

## Biometabolites of Wild Variety of *Coccinia grandis* (L) Voigt: An Ethno Claimed Plant of North East India

Gunamoni Das\*<sup>1</sup>

Received: 05 Jan 2021 | Revised accepted: 22 Feb 2021 | Published online: 10 Mar 2021

© CARAS (Centre for Advanced Research in Agricultural Sciences) 2021

### ABSTRACT

Present study was carried out to investigate the important biometabolites present in the wild variety of *Coccinia grandis* (L) Voigt. from North East India. Powdered leaves and fresh fruits were extracted using methanol and distilled water. The methanolic extracts and water extract of leaves and fruits were taken for biochemical analysis. Laboratory investigation was carried out to know the important biometabolites available in the wild variety of *Coccinia grandis* such as proteins, alkaloids, flavonoids, phenolic glycosides and reducing sugar etc. The Biometabolites in water extracts was higher in contents than the methanolic extracts. The protein and alkaloids contents were found maximum in the methanolic extracts of young leaves and mature leaves than the water extracts. But the contents of phenol, reducing sugar and flavanoids were higher in concentration in the water extracts of young leaves of wild variety of *Coccinia grandis* than the methanolic extracts. The result shows that the wild variety of *Coccinia grandis* is an important source of various biometabolites and has a very high nutritional value.

**Key words:** Biometabolites, Conservation, Ethnomedicine, North East India, Wild variety

North East India is well known for its rich biodiversity and home of majority of ethnic inhabitant in India. There are numerous ethnomedicinal plants are reported to be useful in the treatment and management of various ailments from this region. Ethnic inhabitants of this region have been traditionally practicing medical plants and curing many human and animal diseases without the intervention of today's modern medicine in their traditional healing system [1]. *Coccinia grandis* is a very important medicinal plant belongs to the family Cucurbitaceae which is used in the treatment of diabetes, practiced by the traditional healers of this region. They also used this plant in their herbal formulations for the treatment of liver disorder, anemia, jaundice and normal cough and fever [2]. The young leaves along with leaf tendrils and unripe green fruits of the wild variety of *Coccinia grandis* are taken as vegetables by the local people of this region. Documentation and scientific study of such indigenous knowledge is highly required to solve many unaware diseases cost effectively.

*Coccinia* is the 11<sup>th</sup> largest genus of the Cucurbitaceae comprises 25 biological species. *Coccinia grandis* (Fig 1) is a diocious perennial aggressive creeper with soft stem and fleshy leaves and very fast growing that cover small trees and shrubs in a very short period of time [3]. It can spread by seeds or vegetatively. Domestication of *Coccinia grandis* is in an early stage in North east India, the ethnic people use to

collect the leafy vegetables and unripe green fruits from the wild. There are some studies that suggest a high potential for the use of *Coccinia grandis* leaf extracts in the treatment of diabetes. The plant is indigenous to North East India and other parts of India. The Wild variety of *Coccinia grandis* commonly known as Ivy gourd distributes in Saudi Arabia, Senegal, Yemen, Moutitus and many subtropical and tropical regions including India [4].

The plant is locally known as Telakuccha or Kundali which is available in the wild form in the rainy season all-over North-East India. The leaves are 5-10 cm, long and broad, young leaves are bright green in color and it becomes darker with the time of maturity [5]. Leaves are 5-lobed in structure and the lobes are broad with ling petioles sized 2-3 cm long. The flowers are large and white in colour [6]. The female flower (Fig 3) composed of three rudimentary stamens surrounding the three fused carpels with an long fusiform inferior ovary and the male flower (Fig 4) consist of three convoluted (bithecous) stamens. The fruits are many-seeded berries (Fig 2) and 5.5 com long and 2.5 cm diameter. Unripe fruits are light to dark green in colour and mature fruits are deep red in colors (Fig 5) when fully ripe [7]. Seeds (Fig 6) are flattened and 5-6 mm long. *Coccinia grandis* is extensively used in the Indian system of medicines like Ayurveda and Unani [8]. The plant is considered as refrigerant and astringent. The infusion of leaves is applied on the patient body to relieve from fever and also used in the treatment of ear pain by the traditional healers of North east India. Antioxidant activity of the fruits in diet may be useful as home base remedies.

