

Pharmacognostic and Phytochemical Characteristics of The Fruits of *Bunium persicum* (Boiss.) B. Fedtsch, Growing Wild in Kashmir Valley, India

Riehana Gani, Zulfiqar Ali Bhat*, Mudasir Ahmad Dar, Mohammad Akbar Dar, Junaid ul Yousuf Rather

Department of Pharmaceutical Sciences, University of Kashmir, Hazratbal, Srinagar, Jammu and Kashmir, INDIA.

ABSTRACT

Introduction: *Bunium persicum* (Boiss.) B. Fedtsch belongs to family Apiaceae of genus *Bunium*, which is comprised of about 166 species and is widely distributed in Kashmir valley. It is used medicinally in dyspepsia and diarrhea, digestive and urinary tract infections, chronic gastritis, colitis, anticonvulsant, antiasthma and diuretic. **Objective:** The current study deals with Pharmacognostic parameters of the fruits of *Bunium persicum* (Boiss.) B. Fedtsch. **Materials and Methods:** The fruits of *Bunium persicum* (Boiss.) B. Fedtsch were collected, shade dried for about 2 weeks and powdered and the powdered fruit part of plant material was evaluated for Pharmacognostic parameters by standard methods. The hydroalcoholic extract of *Bunium persicum* was subjected to preliminary phytochemical screening for the presence of various Phytoconstituents. The microscopy of the fruits of *Bunium persicum* (Boiss.) B. Fedtsch reveals the presence of Part of a group of sclereids from the mesocarp, thicker-walled sclereids with adjacent thin walled parenchyma, Fragment of vitta, Thin-walled fibre and Calcium-oxalate crystals. **Results:** Proximate analysis of the fruits of *Bunium persicum* (Boiss.) B. Fedtsch showed that the dried fruit powder has 34.0 % Total ash value, 29.0 % Acid insoluble ash value, 9.5 % Sul-

phated ash value. Loss on drying was found to be 6.2 %. The hydroalcoholic extract of *Bunium persicum* was found to contain various phytoconstituents. Fluorescence analysis of the fruit powder showed the behaviour, when treated with different chemical reagents. **Conclusion:** The current study displayed the microscopical characters, the preliminary phytochemical screening and the proximate analysis of the fruits of *Bunium persicum* (Boiss.) B. Fedtsch. Data composed from such studies can be used as standard in the quality control of this plant as a herbal medicine for treatment of various diseases.

Key words: *Bunium persicum*, Proximate Analysis, Fluorescence Analysis, Phytochemical Screening, Microscopical Characters.

Correspondence

Prof. Zulfiqar Ali Bhat

Professor and Head Department of Pharmaceutical Sciences University of Kashmir, Hazratbal, Srinagar-190006, Jammu and Kashmir, INDIA.

Phone no: +91-9419077701

E-mail: rehanagani35@rediffmail.com

DOI : 10.5530/phm.2019.1.8

INTRODUCTION

The genus *Bunium* belongs to a family *Apiaceae*, which comprised about 166 species. *Bunium persicum* (Boiss.) B. Fedtsch is one of the species of genus *Bunium*, which is economically and medicinally important. *Bunium persicum* (Boiss.) B. Fedtsch is widely distributed in the warm climate such as Central and Western Asia including Iran, Syria, Pakistan, Afghanistan, Tajikistan, North India (Kashmir and Pamir), China and some parts of North Africa, Europe and South America.¹⁻³ In Kashmir valley it is found in Gurez, Harwan Dara, Baramulla, Chrarisharief, Wasturwan Tral and Khrew.⁴ *Bunium persicum* (Boiss.) B. Fedtsch is known with various names across the world like Black zire, Great pignut, Persian cumin, Black caraway, Kala zeera, Shahi zeera, Jira, Wild cumin, Wild caraway and Zire kuhi.^{4,5} It is a perennial, aromatic plant bearing small pink or white flowers with readily symmetrical small sepals, petals and stamens (Each five in number) and are present in compact umbels. This plant can attain a height of about 60 cm and 25cm wide. The leaves are freely, pinnate (2-3), finely dissected and filiform. The fruit of *Bunium persicum* is slender, dark brownish in colour and crescent shape. The stem is often hollow in the internodal region with secretory canals containing ethereal oils and resins.⁶ The major bioactive constituents that have been identified in *Bunium persicum* are cuminaldehyde, p-mentha-1,4-dien-7-al, gamma-terpinene, beta-pinene, alpha-thujene and myrcene.⁷ The fruits of *Bunium persicum* (Boiss.) B. Fedtsch are widely used as condiment, stimulant and carminative. Therapeutically, the fruits of *Bunium persicum* are used to treat dyspepsia and diarrhea, digestive and urinary tract infections, chronic gastritis, colitis, kidney stones, chronic cholangitis, jaundice, swelling and jaundice. It is also used as flow increaser of breast milk, antidiabetic, antispasmodic, antiasthma, antiepileptic, diuretic and anticonvulsant.² Besides, it also shows

