

## Analysing The Creeping Foxglove (Asystasian Gangetican) And Its Uses

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### Abstract

*The creeping foxglove, Ganges or tropical primrose as is commonly called is a perennial herb, a native in tropical Africa and Asia, but has been introduced into tropical areas in North, Central and South America, Hawaii, West Indies, and Australia as ornamental herb and eventually escapes into natural and disturbed areas. Its uses are enormous and have some medicinal and nutritional values which this study documents. There is need for the general public and scientists to take advantage of these species.*

**Keywords:** *Creeping Foxglove, Asystasian gangetican, nutrition, medicinal, food.*

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Brief History of Creeping Foxglove

The creeping foxglove, Ganges or tropical primrose as is commonly called is a perennial herb, a native in tropical Africa and Asia, but has been introduced into tropical areas in North, Central and South America, Hawaii, West Indies, and Australia as ornamental herb and eventually escapes into natural and disturbed areas. (JPS, 2010). This plant is commonly found along the road sides, rivers banks or less water logged areas. Creeping Foxglove can tolerate different climates like: Tropical/ Megathermal, Tropical Rain Forest, Tropical monsoon, Tropical Savanna with dry summer, Tropical wet and dry Savanna climates. The means of movement and dispersal of Creeping Foxglove is by seeds and by rhizomes. This herb tolerates different soil types like: free, impeded, and waterlogged soil drainage along with heavy, light, and medium soil texture. In the Environmental Impact, the herb has been identified as a weed which can smother native plants where it has been introduced. This is possibly due to the fact that this species is a facultative climber and forms dense colonies, it prove invasive outside its native range (Gonzalez-Torres, et al, 2012).

#### 1.2 Botanical Features of Creeping Foxglove

Creeping Foxglove belongs to the kingdom plantae scientifically and the family of Acanthecea, with a preferred scientific name as *Asystasiagangetica* and other common names as creeping foxglove, Ganges, Chinese Violet, tropical primrose, coromandel, "obudama," hunters spinach, and others.

#### 1.3 Growth and Development of Creeping Foxglove

Creeping Foxglove is an attractive, fast growing spreading herb or the most rewarding and friendliest of all the ground Covers, a shade- loving Plant that grows and tolerates a wide range of soil types and can grow from 300-600mm in height or one metre if supported, (W.I.A, 2010). It has about seventy (70) species, but the common one eaten in Cross River State, Nigeria, is the one with the white flowers. (Akamine, 2014). See the growing plant in Fig 1



**Fig. 1: The growing plant**

**Source: W.V.C(2017)**

Creeping foxglove has a moderate growth rate, and grows best under full sun or indirect light and should be planted in well drained, compost- rich soils. The stem, root easily by the nodes and grows by vegetative fragment and by seed, (SANBI, 2010). See the stems in fig 2



**Fig. 2**

*Stems of creeping foxglove*

*Source: W. V.C (2017)*

#### **1.4 The Leaves and Flowers of Creeping Foxglove**

The leaves are simple, dark or bright green in colour. Opposite, dark green leaves are ovate with entire leaf margin (8cm long, 4cm wide). Older leaves tend to have a distinct drip tip and have deep venation that produces a slightly wrinkled leaf surface, (SANBI, 2010). The Flowers are bisexual, funnel-shaped, 2.5-4.0cm long and are violet, white with purplish spots inside lower lobe or light yellow depending on the species. Flower production can begin as early as 40 days after germination, with seed development beginning after 57 days, facilitating the production of viable seed in as little as 72 days, (Akamine, 2014). See Fig. 3, for the white flower species eaten commonly in Cross River State, Nigeria. Fig 4 & 5 shows other species with different size and colour of flowers



**Fig. 3**

Leaves and white flowers of *creeping foxglove*

Source: (W.V.C., 2017)



**Fig 4**

The leaves and purple flower

Source: W. V. C (2017)



Fig 5

The leaves and tiny yellow flowers

Source: W.V.C (2017)

### 1.5 The Mature Fruits of Creeping Foxglove

The fruit is a club-shaped capsule 2-3cm long, hairy, and granular, it contains 3mm-long hooks which help to propel the seeds further away from the plant during explosive dehiscence. (SANBI, 2010). See Fig 6,



Fig 6

A mature fruit of creeping foxglove

Source: W.V.C (2017)

### 1.6. The Exploded Capsules and Seeds of Creeping Foxglove



The seeds are egged- shaped which are grey or brown in colour, 4-5mm long four in a fruit and are expelled from parent plant and thrown as far as 6m by hot afternoon explosively, upon ripening via hooked retinacula, see fig 7.



