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Research Paper

EVALUATION OF CYANOGENIC GLYCOSIDES FROM SOME MEDICINAL PLANTS BY SPECTROPHOTOMETRIC METHOD

Poonam R. Gulhane and K. D. Jadhao

P.G. Department of Botany,
Govt. Vidarbha Institute of Science and Humanities,
Amravati - 444604,
India.

Abstract

Quantitative estimation was done to find out Anti-nutritional factor compound cyanogens. Cyanogenic glycosides are naturally occurring plant compound and are classified as secondary metabolites have been produced by many plant species as part of their protection against attack by herbivorous, insects and pathogens or as means to survive in adverse growing conditions. It is not difficult to find plants containing thes compound in the food supply and/or in medicinal plant collections. The aim of this study was to estimate cyanogens content present in (*Bombax ceiba*, *Leea macrophylla*, *Argyreia nervosa*, *Begonia crenata*, *Clerodendrum infortunatum*, *Dioscorea bulbifera*, *Dioscorea pentaphylla, Abrus precatorius*) some medicinal plants.

Key words: Cyanogenic glucosides, Medicinal plants , Spectrophotometer.

INTRODUCTION

Cyanogens are cyanogenic glucosides and widespread in the plant kingdom. These glucosides release hydrogen cynide by an endogenous enzymatic reaction. Cyanogenic glycosides or cyanoglycosides account for approximately 90% of the wider group of plant toxins known as cyanogenesis. The key characteristic of these cyanogens, the formation of free hydrogen cyanide, and is associated with cyanohydrins that have been stabilized by glycosylation (attachment of sugars) to form the cyanogenic glycosides (Davis, 1991). There is strong evidence that cyanogenesis is one of the mechanisms that can serve to the plant as protective device against predators such as herbivores. The level of Cyanogenic glycosides produced is depend upon the age and variety of the plant, as well as environmental factors (Copper- Driver and swain,1976). Cyanogenic glycosides are phytotoxins which occur in at least 2000 plant species of which a number of species are used as food in some areas of the world. Cassava (*Manihot esculenta*) and sorghum are especially important staple foods consisting cyanogenic glucosides (Conn1979., Nartey 1980). There are approximately 25 cyangenic glycosides known. About ten cyanogenic glycosides including amygdalin, prunasin, dhurrin, linamarin and

taxiphyllin have been reported in edible plants(Vetter, 2002). The major cyanogenic glycosides found in the edible parts of plants used as food or as herbal medicine for human or animal consumption (Francisco,2000 and Haque 2002). There are many economical important plants highly cyanogenic, including white clover, linum, almond, sorghum, the rubber tree and cassava (Tokarnia *et al*.,1994). The aim of this work was to detect cyanogenic glycosides in some medicinal plants.

MATERIALS AND METHODS

Collection and Identification of Plant materials

The extensive survey, identification and collection of plant from Melghat and Amravati region Maharashtra, were done. Plant identification was carried out with the help of floras (Dhore, 1986 - 1998; Naik , 1998).

Preparation of samples

Spines and flowers of *Bombax ceiba* and leaves of *Leea macrophylla*, *Argyreia nervosa*, *Begonia crenata*, *Clerodendrum infortunatum*, *Dioscorea bulbifera*, *Dioscorea pentaphylla* and *Abrus precatorious* were collected and dried in sunlight. After that powdered with mechanical grinder and stored in airtight container. Samples were powdered separately. 1gm of samples was taken for estimation of cyanogens µ/gram.

***Bombax ceiba* L.**

A genus belonging to the Bombacaceae family, Deciduous tree. Flowers, fruits, seed fleshy calyces and gum are edible. Flowers are cooked as vegetable; Flower is cooling, diuretic and laxative. Used for sterilization Premature ejaculation, menstrual disorders, stomach disorder, internal bleeding, cancer and snake bites. Spines are used for skin trouble, acne, headache and
vaginal infections.(Manzur-ul kadir *et al.,*2009).

***Leea macrophylla* Roxb.**

A genus belonging to Leeaceae family, Perenial herb. Root is vermicidal, astringent, anti-diarrheal, laxative, febrifuge, anti inflammatory, snake antidote and used for dog bite, Leaf juice boiled with oil used in rheumatism and bone fracture, leaf juice neurologic used in chest pain, pneumonia, eye diseases and headache. In Maharashtra the seeds and very young leaves are eaten. (Jadhao *et al.,* 2009).

***Argyreia nervosa* (Burm.F.)**

A genus belonging to Convolvulaceae family, extensive twiner. Whole plant used for stomach complaints, sores on foot, small pox, dysentery, antifertility, antirhematic, antifungal. Leaves used for antiphlogistic, emollient, externally for skin diseases.

***Begonia crenata* L.**

A genus belonging to Begoniaceae family, Annual, succulent herb. Dry and fresh wild edible as well as medicinal herb used by korkus of melghat. (Bhogaonkar and Marathe, 2008).

***Clerodendrum infortunatum* L.**

A genus belonging to Verbanaceae family, Perennial. The leaves are bitter, tonic, vermifuge, laxative and cholagogue.it is also used in Indian folk medicine for treatment of bronchitis, asthma, fevar and blood disease.

***Dioscorea bulbifera* L.**
A genus belonging to Discoreaceae family, Large unarmed, tuberous climbing herb. Tubers and bulbils are cooked and eaten as vegetables Plant is anthelmintic, diabetic, aphrodisiac. Cooling, diuretic, sweet and tonic. It is used in diabetes, gonorrhea, helinthiasis and leprosy. (Ahmad, 2012).

