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Effect of Drying on Total Bitter Contents in *Gentiana kurroo* Leaves

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ABSTRACT The leaves of Gentiana kurro Royle was harvested from a period between May to December 2011 for three different developmental phases (before flowering, flowering and after flowering) for determination of the total bitters. The best development phase was identified and its leaves were further subjected to three different drying methods –sun dry, shade dry and oven dry (40°C). In shade dry, sun dry and oven dry the total bitters were found to be 2.62%, 2.40% and 1.98% respectively. The total bitters strongly depended on the drying method.

KEYWORDS : *Gentiana kurroo;* total bitters; fresh leaves, dried leaves.

INTRODUCTION

Gentiana kurroo Royle (commonly known as Kutki, Karu, Kaur, Trayman) belongs to family Gentianaceae- a widely distributed family represented by more than 90 genera and 1000 species worldwide. It grows naturally in temperate to alpine grassy slopes, plateaus, and open places in northwestern Himalayan states of Jammu & Kashmir, Himachal Pradesh and Uttarakhand ranging between 1800-2700 m above the sea level[1,2] .This perennial, glabrous, branched herb with thick, stout root stock is traditionally uprooted and the rhizomes and roots are traded to prepare medicinal formulations: Sudarshana Churna prescribed in intermittent and malarial fevers, as an antiperiodic, and digestive compound, also prescribed in skin diseases, leprosy as a blood purifier. It is valued as bitter tonic, anti periodic, expectorant, antibilious, astringent, stomachic, anthelmintic, blood purifier and carminative[3,4], antioxidant[5], anti-inflammatory activity[6]. Bioactivity/ medicinal properties are supposed to be attributed to bitters. The aim of our study was to identify the optimum development phase for leaf harvest and to compare the effect of the drying method: shade dry, oven dry (40°C) and sundry on the quantity of total bitters in gentian leaves.

MATERIAL AND METHODS

Study area: The present study was conducted in Forest Research Institute's "High Altitude Herbal Garden, Chakrata. The chemical investigations was carried out in the laboratory of the Chemistry Division, Forest Research Institute, Dehradun, Uttarakhand.

Plant material: Even aged mother planting stock was collected for field experimentation from Kadukhal Nursery [30°24'.316"N Lat, 78°17'.911"E Long] in Saklana Range of Narendranagar Forest Division in the year 2011 and then transplanted in "High Altitude Herbal Garden, Chakrata.

Chemicals and Reagents: The solvents and chemicals used were laboratory grade methanol, ethanol, ethylacetate and sulphuric acid procured from Rankem/E. Merck; Methanol and chloroform (AR Grade) were obtained from Sd-fine; TLC silica aluminum sheets were purchased from E. Merck. Silica gel G is used for TLC.

Determination of Total bitters in different developmental stages of *Gentiana kurroo*

The study aimed to identify the best developmental stage in which the total bitters were maximum. The leaves were collected in the three months viz. May (before flowering), September (during flowering: full bloom) and in December (after flowering: capsule formation). After the collection, the leaves were washed under tap water and then allowed to dry under shade at room temperature. The dried leaves were then crushed to fine powder for further chemical analysis. Moisture content of the different batches varied; about 75.76% to 64.02% hence moisture content of each batch was therefore taken into account for the calculation of amount of total bitters. To quantify the loss during drying, dry matter of the ground samples was measured by oven drying at about 110°C to constant weight according to the pharmacopoeial requirements[7]. The total bitters were determined for all the three developmental stages of the plants separately following the procedures as mentioned in Ayurvedic pharmacopeia of India, volume 1 part 1;1986. 2 gram of powder (No. 60 sieve) of *Gentiana kurroo* was mixed with boiling water containing 0.5gram of calcium carbonate till the last portion of the extract was devoid of bitterness. Then it was concentrated in vacuum (Life lysed) and the residue was dissolved in hot alcohol. This was filtered at hot, and then residue was washed thrice on the filter with 10ml hot alcohol. The alcohol solution was removed from the filtrate and the residue was repeatedly taken with 25, 15, 15, 15, and 15 ml of hot water. The aqueous solution was shaken and extracted repeatedly with 25, 20, 15, 15 and 10 ml of Ethyl Acetate, extracts was collected, evaporated, dried and weighed[11]. The powder of three samples from three developmental phases was taken repeatedly and replicated thrice for the consistency in the result. After identification of the optimum phase, the leaves were collected and then subjected to three different drying methods: shade dry, oven dry and sundry. Total bitters were quantified following the above mentioned procedure.