\*Gunamoni Das

gunamoni09@gmail.com

<sup>1</sup>Department of Botany, Assam Down Town University, Panikhaiti, Guwahati - 781 026, Assam, India

### MATERIALS AND METHODS

Fig 1 Wild *Coccinia grandis*

Fig 2 Young fruits



Fig 3 Female flower



Fig 4 Male flower



Fig 5 Ripen fruits



Fig 6 Seeds

#### Collection and identification of *Coccinia grandis*

The leaves and fruits of wild *Coccinia grandis* were collected from the different forest areas of North East India and were confirmed by the taxonomist from Botany Department of Assam Down Town University.

#### Extraction of leaves and fruits of wild *Coccinia grandis*

The collected fresh leaves of wild variety of *Coccinia grandis* were air dried properly in the shade beds. The dry leaves were ground in a grinder into a fine powder. These powder leaves were used for further experiment. Two methods are used to prepare leaves extracts.

In the first method 500 gram of air leaf power soaked in methanol (5 Litre) at normal room temperature. Methanolic extracts were prepared and concentrated using rotary evaporator at 45°C. The crude methanolic extract were used for further investigation [9]. The yield of extract was 24.02% for the wild variety of *Coccinia grandis*.

In the second method 500 grams of dried powdered leaves soaked in distilled water and boiled at 100°C for 3 hours to prepare an initial extract and kept for cooling to room temperature. After that the extract was filtered using conical flask and filter paper. After that the extract was lyophilized in a low temperature and preserved at 20°C for further use [10]. The yield of aqueous extract was 13.84% for wild variety of *Coccinia grandis*.

Fresh green fruits of wild variety of *Coccinia grandis* were collected and washed properly with the application of double distilled water. The methanolic extracts of fruit and water extract were prepared and were taken for biochemical analysis.

Laboratory investigation were carried out to know the biometabolites available in the wild variety of *C. grandis* by boiling the crude methanolic extracts and aqueous extracts for 3 hours to estimate the presence of: proteins, alkaloids, flavonoids, phenolic glycosides and reducing sugar etc.

1. Determination of total protein concentration in the different extracts was evaluated by Folin-Lowry method [11]. Total soluble proteins were estimated using 1 gram fresh grinded leaves with 10 ml extraction buffer (0.5 M Tris pH 6.8, 10% SDS) [12]. The extracts were centrifuged for 10 minutes at 4°C at 10,000 rpm and the material was applied for SDS-Page analysis.

2. Determination of alkaloids concentration was performed according to the procedure of [13]. 1 ml of leaves extracts was taken and added 2 ml of diluted hydrochloric acid. Then five drops of Wagner's reagent were added to 1ml of the previous solution and shaken properly after addition of each drop and kept carefully and precipitation formed in the solution showed the presence of alkaloids.

3. Determination of flavonoids was conducted according to the procedure of [13]. 1 ml of leaves extract was soaked in 1% hydrochloric acid overnight and filtered then added 10% sodium hydroxide solution to the filtrate, the occurrence of yellow color proved the presence of flavonoids.

4. Determination of phenol was carried out according to [13]. A few drops of concentrated sulfuric acid were added to 1ml of leaves extract and fruit extract, immediately the solution turned into red in color and when water added the red colour disappeared.

5. *Determination of reducing sugars:* The carbohydrate content in the different extracts was carried out by Anthrone method [14]. The carbohydrate content was expressed as mg/g of the sample as calculated from sucrose standard graph.

## RESULTS AND DISCUSSION

The results of biochemical tests of methanolic extracts and crude water extracts of leaves and fruits were mentioned

in the (Table 1-2). The Biometabolites in both the extracts were rich in protein, flavonoids, alkaloids, reducing sugar and phenol within the limit. Comparative study on alkaloids (Fig 7), phenol (Fig 8), protein (Fig 9), sugar (Fig 10), and flavonoids (Fig 11) of methanolic extracts of young leaves, mature leaves, young shoots and fruits were carried out for the wild variety of *Coccinia grandis*. Again, comparative study on alkaloids (Fig 13), phenol (Fig 14), protein (Fig 15), sugar (Fig 16) and flavonoids (Fig 17) of water extracts of young

leaves, mature leaves, young shoots and fruits were carried out for the wild variety of *Coccinia grandis*. The Biometabolites in water extracts was higher in contents than the methanolic extracts. The protein and alkaloids contents were found maximum in the methanolic extracts (Fig 12) of young leaves and mature leaves than the water extracts [15]. But the contents of phenol, reducing sugar and flavonoids were higher in concentration in the water extracts (Fig 18) of young leaves of wild variety of *C. grandis* than the methanolic extracts [16].