good antioxidant and anti-inflammatory, free radical scavenging, antimicrobial and antiparasitic activities are reported for fruits of *Bunium persicum*.^{5,8} Despite, of the medicinal importance of *Bunium persicum* there is deficiency of information available on the Pharmacognostic parameters for identification and standardization of this species in whole as well as in powder form. The current study is schemed at the standardization and monograph development and to evaluate the Macroscopical, microscopical and Pharmacognostic parameters and phytochemical screening of the fruits of *Bunium persicum* (Boiss.) B. Fedtsch.

MATERIALS AND METHODS

The fruits of *Bunium persicum* (Boiss.) B. Fedtsch were collected from the Gurez-Bandipora, Jammu and Kashmir, India. This plant was identified and authenticated by Akhtar H. Malik, Curator Centre for Biodiversity and Taxonomy (CBT) Department of Botany, University of Kashmir under specimen voucher no. 2710 KASH. A sample specimen of collected material was deposited in herbarium for future references.

Reagents

The reagents used for this work were all of analytical grade obtained from Central Drug House (P) LTD, Bombay, India.

Macroscopical and Microscopical Evaluation

Macroscopical and Microscopical evaluation of the fruits of *Bunium persicum* (Boiss.) B. Fedtsch were studied according to the methods described in Trease and Evans Pharmacognosy.^{9,10} The Macroscopical and Microscopical evaluation of *Bunium persicum* was taken to prevent adul-

teration and mistaken in selection procedures of raw medicinal material from genus *Bunium*.

Preparation of Extracts

The fresh air-dried ripe fruits of *Bunium persicum* (Boiss.) B. Fedtsch was powdered and the powdered sample of plant material was then subjected to hydroalcoholic extraction by using soxhlet extractor for 72 hr. The hydroalcoholic extract obtained was filtered through whatman filter paper and concentrated under reduced pressure using rotary vacuum evaporator. The Hydroalcoholic extract was then dried and transferred in a closed air tight container for further use.

Proximate Analysis

On the powdered fruits of *Bunium persicum*, Proximate Analysis was performed for the evaluation of various physicochemical parameters such as extractive value (hot and cold),¹¹ loss on drying¹² total ash value, acid insoluble ash value, sulphated ash value¹³ and PH determination (1% and 10%) solution of drug.¹⁴ Fluorescence analysis study of powdered drug material was carried out by treating with different chemical reagents to detect the colour change under UV at 254nm and 366nm and under visible light.^{15,16} The preliminary phytochemical screening was carried out on the hydroalcoholic extract of the fruits of *Bunium persicum* to determine the presence of various phytoconstituents.^{17,18}

RESULTS

Macroscopical Evaluation

Colour:	Black-brownish
Size:	4.7mm long and 1.6mm wide
Taste:	Astringent
Odour:	Aaromatic
Shape:	Slenderical.

Powder Microscopy of the Fruits of *Bunium persicum*

When the powdered fruit part of *Bunium persicum* was examined under microscope, it showed (i) The presence of the sclereids of the mesocarp which occur in large groups and often associated with thicker-walled sclereids with adjacent thin walled parenchyma (ii) It also showed presence of fragment of a vittae which is composed of thin-walled cells - polygonal in shape (iii) Further the powdered fruit part under microscope reveals the presence of thin-walled fibre and (iv) Endosperm containing calcium oxalate crystals. The various characters observed are given in Figure 1.

Table 1: Physicochemical Analysis and Extractive Value of the Fruits of *Bunium persicum*.