Fig. 7  
Exploded Capsules of Creeping Foxgloves  
Source: W.V.C. (2017)

The seeds scattered from explosive capsules and germinate freely 135 days after being expelled from the parent plant, the seed is generally ready for cultivation by early August and sowing at this time allows the young plants to become established before any hard weather, see the seeds in fig 8.

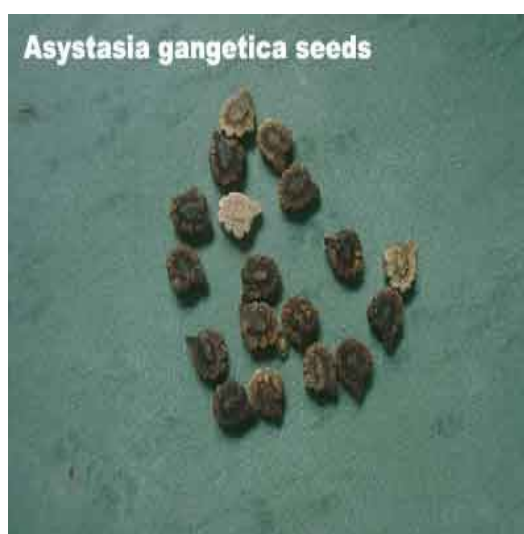


Fig. 8  
The seeds of creeping foxglove  
Source: W.V.C (2017)

### Objectives

This examines the nutritional value and uses of Creeping Foxglove a food for humans and animals, for medicinal and Pharmaceutical purposes, in botanical garden, and as ornamental Plant.

## CHAPTER TWO

### OVERVIEW METHODS OF ANALYSIS OF CREEPING FOXGLOVE AND THE RESULTS

#### 2.1 Phytochemical Screening of Creeping Foxglove

The phytochemical screening of this plant yielded carbohydrates like the reducing sugar, a glycan; proteins, minerals like calcium, phosphorous, sodium, manganese, copper, zinc, magnesium, iron and vitamins like, vitamin C and A, Thiamine, Riboflavin, Niacin, further screening of the plant yielded tannin, steroid, saponins, flavonoids, alkaloids, glycosides, and phenolics. (Kumar et al, 2009). Flowers yielded a biflavon glycoside-apigenin 7-0-glucosyl luteolin 7"-0-glucoside. Aerial parts yielded a 5, 11- epoxymegastigmaneglucoside. Preliminary phytochemical analysis of Hexane, EA, and methanol extract yielded Saponins, reducing sugar, steroids, glycosides, flavonoids and anthraquinones (Hamid et al, 2009). GCMS analysis of leaves for essential oil yielded hexadecanoic acid, n- hexadecanoic acid, phytol, and 9,12,15-octadecatrienoic acid, (Hanafi,2015). Table one shows the proximate analysis of fresh weight of leafy vegetable of plant, per 100g fresh weight, see Table 1.

**TABLE 1**

#### PROXIMATE ANALYSIS OF FRESH WEIGHT OF LEAFY VEGETABLE OF PLANT (Per 100g Fresh weight)

Fresh Vegetable	Energy	Moisture	Protein	Fat	Ash	Fibre	Carbohydrate
	50 kcal	85g	3g	0.5g	2.84mg	1.63g	8.27g

**Source:** Odhav. et al (2007) Calcium Phosphorus

The mineral content present in Creeping Foxglove (100g dry weight) is seen in Table two, see Table 2

**TABLE 2**

#### MINERAL CONTENTS PRESENT IN CREEPING FOXGLOVE (100g DRY WEIGHT)

Sodium	Manganese	Copper	Zinc	Magnesium	Iron
2556mg	814mg	933mg	18mg	4mg	7mg
				961mg	21mg

Source: (AGEA, 2014)

The study of 100g Edible portion of Creeping foxglove yielded vitamins. See Table 3

**TABLE 3**  
**VITAMIN CONTENT OF CREEPING FOXGLOVE**  
**(100g Edible Portion)**

VITAMIN C	B-CAROTENE	Thiamine	Riboflavin	Niacin
48.51(0.91mg)	5937.21 (1.50kg)	0.19mg	0.12	1.0mg

*Source: PJN, (2016), & AGEA, et al, (2014)*

## 2.2 Pharmacological/ Medicinal Uses of Creeping Foxglove

With the development of pharmaceutical industries, much more interest has been created on plant products.