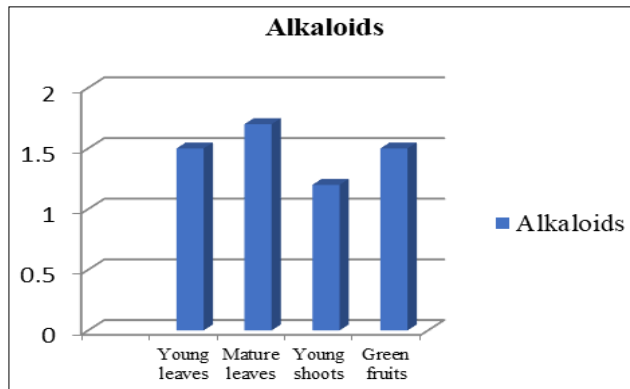


Fig 7 Comparative concentration of alkaloids in different methanolic extracts of *Coccinia grandis*

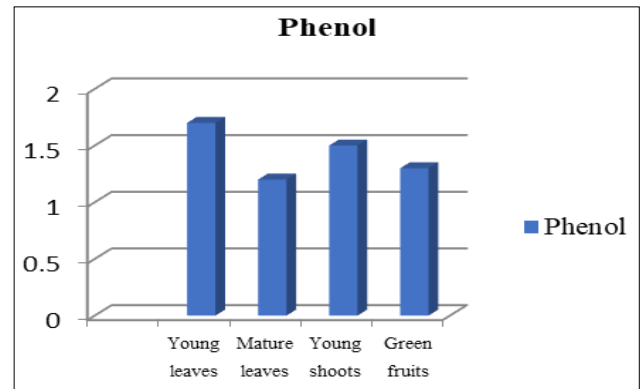


Fig 8 Comparative concentration of phenols in different methanolic extracts of *Coccinia grandis*

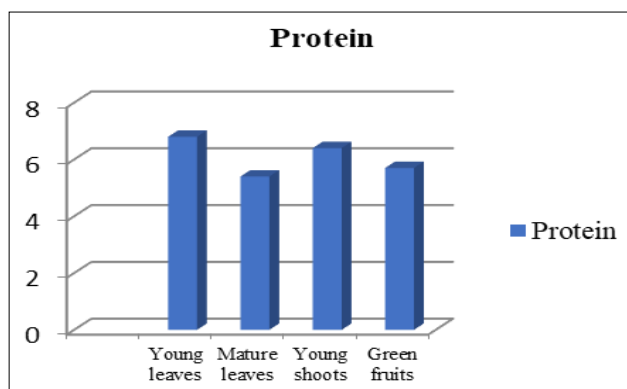


Fig 9 Comparative concentration of proteins in different methanolic extracts of *Coccinia grandis*

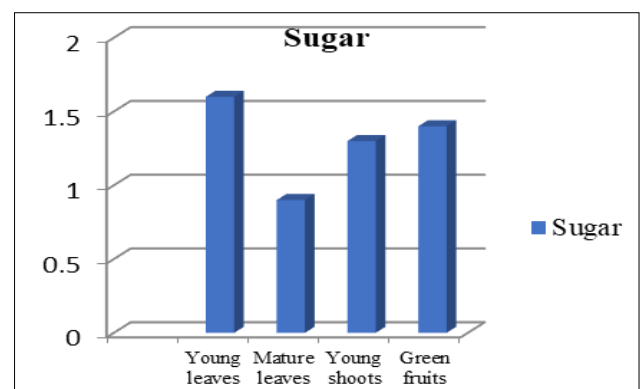


Fig 10 Comparative concentration of sugar in different methanolic extracts of *Coccinia grandis*