Physicochemical parameters	Results	
Total ash value (%w/w)	34.0	
Acid insoluble ash value (%w/w)	29.0	
Sulphated ash value (%w/w)	9.5	
Loss on drying(%w/w)	6.2	
Swelling index(%w/w)	1	
Foreign matter(%w/w)	0.016	
Foaming index	Less than 100	
PH of 1% solution	6.5	
PH of 10 % solution	6.1	
Extractive values (%w/w)	Cold extractive value	Hot extractive value
Ethanolic	8.0	17.5
Aqueous	15.6	31.8

Table 2: Phytochemical Screening of Hydroalcoholic Extract of the Fruits of *Bunium persicum*.

TESTS	Inference	Hydroalcoholic extract
CARBOHYDRATES		
Molish's test	Violet ring	++
Fehling's test	Brick red ppt	++
Barfoed's test	Brick red ppt	++
Selwinoff's test	Pink colour	+
TANNINS		
5% FeCl ₃	Yellow colour	+
Lead acetate	White ppt	+
SAPONINS		
Foam test	Foaming	-
Froth test	Frothing	-
FLAVONOIDS		
Shinoda test	Pink colour	++
PHENOLICS		
1%FeCl ₃	Bluish colour	+
ANTHRAQUINONE GLYCOSIDES		
Borntrager's test	Pink Colour	+
CARDAIC GLYCOSIDES		
Keller killiani Test	Brown ring at junction	+

Legal test	Pink colour	+
Table 2: Con'		
TERPENOIDS		
Salkowski's test	Golden yellow ring at junction	++
PHYTOSTEROLS		
Liebermann's test	Brown ring at junction	++
ALKALOIDS		
Dragendroff's reagent	Orange ppt	+
Mayer's reagent	Cream ppt	-
PROTEINS		
Ninhydrin test	Purple colour	+++
Biuret test	Blue colour	+

Table 3: Fluorescence Analysis of the Fruits of <i>Bunium persicum</i>.			
Treatment	Day Light	UV (254nm)	UV (366nm)
Powder as such	Dark brown	Brown	Dark brown
Powder treated with distilled water	Brown orange	Brown orange	Dark orange
Powder treated with GAA	Brownish orange	Light orange	Light orange
Powder treated with conc. HCl	Brown orange	Light orange	Dark orange
Powder treated with conc. HCl + H ₂ O	Yellow orange	Light pink	Light pink
Powder treated with Pet. ether	Brownish grey	Light brown	Dark brown
Powder treated with 10% NaOH.	Brown yellow	Dark yellow	Brown yellow
Powder treated with methanol	Faded orange	Light pink	Light pink
Powder treated with ethylacetate	Light grey	Light pink	Pink
Powder treated with conc. H ₂ SO ₄	Brown red	Black red	Black red
Powder treated with conc. H ₂ SO ₄ + H ₂ O	Brown orange	Black orange	Black orange
Powder treated with picric acid	Yellow orange	yellow orange	Dark yellow
Powder treated with 5% FeCl ₃	Brown orange	Brown orange	Yellow orange
Powder treated with chloroform	Dark orange	Light orange	Dark orange
Powder treated with HNO ₃	Brown red	Dark red	Dark red
Powder treated with HNO ₃ + H ₂ O	Brown orange	Dark orange	Dark orange
Powder treated with 5% Iodine	Brown red	Black red	Dark red

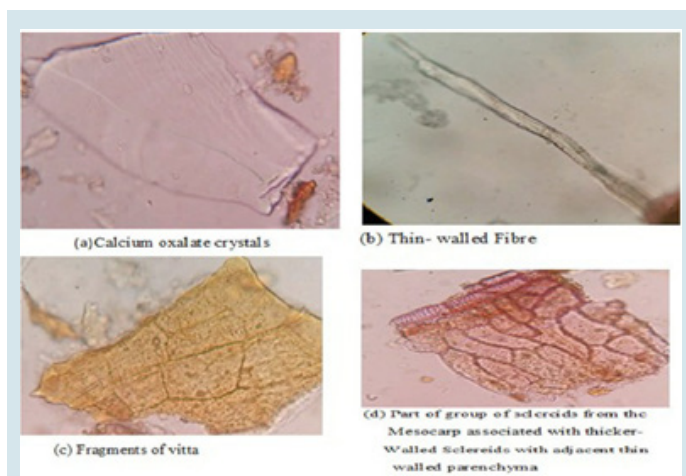


Figure 1: Shows the Observation of Various Powder Characters of Fruits of *Bunium persicum* with (a) Calcium Oxalate Crystal (b) Thin- Walled Fiber (c) Fragments of Vitta and (d) Part of Sclereids from the Mesocarp Associated with Thicker- Walled Sclereids with Adjacent thin Walled Parenchyma

Proximate Analysis and Phytochemical Screening of *Bunium persicum*

For the evaluation of Pharmacognostic parameters of the fruits of *Bunium persicum*, the proximate analysis was used as shown in (Table 1). The phytochemical screening of hydroalcoholic extract of the fruits of *Bunium persicum* showing presence of various Phytoconstituents are shown in (Table 2). The fluorescence analysis of powdered drug treatment with different reagents was studied under visible light and under UV light as shown in (Table 3).