***Dioscorea pentaphylla* L.**
A genus belonging to Dioscoreaceae family, Delicate, twining, bulbiferous
Herb. Tuber, Bulbils, Leaves, Inflorescence and Flowers are edible, Cooked as
Vegetable. Tubers use as Medicinal Properties like dispersing Tonic Intiflamatory, Cough, Bile,
Bronchial, Asthma, Rheumatism, Swelling and bone Fracture.

***Abrus precatorius* L.**

A genus belonging to fabaceae family, Glabrous, perennial thinners.
The plant has been used in hindu medicines from very early times, as well as
in china and other ancient cultures. Leaves and seeds are used in Ayurvedic medicine to cure abdominal pains, tumors, to treattetanus, to prevent rabies and used as oral contraceptives. Anonymous (1948-1976). The plant report are antitumor, immunomodulating, antiplatate, anti-inflammatory, insecticidal,antioxidant, antibacterial, antifertility activity in male and abortifacient activity infemale. (Dipanjan and Tapas, 2007).

METHODS
Estimation of Cyanogens were done according to the methods prescribed by S. R. Thimmaiah (1999), which are given below.
Estimation of Cyanogens

Homogenise 1gm of sample in 25ml of distilled water with 3-4 drops of
chloroform and placed the homogenate in 500ml of conical flask, the saturated filter paper of picric acid was placed in hanging position with the help of cork stopper
inside the conical flask. The mixture was incubated at room temperature (20˚C) for
20-24 hours. The sodium picrate in the filter paper was reduced to reddish compound in
proportion to the amount of hydrocyanic acid evolved. Elute the colour by placing the paper in a clean test tube containing 10ml distill water. Absorbance was measured at 625nm against a reagent blank laking only extract.
Standard curve was prepared using different concentrations (0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, and 1 ml) of hydrogen cyanide. (Thimmaiah, S. R. 1999).

A standard graph was obtained by plotting concentration on X- axis and the corresponding values of absorbance along Y- axis on a graph paper resulting a straight line which passes through the origin and maximum points of standard reading. It is used to quantify the amount of a given compound present in an unknown sample whose absorbance value is matched against that of standard along Y-axis and a corresponding concentration could be read off along X-axis. (Thimmaiah, 1999).

RESULT AND DISCUSSION

Table 1. cyanogen content from medicinal plants.

Sr. no.	Plant material	Plant part used for estimation	Absorbance (at 625 nm)	µgm / gm
1	*Bombax ceiba*	Spines	0.023	64
2	*Bombax ceiba*	Flowers	0.009	51
3	*Leea macrophylla*	Leaves	0.15	137
4	*Argyreia nervosa*	Leaves	0.009	51
5	*Begonia crenata*	Leaves	0.032	69
6	*Clerodendrum infortunatum*	Leaves	0.13	125
7	*Dioscorea bulbifera*	Leaves	0.050	80
8	*Dioscorea pentaphylla*	Leaves	0.056	83
9	*Abrus precatorius*	Leaves	0.079	96

The cyanogen compound contents in different medicinal plants are shown in Table 1. The highest content of cyanogens was found in leaves of *Leea macrophylla* (137 µgm /gm),
leaves of *Clerodendrum infortunatum* (125 µgm / gm) as well as in leaves of *Abrus precatorius* (96 µgm / gm) and *Dioscorea pentaphylla* (83µgm /gm). Lowest amount of cyanogens was found in flowers of *Bombax ceiba* and leaves of *Argyreia nervosa* (51 µgm / gm).

Natural plant toxins may be present inherently in plants such as fruits and vegetables which are common food sources. They are usually secondary metabolites produced by plants to defend these secondary metabolites elicit very harmful biological responses, while some are widely applied in nutrition and as pharmacologically active agents (Oakenfull and sidhu,1989; Soetan, 2008). Toxicity of cyanogenic glycoside containing plant is due to the cyanide produced on injestion. The plant species that produced cyanogenic glycosides usually also has corresponding hydrolytic enzyme (β-glucosidase). In presence of water, the non-toxic cyanogenic glycosides are hydrolysed by the enzyme producing cyanohydrins which quickly decompose to toxic hydrogen cyanide. In this way, cyanogenic plants are protected against predators. Cyanogenic glycosides, cyanohydrins and hydrogen cyanide are collectively known as cyanogens (Onojah and Odin, 2015).

In human, the clinical signs of acute cyanide intoxication can include: rapid respiration, drop in blood pressure, rapid pulse, dizziness, stomach pains, vomiting, diarrhoea, mental confusion, stupor, cyanosis with twitching and convulsion followed by terminal conia (WHO,1993). Death due to cyanide poisoning can occur when the cyanide level exceeds the limit an individual is dependent on body weight. For example, it is possible that child or person of smaller body weight would not be able to detoxify the cyanide resultant from a meal of inadequately prepared cassava or bamboo shoots. The acute

lethal dose of hydrogen cyanide for humans is reported to be 0.5 – 3.5 mg/kg bw. Approximately 50 -60 mg of free cyanide constitutes does for an adult man (WHO,1993).
In view of the poisonous nature of hydrogen cyanide (HCN) and its prevalence in many plant seeds and nuts in form of cyanogenic glycoside, this paper estimates the levels of this class of secondary metabolites.

CONCLUSIOIN

The importance of this work relied at the number of plant species that were analysed. The study could serve as reference to new studies about cyanogenic glycosides in these plants.

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