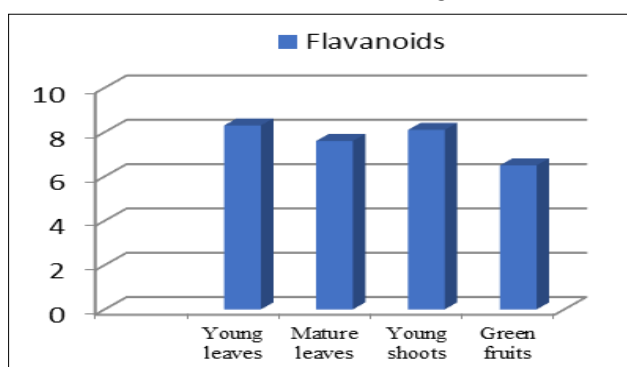


Fig 11 Comparative concentration of flavanoids in different methanolic extracts of *Coccinia grandis*

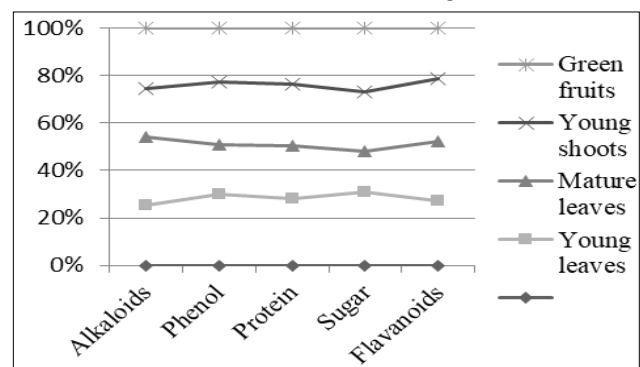
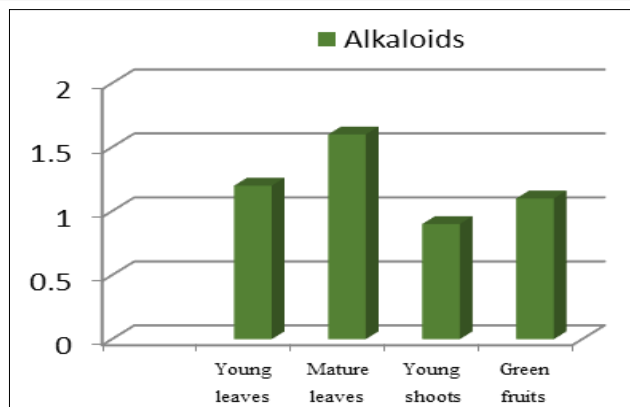
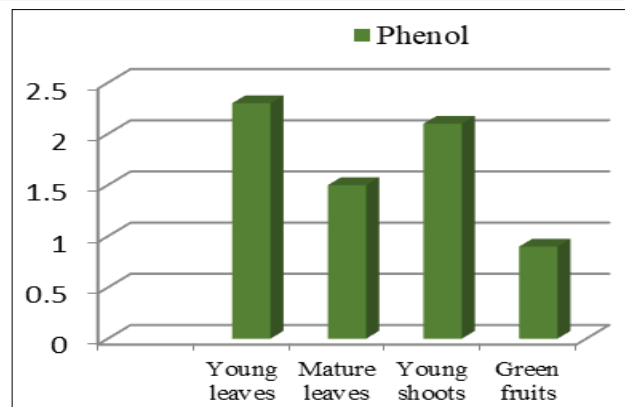
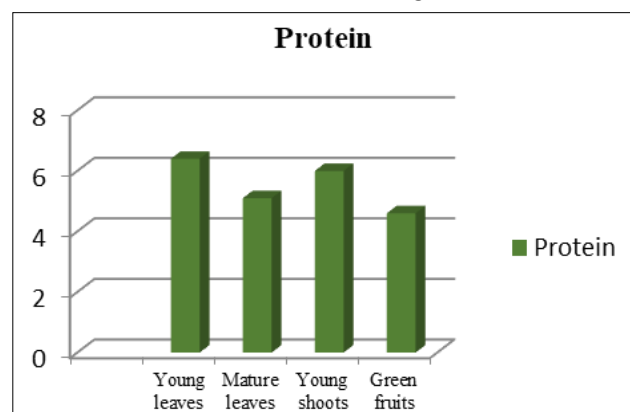
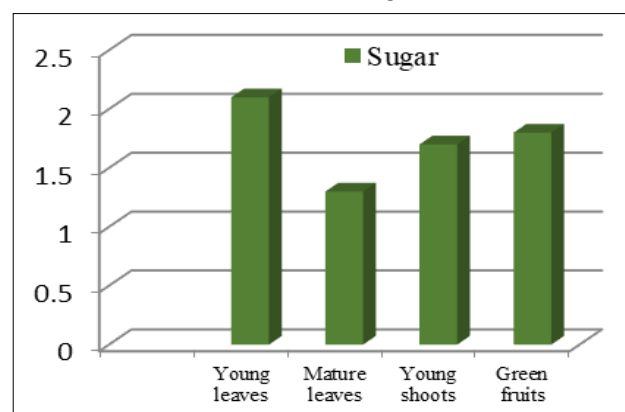
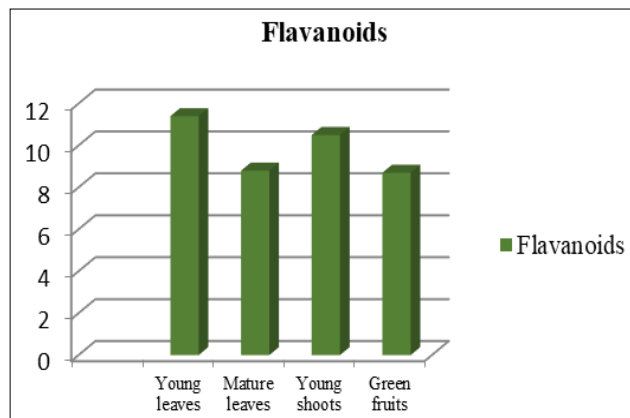
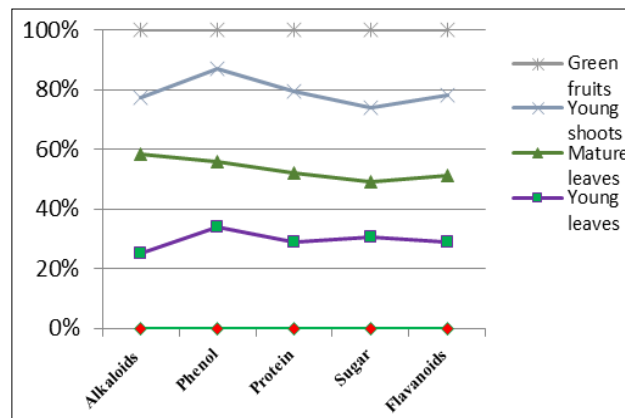


