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. 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 wetand 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 plantaescientifically 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
1.5 The Mature Fruits of Creeping Foxglove

The fruit is a club-shaped capsule 2-3cm long, hairy, and grandular, it contains 3mm-long hooks which help to propel the seeds further away from the plant during explosive dehiscence. (SANBI, 2010). See Fig 6,
The seeds are egg-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](image1.jpg)

Explored 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](image2.jpg)

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, phosphorus, 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- epoxymegastigmane-glucoside. 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>
<thead>
<tr>
<th>TABLE 1</th>
<th>PROXIMATE ANALYSIS OF FRESH WEIGHT OF LEAFY VEGETABLE OF PLANT (Per 100g Fresh weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Vegetable</td>
<td>Energy</td>
</tr>
<tr>
<td>------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Fresh Vegetable</td>
<td>50 kcal</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>TABLE 2</th>
<th>MINERAL CONTENTS PRESENT IN CREEPING FOXGLOVE (100g DRY WEIGHT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>Manganese</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td>2556mg</td>
<td>814mg</td>
</tr>
</tbody>
</table>

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)

<table>
<thead>
<tr>
<th>VITAMIN C</th>
<th>B-CAROTENE</th>
<th>Thiamine</th>
<th>Riboflavin</th>
<th>Niacin</th>
</tr>
</thead>
<tbody>
<tr>
<td>48.51(0.91mg)</td>
<td>5937.21 (1.50kg)</td>
<td>0.19mg</td>
<td>0.12</td>
<td>1.0mg</td>
</tr>
</tbody>
</table>


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:

TABLE 4

Results from different studies conducted on Creeping foxglove (Asystasiagangetica)

<table>
<thead>
<tr>
<th>Anti-infective agent</th>
<th>Part of plant involved</th>
<th>Active constituents</th>
<th>Result</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Blood Pressure (Hypertention) &amp; Angiotension</td>
<td>Acqueous leaf extract</td>
<td>Ale on Ace (angiotension I converting enzyme, (ANG II reception and heart rate) Ace inhibitory activity</td>
<td>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)</td>
<td>Mugabo, et al, 2013</td>
</tr>
<tr>
<td>Activity Type</td>
<td>Plant Part</td>
<td>extraction Method</td>
<td>Source</td>
<td>Notes</td>
</tr>
<tr>
<td>---------------</td>
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<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td>Anti-Bacterial Activity</td>
<td>Whole Plant Extract</td>
<td>Benzene cold organic solvent and ethanol extract</td>
<td>Janakiraman, et al, (2014)</td>
<td>Benzene extract showed the broadest spectrum of inhibition against B. subtilis, followed by an ethanolic extract against salmonella typhl</td>
</tr>
<tr>
<td>Anti-Diabetic &amp; Anti-Oxidant</td>
<td>Leaf Extract</td>
<td>Methanolic Extract</td>
<td>Somanathan, et al, (2015)</td>
<td>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 T2DMi source</td>
</tr>
<tr>
<td>Gastro-protective /Anti-Ulcer activity</td>
<td>The stem extract</td>
<td>Acqueous extract against pylorus ligated gastric ulcer in rats</td>
<td>Ezike, et al, (2013)</td>
<td>Result shows ulcer protection by significant reduction in ulcer index, volume of gastric juice with an effect comparable to omeprazole (drug)</td>
</tr>
<tr>
<td>Anthelmintic</td>
<td>Whole plant</td>
<td>Methanolic extract, The worms-pheretimaposthuma and round worms-As cardia galls. Result shows significant anthelmintic activity at highest concentration of 100mg/ml with piperazine citrate (10mg/ml) as standard reference</td>
<td>Ezike, et al, (2013)</td>
<td></td>
</tr>
<tr>
<td>Anti-diabetic Anthocyanin</td>
<td>Flower extract</td>
<td>Phenolic compounds</td>
<td>Kavitha, et al (2013)</td>
<td>Result shows significant and appreciable alpha-amylase and</td>
</tr>
</tbody>
</table>

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.


### CHAPTR THREE

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

**3.1 Uses of Creeping Foxglove**

a. 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.

b. They are used for medical and pharmaceutical purposes, (they are a source of medicine and pharmaceutical).

c. They are used in botanical garden and zoo (socio cultural value).

d. They are used commercially as detergent in soap production (because of its saponin content).

e. They are used as ornamental (as potted plant).

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

a. Creeping foxglove serves as food and beverages for humans mainly in times of scarcity of leafy vegetables.

b. 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.

c. In nature, Creeping foxglove has developed a good relationship with the honeybee that pollinates the flowers.

d. The flowers also serve as food for Beetles and the plant receives visits from ants.

e. 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 (Ezike* et 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, gonorrhoea 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. **Philipines:** 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 phytoconstituents 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 encouraged to go into large scale production of this plant.

**REFERENCES**