Researchers have attained to isolate active constituents from different plant parts and use them directly as drugs or design them as pharmacological active compounds with or without synthetic ones.

Results from different studies conducted on *Creeping foxglove* reveals the following; see table 4 below:

**TABLE4**  
**Results from different studies conducted on Creeping foxglove (*Asystasiagangetica*)**

Anti-infective agent	Part of plant involved	Active constituents	Result	References
Anti-Microbial& Anti-Fungal	Whole Plant (Extract)	Hexan, ethyl acetate and Methanol	In vitro shows inhibition of higher anti-fungal properties of candida albicans, penisillium notation, tricophytonrubrum and Epider-mophtanfloccosum with activity comparable to reference drug tioconazole	Kensa, (2011), & Hamid, <i>et al</i> (2011)
High Blood Pressure (Hypertention) &Angiotension	Acqueous leaf extract	Ale on Ace (angio-tension I) converting enzyme, (ANG II reception and heart rate) Ace inhibitory activity	In vivo effect-dependent reduction of systolic, diastolic and mean arterial Bp. Effect may be due to actions of the ALE on ACE (angiotension I converting enzyme), ANG II (angiotension II receptors and heart rate)	Mugabo, <i>et al</i> , 2013
Anti-Asthmatic Activity	Leaf Extract	Hexane, ethyl acetate and methanol extracts,	Relaxed histamine-pre-contracted tracheal strips and exhibited anti-inflammatory	Ezike, <i>et al</i> (2008) & Mall, <i>et al</i> , (2011)

activity study justified plant use in Nigeria folk medicine for asthma management.

Anti-Bacterial Activity	Whole Plant Extract	Benzene cold organic solvent and ethanol extract	Benzene extract showed the broadest spectrum of inhibition against <i>B. subtilis</i> , followed by an ethanolic extract against <i>salmonella typhi</i>	Janakiraman, <i>et al</i> , (2014)
Anti-Oxidant & Anti-Inflammatory Activity	Acqueous Leaf Extract	Methanolic extract with 84.7 – 0.38% scavenging activity, aqueous extract -36.2 – 0.18	Shows dose dependent decrease of paw oedema in the carrageenan model and significant decrease in granuloma in the cotton pellet model	Adeyemi, <i>et al</i> , (2011), Krishma, <i>et al</i> , (2011) and Somanathan, <i>et al</i> , (2015)
Anti-Diabetic & Anti-Oxidant	Leaf Extract	Methanolic Extract	In vitro-methanolic extract showed concentration dependent alpha glucosidase and alpha-amylase inhibitory activity, reducing power of extract was concentration dependent. Results suggest a potential candidate for the management of T2DM source	Somanathan, <i>et al</i> , (2015)
Analgesic /Anti-inflammatory activity	Whole plant extract	Methanolic extract (400mg/kg)	Significant decreased paw oedema in carrageenan model	Krishna, <i>et al</i> , (2011) Maria, <i>et al</i> , 2012
Gastro-protective /Anti-Ulcer activity	The stem extract	Acqueous extract against pylorus ligated gastric ulcer in rats	Result shows ulcer protection by significant reduction in ulcer index, volume of gastric juice with an effect comparable to omeprazole (drug)	Ezike, <i>et al</i> , (2013)
Anthelmintic	Whole plant	Methanolic extract,	The worms- <i>Pheretima posthuma</i> and round worms- <i>Ascaridia</i> galls. Result shows significant anthelmintic activity at highest concentration of 100mg/ml with piperazine citrate (10mg/ml) as standard reference	Ezike, <i>et al</i> , (2013)
Anti-diabetic Anthocyanin	Flower extract	Phenolic compounds	Result shows significant and appreciable alpha-amylase and	Kavitha, <i>et al</i> (2013)



alpha glucosidase inhibitory activity. This may be due to the presence of anthocyanin phenolic compounds and the presence of a potential source of a natural anti diabetic agent

