

## A Report on the Quality Control Parameters of Root of *Heliotropium Eichwaldi* Stued. Ex dc.

Surendra Kr. Sharma\*, Naveen Goyal

Department of Pharmaceutical Sciences, Guru Jambheshwar University of Science and Technology, Hisar, Haryana, India

### Abstract

*Heliotropium eichwaldi* Stued. ex DC., Boraginaceae, is a herbaceous weed and widely distributed in the state of Punjab, Haryana and Rajasthan of India. Genus *Heliotropium* has been known to possess a number of medicinal properties and these are chiefly attributed to pyrrolizidine alkaloids. These alkaloids possess a number of medicinal activities. The herb is used traditionally for earache, headache, cleaning and healing ulcers etc. This paper aims at setting the morphological and anatomical standards of root and to characterize the extract(s) of *Heliotropium eichwaldi* Stued. ex DC., Boraginaceae, by preliminary phytochemical screening as quality control parameter for the raw material.

**Key Words:** *Heliotropium eichwaldi*, quality control, Physico-chemical, microscopy, fluorescence.

### Introduction

*Heliotropium eichwaldi* Stued. ex DC., Boraginaceae, is a herbaceous weed and widely distributed in the state of Punjab, Haryana and Rajasthan<sup>[1]</sup>. Genus *Heliotropium* has been known to possess a number of medicinal properties and these are chiefly attributed to pyrrolizidine alkaloids. These alkaloids possess a number of medicinal activities. The herb is used traditionally for earache, headache, cleaning and healing ulcers etc.<sup>[2,3]</sup>. Pharmacologically, the plant species demonstrated hypotensive effect<sup>[4,5]</sup> and antimicrobial<sup>[6]</sup> activities.

In spite of its numerous medicinal attributes, we did not find a systematic report on quality control parameters of roots of *Heliotropium eichwaldi*. The present investigation was therefore, undertaken to set standards and to characterize the root extract of *Heliotropium eichwaldi* by preliminary phytochemical screening.

### Material and Methods

#### Plant material

The shade dried roots of the plant *Heliotropium eichwaldi* Stued. ex DC., Boraginaceae, was collected from waste land of Dist. Hisar and Sirsa, Haryana (India), in the month of October 2009 and authenticated by Dr. H. B. Singh, Head, Raw Materials, Herbarium and Museum division of NISCAIR, New Delhi [Ref. no. NISCAIR/RHMD/Consult/-2009-10/1290/93].

A voucher specimen was deposited in the Department of Pharmacognosy, Guru Jambheshwar University of Science and Technology, Hisar. The plant material was further size reduced and stored until further use in an air tight container. Fresh plant material was obtained for the macroscopical and microscopical evaluation.

#### Chemicals

All the chemicals used were of analytical grade from Qualigens Fine Chemicals Pvt., Ltd. Mumbai, India.

#### Macroscopic and microscopic analysis

The macroscopy and microscopy of the root of plant was studied according to the methods of Brain & Turner<sup>[7]</sup>, the cross sections were prepared and stained. The microscopic analysis of powder was done according to the method of Brain & Turner<sup>[8]</sup> and Kokate et al.<sup>[9]</sup>.

#### Physico-chemical analysis

Air dried plant material was used for the quantitative determination of ash and extractive values<sup>[10]</sup>. Fluorescence analysis of the root powder was carried out by the method of Chase & Pratt<sup>[11]</sup> and Kokoski et al.<sup>[12]</sup>.

#### Preliminary phytochemical screening

Preliminary phytochemical screening of root extract was carried out by using standard procedure described by Kokate et al.<sup>[9]</sup> and Harbone<sup>[13]</sup>.

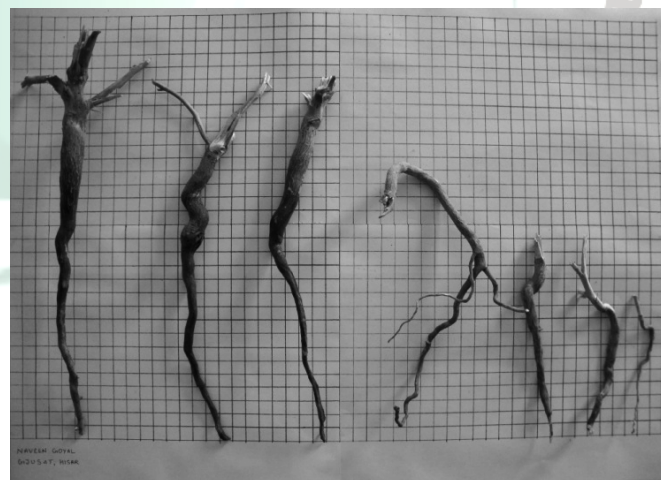


Figure 1: Macroscopy of the root of *Heliotropium eichwaldi* Stued. ex DC., Boraginaceae.