DISCUSSION

Genus *Bunium* has been largely used as medicinal agent, a number of researches revealed that the presence of medicinal substances in the fruits of *Bunium persicum*. This study revealed the characteristics of macroscopy, microscopy and Pharmacognostic parameters from the fruits of *Bunium persicum*. This data is expected to be a reference for the selection of raw material for the production of crude extract from the fruits of *Bunium persicum*. According to World Health Organization guidelines, the macroscopic and microscopic characters are the initial steps in the determination of degree of purity and identification of such materials.

The current Macroscopical and microscopical observations of the fruits of *Bunium persicum*, thus provides the useful information for quality control parameters for the crude drugs. The ash value was used to detect the presence of foreign matters in the sample such as sand and soil. The extractive value was used to determine the amount of active constituents. Loss on drying determine the amount of moisture as well as volatile content present in a drug. PH determination showed the concentration of acidic and basic compounds present in the extract. The fluorescence is an important phenomenon exhibiting by various chemical constituents present in the plant material and it is an important Pharmacognostic evaluation parameter. The results of phytochemical screening of hydroalcoholic extract of the fruits of *Bunium persicum* showed the presence of various Phytoconstituents such as flavonoids, terpenoids, carbohydrates tannins etc.

CONCLUSION

Characteristic macroscopy and microscopy of *Bunium persicum*(fruit) in this study are suggested to be a benchmark in the selection process of raw materials for the preparation of herbal medicines containing the fruits of *Bunium persicum*. Pharmacognostic parameters and phytochemical screening were also suggested to be a benchmark for the quality control of the fruits of *Bunium persicum*

ACKNOWLEDGEMENT

The authors acknowledge the support of: Department of Pharmaceutical Sciences (DOPS), University of Kashmir, Srinagar, Jammu and Kashmir, India, for providing the necessary facilities to conduct this study.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

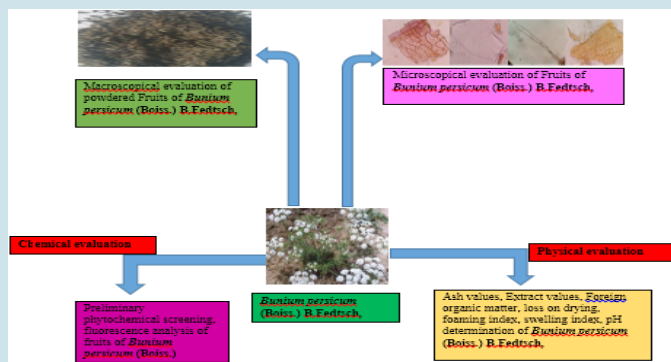
UV: Ultraviolet.

REFERENCES

1. Aminzare M, Amiri E, Abbasi Z, Hassanzadazar H, Hashemi M. Evaluation of *in vitro* Antioxidant Characteristics of Corn Starch Bioactive Films Impregnated with *Bunium persicum* and *Zataria multiflora* Essential Oils. *Annu Res Rev Biol*.

