutical industries management and treatments of different diseases that affect man and animals. *Centella asiatica* is commonly known for its medicinal and nutritional values throughout the world. The medicinal properties of *Centella* root, leaf and other parts of the plant are also well known in traditional system of medicine (Jyoti *et al.*, 2016),. It is consumed in the form of Green Leafy Vegetables (GLVs) and in the preparation of juice, drink, and other food products. It is also known to contain vitamins B and C, proteins, important minerals, and some other phytonutrients (Udumalagala *et al.*, 2015) [14].

Materials and Methods
Degraded feather
Degraded feathers (fertilizer) were purchased from Indian Biotrack Research Institute, Thanjavur, Tamil Nadu.

Plantation of *Centella asiatica* (Anjana and Pramod, 2009) [3]
Several plant cuttings of randomly sampled individual plants of *C. asiatica* were collected from Indian Biotrack Research Institute Garden, Karuvakurichi, Mannargudi. The cuttings of plantlets were more or less uniform size containing four leave condition were planted in earthen shallow pots in greenhouse conditions.
Ten plants for each treatment were planted separately for experiment. Planting was done in September 2021 and sufficient amount of water was provided for irrigation purpose for each treatment. All pots and treatments were rotated each week to counter any positional effects of pots within treatments.

Soil treatment (Nurfatiha *et al.*, 2018) [11]
The soil was treated by degraded feather with different concentration such as 25, 50, 75mg and untreated soil was considered as a control.
Control: Soil only
MIRR 1: Soil 1kg / Degraded feather 25mg
MIRR 2: Soil 1kg / Degraded feather 50mg
MIRR 3: Soil 1kg / Degraded feather 75mg
Vitamin and mineral Analysis (Xu *et al.*, 2021) [16]

The amount of vitamin A was determined using ultra performance liquid chromatography (UPLC) method by described Wang *et al*., (2005) [15], Vitamin C was followed by method of Achi *et al.,* (2017) [1] and vitamin B6 was estimated by AOAC, (2010) [5] method. The minerals determined such as calcium, magnesium, iron, phosphorus and sodium were determined by the method described by Carpenter and Hendricks, (2003) [7].

Table 1: Effect of degraded feather on the growth and development of *C. asiatica* and its analysis of vitamins

Vitamins	Quantity (mg/100g)			
	Control	MIRR 1	MIRR 2	MIRR 3
A	0.29±0.05	0.32±0.07	0.31±0.01	0.35±0.08
E	-	-	-	-
C	0.67±0.21	0.68±0.03	0.71±0.11	0.73±0.55
B1	-	-	-	-
B6	0.68±0.00	0.71±0.87	0.69±0.35	0.73±19.1

The values are expressed with mean±standard deviation

Table 2: Effect of degraded feather on the growth and development of *C. asiatica* and its analysis of minerals

Minerals	Quantity (mg/100g)			
	Control	MIRR 1	MIRR 2	MIRR 3
Calcium	21.1±0.03	21.9±0.08	22.1±0.11	22.5±0.84
Magnesium	2.88±0.01	2.98±0.07	2.94±0.00	3.05±0.06
Iron	0.17±0.08	0.18±0.04	0.18±0.01	0.19±0.07
Phosphorus	2.67±0.24	2.53±0.01	2.74±0.33	2.94±0.05
Sodium	7.48±0.03	7.89±0.11	8.05±0.14	8.35±0.38

The values are expressed with mean±standard deviation

Result and Discussion

In the present investigation was revealed that the following results from the *Centella asiatica*. In this study aimed the vitamin and mineral contents of the experimental plant.

The vitamins like A, E, C, B1 and B6 were analysed from *Centella asiatica* leaf and observed vitamin A, C and B6 in each concentration of degraded feather treated and untreated pots.

Vitamin A was quantified as followed 0.29±0.05mg in control, 0.32±0.07mg in MIRR 1, 0.31±0.01mg in MIRR2 and 0.35±0.08 mg in MIRR3 were recorded. Vitamin C was quantitatively and followed by 0.67±0.21mg in control, 0.68±0.03mg in MIRR1, 0.71±0.11mg in MIRR2 and 0.73±0.55mg MIRR3 recorded and vitamin B6 was analysed and quantitatively and followed by 0.68±0.00mg in control, 0.71±0.87mg in MIRR1, 0.69±0.35mg in MIRR2 and 0.73±19.1mg in MIRR3 was recorded respectively (Table – 1).

Mineral contents were estimated in each untreated and treated plant of *Centella asiatica.* The mineral contents was estimated this plant sample such as calcium, magnesium, iron, phosphorus and sodium. The calcium content of *C. asiatica* leaf was (21.1±0.03mg), MIRR1 (21.9±0.08mg), MIRR2 (22.1±0.11mg) and MIRR3 (22.5±0.84mg) recorded respectively. The magnesium was observed followed the control (2.88±0.01mg), MIRR1 (2.98±0.07mg), MIRR2 (2.94±0.00mg) and MIRR3 (3.05±0.06mg) recorded. The Iron content of each samples was control (0.17±0.08mg), MIRR 1 (0.18±0.04mg), MIRR 2 (0.18±0.01mg) and MIRR 3 (0.19±0.07mg) recorded. The phosphorus content may have control (2.67±0.24mg), MIRR 1 (2.53±0.01mg), MIRR 2 (2.74±0.33mg) and MIRR 3 (2.94±0.05mg) recorded. The sodium has in control (7.48±0.03mg), MIRR 1 (7.89±0.11mg), MIRR 2 (8.05±0.14g) and MIRR 3 (8.35±0.38mg) was recorded respective plant materials.

Ajayi *et al.,* (2020) [2], studied that the *Centella asiatica* leaf meal contains appreciable quantity of calcium, magnesium, iron, phosphorus and sodium. Vitamins A, C and B6 are readily available in the leaf meal while E and B1 are not available. Ranovona *et al.,* (2019) [12] reported the eaves of *C. asiatica* have low vitamin C content. Consumption of 100 g of *C. asiatica* leaves could cover 10 to 21 % of vitamin A was observed. Chandrika *et al.,* (2011) [8], stated that the imported variety *Centella asiatica* had significantly higher content of iron content (74.3 ± 34.1 mg/100 g dry weight) was noted in the results of the plant. Hashim *et al.,* (2011) [9], reported that the *Centella asiatica have* rich in the content of vitamins: vitamin C (7 mg/100 g), vitamin A (738 IU), vitamin B1 (0.09 mg/100 g) was estimated in the respective method. Belwal *et al.,* (2019) [6], studied that the minerals such as Ca (171 mg/100 g), P (32 mg/100 g), K (468.59 mg/100 g) and Fe (5.6 mg/100g) was analysed..

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