\*Corresponding Author

E-mail: prof.sharmask@gmail.com

## Results and Discussion

### Macroscopic characters

The plant is an erect, softly hairy annual under shrub growing up to 20-80 cm high. Roots (Figure 1) are 5 to 20 mm in diameter somewhat twisted and gradually tapering. The external surface is white when young while it is light to dark brown in mature one and the wood is brownish. The surface consists of longitudinal striations. Odour indistinct and fracture is short.

### Microscopic characters of Root

The transverse section of the root (Figure 2A, 2B) is almost circular in outline. Cork consists of two to seven layers of tubular cells. Outer layers contain reddish brown matter. Unicellular covering and glandular trichomes are present. Cortex consists of seven to ten layers of parenchymatous cells with sufficient intercellular spaces. Phloem consists of phloem parenchyma and phloem fibers. Xylem is present as tracheids, vessels, xylem fibres and xylem parenchyma. Vessels are large, pitted or reticulately thickened, lignified cells. Medullary rays are parenchymatous and multiseriate. Pith is absent.

### Powder microscopy

Powder microscopy (Figure 2C) showed patches of Polygonal cells with brown matter (Figure 2G), thin walled parenchymatous cells, fragments of lignified reticulate, annual and spiral vessels (Figure 2E). The crystal of calcium oxalate, starch grains along with unicellular covering (Figure 2D) and glandular root hairs (Figure 2F) were observed.

### Physicochemical analysis

Air dried material was used for quantitative determination of Physicochemical values. Total, acid insoluble and water soluble ash (Table 1) was determined for three times and its mean+SE was recorded. Similarly, petroleum ether (60-80 °C), chloroform, alcohol and water soluble extractives were determined for three times and its mean±SE was recorded (Table 2). Water soluble extractive was found to be very high when compared to other extractable matter in the drug.

### Preliminary Phytochemical Screening

The phytochemical profiling of the root of plant revealed the presence of carbohydrates, alkaloids, phenolic compounds & tannins, saponins, flavonoids, sterols, and acidic compounds & free acids (Table 3). This serves as an important tool for the quality assurance of plant for future studies. The fluorescence analysis is one of important pharmacognostical tool for establishing the standards of plant drug. Thus the fluorescence analysis of the root powder was carried out and data is presented in the Table 4.

### Conclusion

*Heliotropium eichwaldi* Stued. ex DC., Boraginaceae is an unexplored herb which could be a potential medicinal plant where its traditional claims need to be authenticated.

In the present paper, the macroscopical, microscopical and physicochemical evaluation was done to establish the standards of quality control and quality assurance. Thus the above finding will serve the purpose of quality control and assurance for the future studies.