- 2017;15(5):1-9.
2. Miraj S, Kiani S. Pharmacological activities of *Carum carvi* L. *Pharm Lett*. 2016;8(6):135-8.
3. Salehi P, Mohammadi F, Asghari B. Seed essential oil analysis of *Bunium persicum* by hydrodistillation-headspace solvent microextraction. *Chem Nat Compd*. 2008;44(1):111-3.
4. Sofi PA, Zeerak NA, Singh P. Kala zeera (*Bunium persicum* Boiss.) a Kashmirian high value crop. *Turk J Biol*. 2009;33(3):249-58.
5. Mandegary A, Arab-Nozari M, Ramiar H, Shariffar F. Anticonvulsant activity of the essential oil and methanolic extract of *Bunium persicum* (Boiss). *B Fedtsch J Ethnopharmacol*. 2012;140(2):447-51.
6. Judd W, Campbell C, Kellogg E. *Plant Systematics- a phylogenetic approach*. Sinauer Associates Inc USA. 2002;470-1.
7. Thappa RK, Ghosh S, Agarwal SG, Raina AK, Jamwal PS. Comparative studies on the major volatiles of Kalazira (*Bunium persicum* seed) of wild and cultivated sources. *Food Chemistry*. 1991;41(2):129-34.
8. Agah S, Taleb AM, Moeini R, Gorji N, Nikbakht H. *Cumin* extract for symptom control in patients with irritable bowel syndrome: A case series. *Middle East J Dig Dis*. 2013;5(4):217-22.
9. Evans WC, Evans D, Trease GE. *Trease and Evan's Pharmacognosy*. 16th ed. Saunders/Elsevier. 2009.
10. Trease GE, Evans WC. *Pharmacognosy*. International edition. WB. Saunders. 2008;2(3):53844.
11. Chaudhari RD. *Herbal drug industry*, 1st ed. Eastern Publisher, New Delhi. 1996;498-9.
12. Chase CR, Pratt R. Fluorescence of powdered vegetable drugs with reference to development of a system of identification. *Journal of Pharmaceutical Sciences*. 1949;38(6):324-31
13. *Pharmacopoeia I*. Ministry of health and family welfare. Government of India. 1996;2:350.
14. Anonymous. *Standardization of Single Drugs of Unani Medicine (Part-II)*. Central Council for Research in Unani Medicine, New Delhi. 1992.
15. Mukherjee PK. *Quality control of herbal drugs: an approach to evaluation of botanicals*. New Delhi: Business Horizons Publication. 2002.
16. Kokoski CJ, Kokoski RJ, Slama FJ. Fluorescence of powdered vegetable drugs under ultraviolet radiation. *Journal of the American Pharmaceutical Association*. 1958;47(10):715-7.
17. Harborne JB. *Phytochemical methods in: A guide to modern techniques of plant analysis*. 3rd Ed. Chapman and Hall, U.K. ICMR. 1998;56-99.
18. Trease GE, Evans WC. *A textbook of Pharmacognosy*, London. Bailliere Tindall. 1983;12(193):336.

PICTORIAL ABSTRACT



SUMMARY

- The present study provides characteristics of Fruits of *Bunium persicum* as well as phytochemical screening and fluorescence analysis as a reference for the quality control of herbal medicines.

ABOUT AUTHORS

Riehana Gani: Is a Doctoral Research Scholar at Department of Pharmaceutical Sciences, University of Kashmir, Srinagar, India. Her research is focused on the evaluation of medicinal plants from Kashmir Himalayas for their biological activity and development of quality control standards.

Prof. Zulfiqar Ali Bhat: Is presently Heading Department of Pharmaceutical Sciences, University of Kashmir. His area of specialization is Pharmacognosy and Phytochemistry. He has more than 20 years of teaching and research experience. His area of research is mainly focused on medicinal plants of Kashmir valley and Ladak region. He has worked on plants having CNS, anti-diabetic, anti-inflammatory, anti-ulcer, anti-hyperlipidemic and hepatoprotective activity. He is also member of many Scientific Journals. He has number of National and International publications to his credit and has guided a number of PhD scholars.

Mudasir Ahmad Dar: Is a Research Scholar at Department of Pharmaceutical Sciences, University of Kashmir. His area of Specialization is standardization of plant derived natural medicines from Kashmir Himalayas. He is working on the plants having antimicrobial and CNS related activities and is working on the estimation of phytochemicals using various methods including HPTLC.

Junaid UI Yousuf Rather: Is a Research Scholar in the Department of Pharmaceutical Sciences, University of Kashmir. He is presently doing M.Pharm in Pharmacognosy and Phytochemistry and is working on the biological activities and standardization of medicinal plants.

Mohammad Akbar Dar: Is a PhD Pharmaceutical Chemistry from University of Kashmir. His PhD Research was focused on Antidiabetic potential of the medicinal plants from Kashmir Himalayas using *in vivo* rat models and the isolation of the antidiabetic phytochemicals from these plants. In addition to that he has worked on antibacterial, anti-inflammatory and antioxidant potential of medicinal plants for which he has the publication in his name.