Fig 12 Concentration of various biometabolites in different methanolic extracts of *Coccinia grandis*

Table 1 Quantitative amount of biometabolites found in wild variety of *Coccinia grandis* (Methanol Extracts)

Sample used	Biochemical parameters				
	Alkaloids (g% W/V)	Phenol (mg/g)	Protein (mg/g)	Reducing sugar (mg/g)	Flavanoids (mg/g)
Young leaves	1.5	1.7	6.8	1.6	8.3
Mature leaves	1.7	1.2	5.4	0.9	7.6
Young shoots	1.2	1.5	6.4	1.3	8.1
Green fruits	1.5	1.3	5.7	1.4	6.5

All the values are Mean  $\pm$  SD (n = 3)

Fig 13 Comparative concentration of flavonoids in different water extracts of *Coccinia grandis*Fig 14 Comparative concentration of phenol in different water extracts of *Coccinia grandis*Fig 15 Comparative concentration of protein in different water extracts of *Coccinia grandis*Fig 16 Comparative concentration of sugar in different water extracts of *Coccinia grandis*Fig 17 Comparative concentration of flavonoids in different water extracts of *Coccinia grandis*Fig 18 Concentration of various Biometabolites in different water extracts of *Coccinia grandis*Table 2 Quantitative amount of biometabolites found in wild variety of *Coccinia grandis* (Water Extract)

Sample used water extract	Biochemical parameters (mg/g)				
	Alkaloids (g % W/V)	Phenol (mg/g)	Protein (mg/g)	Reducing sugar (mg/g)	Flavonoids (mg/g)
Young leaves	1.2	2.3	6.4	2.1	11.4
Mature leaves	1.6	1.5	5.1	1.3	8.8
Young shoots	0.9	2.1	6.0	1.7	10.5
Green fruits	1.1	0.9	4.6	1.8	8.7

All the values are Mean  $\pm$  SD (n = 3)

## CONCLUSIONS

From this study it can be concluded that the wild variety of *Coccinia grandis* is an important source of various biometabolites which are of great use in the context of

nutritional value and medicinal properties. The study has revealed that the young leaves and green fruits can be used as dietary supplement as well as pharmaceutical agent for its various uses in the traditional healing system. So, detailed biochemical study and further clinical investigations are



required on the ethnobotanical aspects for the promotion of traditional herbal medicines for the welfare of mankind.