### References

- 1) Jain S.C., Sharma R. (1987). Antimicrobial activity of Pyrrolizidine alkaloids from *Heliotropium ellipticum*. *Chem. Pharm. Bull.*, 35: 3487-3489.
- 2) Chopra R.N., Nayar S.L., Chopra I.C. (1956). *Glossary of Indian Medicinal Plants*, New Delhi: CSIR.
- 3) Kirtikar K.R., Basu B.D. (1967). *Indian Medicinal Plants*, Bombay: Popular Book Depot.
- 4) Bhakuni D.S., Dhar M.L., Dhar M.M., Dhawan B.N., Mehrotra B.N. (1969). Screening of Indian plants for biological activity, Part VIII. *Indian J Exp Bio*, 7: 250.
- 5) Gupta S.K., Mathur I.S. (1972). Effect of *Arnebia nobilis* and its naphthaquinones in rat walker carcinosarcoma 256. *Indian J Cancer*, 9: 50.
- 6) Jain S.C., Singh B. (1998). Bioefficacy of *Heliotropium ellipticum* Ledeb. I. Antimicrobial screening. *Indian J Pharm Sci*, 60: 394.
- 7) Brain K.R., Turner T.D. (1975a). *The Practical Evaluation of Phytopharmaceuticals*, Bristol: Wright-Sciencetechnica. p. 4-9.
- 8) Brain K.R., Turner T.D. (1975b). *The Practical Evaluation of Phytopharmaceuticals*, Bristol: Wright-Sciencetechnica. p. 36-45.
- 9) Kokate C.K. (1986). *Practical Pharmacognosy*, 1st ed., New Delhi: Vallabh Prakashan. p. 111.
- 10) WHO/QCMMPPM (1992). *Quality Control Methods for Medicinal Plant Material*, Geneva: Organisation Mondiale De La Sante. p. 22-34.
- 11) Chase C.R., Pratt R. (1949). Fluorescence of powdered vegetable drugs with particular reference to development of a system of identification. *J Am Pharmacol Assoc*, 38: 324-331.
- 12) Kokoski C.J., Kokoski R.J., Slama F.J. (1958). Fluorescence of powdered vegetable drugs under ultraviolet radiation. *J Am Pharm Assoc*, 47: 715-717.
- 13) Harbone J.B. (1998). Method of extraction and isolation. In: *Phytochemical methods*, London: Chapman & Hall. p. 60-66.

