

## BERBERINE CONTENT OF BERBERIS SPECIES FROM PUNJAB AND NWFP FORESTS

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### Summary

In view of the medicinal value of berberine, a drug needed in international market, a study has been undertaken to evaluate the berberine content of *Berberis* species found in the forests of Punjab and N.W.F.P. The study would help in process development and its economic feasibility evaluation.

### Introduction

Berberine is the major constituent of various species of *Berberis* which are abundantly available in the forests of northern part of Pakistan. Berberine possess antibacterial and anti-protozoal properties and has also been used in the treatment of eye diseases(1). Berberine has also been reported to be useful in the treatment of cholecystitis and dyskinesia(2). Recent researches have indicated that it possesses strong anti-inflammatory activity(3), and has also been found effective against cholera induced diarrhoea(4). Berberine inhibits the growth of *Streptococcus mutans*, thus finding use in the prevention of dental caries(5). It is a standard medicine of Chinese and Japanese Pharmacopoeia.

The commonly available *Berberis* in our forest is *Berberis lycium*, locally called "Sumlo", which grows wild at various altitudes ranging from 1300 to 2500 meters. It is found scattered throughout the forest but comparatively more abundant in Ghora Gali, Charhan and Patriata forests. Other species of *Berberis* associated with *B. lycium* are *B. pachyacantha*, *B. parkeriana* and *B. pseudoumbellata*.

The present work has been undertaken with a view to finding out the availability of *Berberis* in our forest and to determine the berberine content for its commercial exploitation since it has an export potential and its annual demand is over 20 tons.

Representative samples of *Berberis*, irrespective of the determination of species were collected from Charhan, Patriata, Ghora Gali, Murree, Bara Gali, Dunga Gali, Nagri Bala, Jaba and Bugher Mang during November and December and analysed for berberine content. The berberine content was determined by standard analytical method and also by the isolation technique.

### Results and Discussion

Samples of *Berberis* roots were collected from nine different localities listed in Tables

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I & II. Table I provides the information regarding the berberine content which has been determined by analytical method as described in Indian Pharmaceutical Codex and also by isolating the pure alkaloid. The isolation was carried out by soxhlet extraction of the powdered roots in alcohol, concentration followed by acidification of the extract by HCl and cooling. The crystalline precipitate was filtered, washed and dried to constant weight. The identity of berberine was confirmed by n.m.r., i.r. and t.l.c.

TABLE - I

S.No.	Sample	Colour of Picrolonate	Berberine content (Analysis)	Berberine chloride (Isolation)
1.	Charhan Forest - Murree.	Yellow	2.14%	1.69 ± 0.1%
2.	Patriata Forest	Yellow	2.16%	1.4 ± 0.1%
3.	Ghora Gali (R).	Reddish Brown	2.28%	1.15 ± 0.1%
4.	Municipal Area, Murree.	Yellow	2.0 %	1.00 ± 0.1%
5.	Bara Gali (R).	Reddish Brown	2.42%	1.95 ± 0.1%
6.	Dunga Gali Ayubia Link Road.	Reddish Brown	2.7 %	1.78 ± 0.1%
7.	Nagri Bala (Below Kala Bagh).	Yellow	2.04%	1.65 ± 0.1%
8.	Jaba (Cpt 12/iii Kiper).	Yellow	1.88%	1.02 ± 0.1%
9.	Bugher Mang (Dader-Jabori).	Yellow	1.89%	0.67 ± 0.1%

Table-II gives an approximately estimated quantity of the dry Berberis roots available in various localities. Notwithstanding the merit of well-considered survey figures for further projection in justifying the commercial extraction of raw material for berberine production, it was desired to come to an approximate figure at least to highlight the resource which as yet has not found channel of exploitation. All the areas under reference were criss-crossed and by finding the plant population on unit area basis, an approximation was made. These localities cover most of the mountainous regions which has the potential of sustained supply of raw materials for berberine production if managed on scientific lines.



TABLE – II

S.No.	Source	Approximate Estimated Quantity
		(Kg – Dry)
1.	Charhan RF Compartments 41 & 42.	60,000 Kg
2.	Patriata RF.	45,000 „
3.	Ghora Gali Forests.	45,000 „
4.	Municipal Area Murree.	12,000 „
5.	Bara Gali.	10,000 „
6.	Dunga Gali – Ayubia.	10,000 „
7.	Nagri Bala (Below Kalabagh).	15,000 „
8.	Jaba.	15,000 „
9.	Bugher Mang (Daddar-Jabori).	8,000 „

### Conclusion

It appears from the figures in Table-I that the berberine content of *Berberis* from Bara Gali and Dunga Gali is higher than other areas as evidenced by analysis and isolation. However, the estimated quantity of *Berberis* is too small to commercially exploit from these areas. The best areas appear to be Charhan and Patriata forests where large quantity of *Berberis* is available, and which gives a relatively better yield of berberine than other areas. As far as the economics of the extraction of berberine is concerned it depends primarily on the quality of raw material alongwith its cost. The average berberine content in *Berberis* species from our forest is 2–2.5% as against *Berberis vulgaris* (an Indian species) which contains 5–6% berberine. The indigenous raw material would thus be required at a cheaper cost for an economically feasible process for the extraction of berberine.

### Acknowledgements

The authors are grateful to Director, P.C.S.I.R. Laboratories, Peshawar for his keen interest in the work. The authors are also grateful to Dr. M. Nawaz Malik, Director, Biological Sciences Research Division, Pakistan Forest Institute, Peshawar for many helpful discussions and suggestions.

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