Laboratory, AYUSH, Govt. of Assam and Govt. Ayurvedic College, for providing necessary laboratory facilities for carrying out this research work.

#### Acknowledgements

Author is grateful to Assam down town University, Panikhaiti, Guwahati, Assam and State Drug Testing

#### Conflict of Interest

The author declare that there is no conflict of interest.

### LITERATURE CITED

1. Singh S, Arpita G, Sunita S. 2014. *Coccinia grandis* (L.) Voigt: A chemo profile study. *Bionano Frontier* 7(2): 108-113.
2. Chatterjee A, Chatterjee S. 2012. Proximate analysis, phytochemical screening and anti-inflammatory activity of *Coccinia indica*. *International Journal of Pharmaceutical, Chemical and Biological Sciences* 2: 299-304.
3. Chhetri HP, Yogol NS, Sherchan J, Anupa KC, Mansoor S, Thapa P. 2008. Phytochemical and antimicrobial evaluations of some medicinal plants of Nepal. *Kathmandu University Journal of Science, Engineering and Technology* 1: 49-54.
4. Chun ME. 2001. Biology and host specificity of *Mellita oedipus* (Lepidoptera: Sesiidae), a biological control agent of *Coccinia grandis* (Cucurbitaceae). *Proceedings of the Hawaiian Entomological Society* 35: 85-93.
5. Elamathi M, Ilyas MHM. 2012. Qualitative analysis of phytochemicals of *cephalandra indica* naudin leaves. *Pharmacie Globale* 3: 1-3.
6. Hussain A, Wahab S, Rizvi A, Hussain MS. 2011. Macroscopical, anatomical and physiochemical studies on leaves of *Coccinia indica* Wight & Arn., growing wildly in eastern Uttar Pradesh region of India. *Indian Journal of Natural Products and Resources* 2: 74-80.
7. Prakash K, Pandey A, Radhamani J, Bisht IS. 2013. Morphological variability in cultivated and wild species of *Luffa* (Cucurbitaceae) from India. *Genetic Resources and Crop Evolution* 60: 2319- 2329.
8. Sateesh SL, Murugan K. 2011. Antimicrobial activity of protease inhibitor from leaves of *Coccinia grandis* (L.) Voigt. *Indian Journal of Experimental Biology* 49: 366-374.
9. El-Khateeb AY, Azzaz NA, Mahmoud HI. 2014. Phytochemical constituents, hypoglycemic and haematological effects of methanolic *Acalypha wilkesiana* leaves extract on streptozotocin-induced diabetic rats. *European Journal of Chemistry* 5(3): 430-438.
10. Kim JH, Cho A, Yin H, Schafer DA, Mouneimne G, Simpson KJ, Montell DJ. 2011. Psidin, a conserved protein that regulates protrusion dynamics and cell migration. *Genes and Development* 25(7): 730-741.
11. Lowry OH, Rosebrough NJ, Farr AL, Randall RJ. 1951. Protein measurement with the Folin phenol reagent. *Journal of Biological Chemistry* 193: 265-275.
12. El-Adl AM, Abd El-Hadi AH, Fathy HM, Abdein MA. 2012. Molecular genetic evaluation of seven varieties of summer squash. *Journal of American Science* 8(5): 41-48.
13. Harborne JB. 1988. *Phytochemical methods*. 2<sup>nd</sup> Eds. Published in USA by Chapman and Hall 29, west 35th street, New York.
14. Yemm EW, Willis AJ. 1954. The estimation of carbohydrates in plant extracts by Anthrone. *New Phytology* 57: 508-514.
15. Tamilselvan N, Thirumalai T, Elumalai EK, Balaji R, David E. 2011. Pharmacognosy of *Coccinia grandis*: A review. *Asian Pacific Journal of Tropical Biomedicine*. pp1 s299-s302.
16. Pramanik A, Paik D, Naskar K, Chakraborti T. 2017. *Coccinia grandis* (L.) Voigt leaf extract exhibits antileishmanial effect through pro-inflammatory response: An in vitro study. *Current Microbiology* 74(1): 59-67.