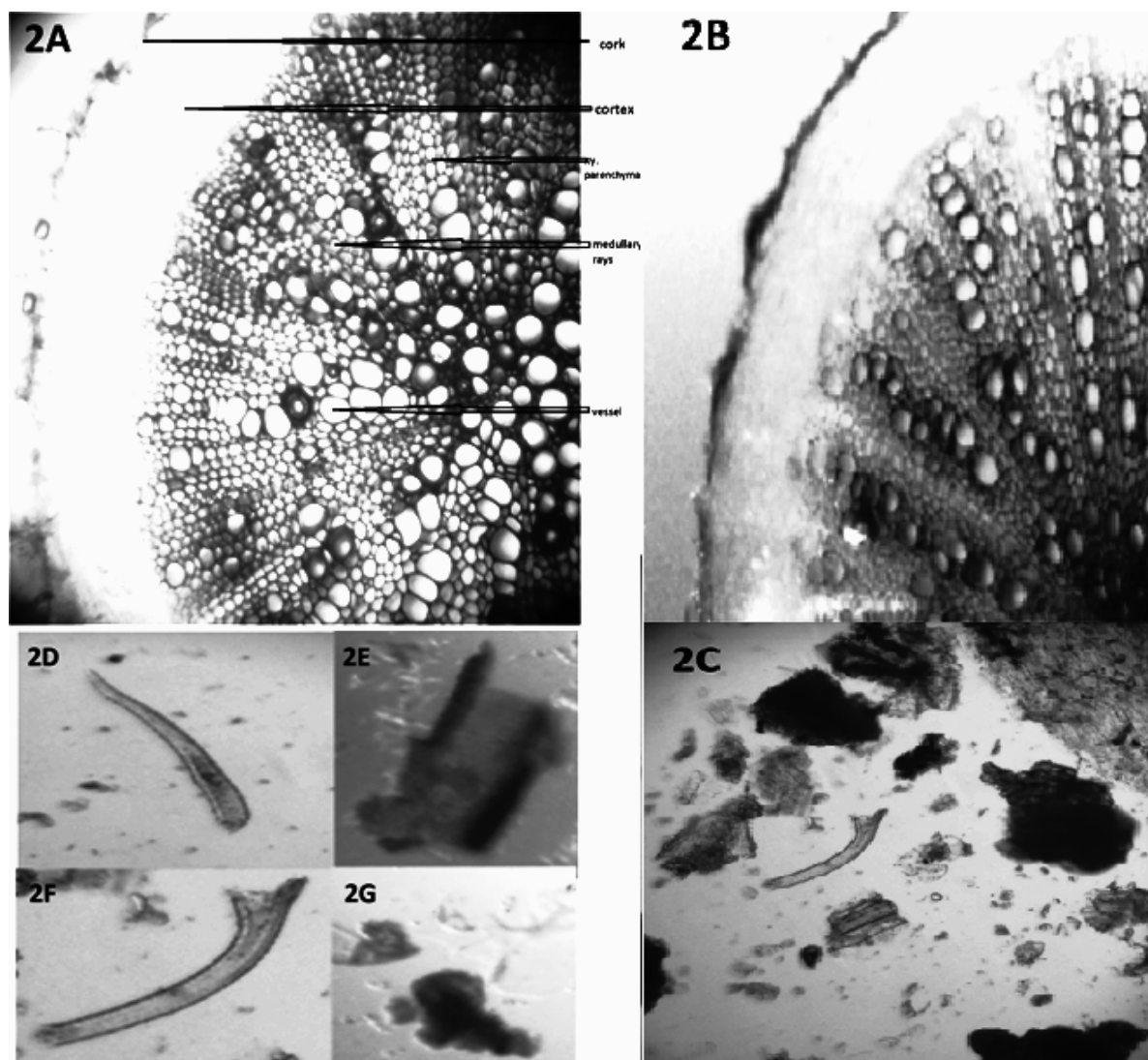


Figure 2: Microscopy of the root of *Heliotropium eichwaldi* Stued. ex DC., Boraginaceae. A. transverse section of the root. B. transverse section of the root central view. C. powder microscopy of root. D. covering trichome. E. vessel. F. glandular trichome. G. cells with brown matter.

**Table 1: Ash values of root powder of *Heliotropium eichwaldi* Stued. ex DC., Boraginaceae**

PARAMETER	VALUES % (W/W)
Total ash value	9.85 ± 0.87
Acid insoluble ash value	3.97 ± 0.41
Water soluble ash value	2.38 ± 0.21

**Table 2: Extractive values of root powder of *Heliotropium eichwaldi* Stued. ex DC., Boraginaceae**

SOLVENT	VALUES % (W/W)
Petroleum ether	0.48 ± 0.02
Chloroform	3.19 ± 0.07
Alcohol	1.22 ± 0.11
Water	10.3 ± 0.33

**Table 3: Preliminary Phytochemical screening of root extract of *Heliotropium eichwaldi* Stued. ex DC., Boraginaceae**

Constituents	<i>Heliotropium eichwaldi</i> Root Extract
Alkaloids	
• Mayer's reagent	+
• Dragendroff's reagent	+
• Wagner's reagent	+
• Hager's reagent	+
Carbohydrates	
• Molish test	+
• Fehlings test	+
Glycosides	
• Keller Killani test	-
• Sodium Nitroprusside test	-
• Borntrager test	-
Phenolic compounds & Tannins	
• Ferric chloride test	+
• Lead acetate test	+
• Gelatin test	+
Flavonoids	
• Ammonia test	+
• Shinoda/Pew test	+
Proteins and Free Amino Acids	
• Millions test	-
• Xantho protein test	-
• Biuret test	-
• Ninhydrin test	-
Resins	-
Saponins	+
Sterols	
• Liebermann – Burchard test	+
• Salkowski reaction	+
• Hersch's sohn's reaction	+
Acidic Compounds & Free Acids	+

**Table 4: Fluorescence analysis of the root powder of *Heliotropium eichwaldi* Stued. ex DC., Boraginaceae**

TREATMENT	VISIBLE LIGHT	U.V. LIGHT
Powder as such	Yellowish brown	Yellowish green
Powdered drug + Conc. HCl	Brownish Green	Blackish green
Powdered drug + Conc. H <sub>2</sub> SO <sub>4</sub>	Blackish brown	Brownish black
Powdered drug+ Conc. HNO <sub>3</sub>	Brownish Yellow	Brownish green
Powdered drug+ Glacial Acetic acid	Yellowish brown	Light green
Powdered drug+ Aqueous NaOH	Yellowish light green	Brownish green
Powdered drug + NaOH (Alcoholic)	Greenish brown	Blackish green
Powdered drug + 10% HCl	Yellowish brown	Yellowish green
Powdered drug + 10% H <sub>2</sub> SO <sub>4</sub>	Yellowish brown	Yellowish green
Powdered drug + 10% HNO <sub>3</sub>	Yellowish brown	Yellowish green
Powdered drug + 10% Glacial Acetic acid	Yellowish brown	Yellowish green
Powdered drug + Ferric chloride (Aqueous)	Blackish green	Greenish black
Powdered drug + Ferric chloride (Alcoholic)	Blackish green	Greenish black