Anti - diabetic/Hypo lipidemic	Leaf extract	Ethanollic extract	Alloxan induced diabetes in rat- result showed the ethanollic extract of leaves to have good hypoglycaemic and hypolipidemic effect	Suvarchaia, <i>et al</i> , (2010), pradeep, <i>et al</i> . (2010) chetty, <i>et al</i> , (2010)
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### CHAPTR THREE

#### TECHNIQUES IN THE USEOF CREEPING FOXGLOVE IN FOOD AND IN FOLKMEDICINE

##### 3.1 Uses of Creeping Foxglove

- Generally, this plant serve as food and beverage for humans and as food for animals, the leaves, stem, flowers, roots are rich in minerals and organic constituents. The leaves can be added to salad in Culinary Food.
- They are used for medical and pharmaceutical purposes,(they are a source of medicine and pharmaceutical).
- They are used in botanical garden and zoo (socio cultural value).
- They are used commercially as detergent in soap production (because of its saponin content).
- They are used as ornamental (as potted plant).

##### 3.1.1 Creeping Foxglove as food for humans and animals

- Creeping foxglove serves as food and beverages for humans mainly in times of scarcity of leafy vegetables.
- The young leaves of 'obudama' as the plant is commonly called in some part of Cross River State, Nigeria, is a popular leafy vegetable used in their "draw soaps" and as medicine.
- In nature, *Creeping foxglove* has developed a good relationship with the honeybee that pollinates the flowers.
- The flowers also serve as food for Beetles and the plant receives visits from ants.
- The flowers are very attractive to butterflies. See young leaves of the plant, in fig 9.



**Fig 9: Young leaves of *Creeping foxglove***

*Source: (W.V.C., 2017).*

- f. The tender leaves and stems are eaten stir-fried or boiled in specific locations of the world as part of their traditional diet.
- g. South Africans consume it as favourite vegetables and as hunter's spinach.
- h. In Kenya and Uganda, it is mixed with beans groundnut and sesame paste or prepared in a mix with leafy vegetables.
- i. It is prepared and eaten as Amphibious-Porridge, in some parts of the world, where the shoots are prepared with rice, sweet potato, plantain, yam, or cassava (fufu).
- j. In the Philippines, the leaves and flowers are eaten as a pot herb. See fig 10. Amphibious-Porridge (dish).



**Fig.10. Amphibious-Porridge (Dish)**

*Source: (W.V.C., 2016)*

### **3.1.2 Traditional uses of Creeping Foxglove in Folk Medicine**

During the last century, the practice of herbalism became popular throughout the world.

In spite of the great advances achieved in contemporary medicine, plants still make a significant contribution to health, and medicinal plants are an integral part of African culture, one of the oldest and most diverse in the world.

*Creeping foxglove* is culturally used in folk medicine as follows:

- a. **Nigeria:** The leaves of this plant are used to manage asthma and in treating wounds (Ezikeet *al*, 2008).
- b. **South Africa:** The plant is used to treat high blood pressure (hypertension), the plant juice is used for anthelmintic activity, in swelling, rheumatism, gonorrhea and ear diseases, (Simbo, 2010).
- c. **Southern India:** The entire plant juice is used for treating rheumatism, the root paste is applied for skin allergies, it is also used as bone fractured healing extract, (DIPP, 2016).
- d. **Philippines:** The leaves and flowers are used as an intestinal astringent, (Kavitha, *et al*, 2013).
- e. **Indonesia:** The juice along with lime and onion juice is recommended for dry cough with an irritated throat and discomfort in the chest, (Mugabo, *et al*, (2013).
- f. **Tanzania:** The plant is pounded with water to make a wash against fleas for young animals (Simbo 2010).
- g. In West Africa it is used for epilepsy, (Ovarte, *et al*, 2012).

## CHAPTER FOUR

### CONCLUSION

This presentation reveals the multi potential application of *Creeping foxglove* (*Asystasiagangetica*) as food for man and animals, and as a medical plant. The bioactive component responsible for the activities of this plant may be one or more of the phyto-constituents established to be present at various parts of the plants. *Creeping foxglove* (*Asystasiagangetica*) is indeed a wonder plant, a green super herb.

In view of the numerous nutritive and medicinal values of *Creeping foxglove* (*Asystasiagangetica*), much publicity should be given to it and farmers should be encourage to go into large scale production of this plant.

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