RESULTS AND DISCUSSION

The bitterness test of the material revealed some variation with respect to bitter content in different developmental phases. The sample collected during before flowering phase had a bitter content of 2.70±0.16 % while the samples from flowering and after flowering stages had bitter content of 2.92±0.04% and 1.50±0.11 % respectively. The percentage values of bitters principle in different developmental phases showed a slight variation between the samples. The difference was only 0.20% between flowering and before flowering and 1.40 % between flowering and after flowering phases. The content of bitters at the particular stage of growth is the net result of rate of production of biomass and of the phytochemicals. In present case the increase of bitter value from non flowering to flowering stage indicated that the bitters are synthesized at much faster rate than the biomass however after

flowering stage onwards the bitter production lags behind than the rate of biomass. The total bitters value of samples of different developmental stages is tabulated in Table-1.

Table 1: Total Bitters in different developmental phases

Parameter	Before Flowering	Flowering	After Flowering
Total Bitters (%)	2.70	2.92	1.50
SD	0.16	0.04	0.11

SD0.150.120.11This comparative study concerned variation of total bitters among leaves dried through three different methods. The medicinal plant materials should have low content of moisture to discourage the risk of microbial infection[8]; this is the reason why drying of the medicinal plants prior to their storage holds an immense importance. In the present study, the mean levels of total bitters are reported (Table 2) with maximum total bitter content in shade dried leaves (2.62% dry weight) followed by sun dried leaves (2.40% dry weight) along with lowest amount in oven dried leaves (1.98% dry weight). Our finding were in agreement with the work done by Bahuguna[9] who prescribed shade dry method than the sun dry and shade dry methods.

Table 2: Total Bitters for different drying methods.

Drying conditions	Sun dry	Shade dry	Oven dry
Total Bitters (%)	2.40	2.62	1.50
SD	0.15	0.12	0.11

It has been observed that during the oven drying, degradation of the bitter are possible which might explain the losses of bitters. Oven dry method greatly depresses the bitter content level (1.98% dry weight), while shade dry method conserves most of bitters.

The research related on the drying process on this species is still insufficient and there is an increasing need for specific studies in this context because different constituents behave differently under various drying conditions. For this reason, the suitable drying condition should be adopted to ensure maximum retention of the active constituents[10].

CONCLUSION

The present study is the first report on effect of drying methods on total bitter contents of *G.kurroo*. The maximum bitter content is observed during flowering phase however the collections of this species should be discouraged during this phase to avoid threat to its existence. The dormant stage of the plant can be utilized for collection. The mode of drying method has direct effect on bitter content therefore shade dry method is the best method in terms of maximum preservation of total bitters contents. The knowledge of the drying method is necessary to increase the shell life of the plant and reduce loss of active substances. This study will help in improving the quality of the plant after harvesting thereby providing high income returns to the collectors.

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REFERENCES

1. Khuroo, A.A., Dar, G.H., Khan, Z.S. and Reshi, Z.A.(2005).Observations on Gentiana kurroo Royle, a critically endangered medicinal plant from the Kashmir Himalaya, India, Endangered species update.
2. Chauhan, N.S.(1999).Medicinal and Aromatic Plants of Himachal Pradesh. Indus Publishing Company, New Delhi:207-210.
3. Kirtikar, K.R., Basu, B.D. (1935). Indiana Medicinal plant (IInd Ed) Bishen Singh Mahendra Pal Singh. Periodicals expert, Dehradun Vol III: 1661-1662
4. Chopra, R.N., Nayar, S.L., Chopra, I.C. (1956). Glossary of Indian Medicinal Plants, C.S.I.R, New Delhi:124.
5. Ambika (2010).Isolation and Chemical Studies of Active Constituents From Selected Medicinal Plants, Ph.D Thesis, Delhi University, India
6. Latif, A. & Afaq, S.H. (2007). Anti-inflammatory activity of flower tops of Gentiana kurroo Royle extract, Forsch Komplementarmed, 14(suppl 1):23.
7. Zhang, X. (2002).European Pharmacopeia, 4th edn. EDQM, Strasbourg: 50–51.
8. WHO guidelines on good agricultural and collection practices (GACP) for medicinal plants.2003.
9. Bahuguna, R., Bisht, H., Prakash, V.(2012).Active content enhancement through different agrotechnological and post harvesting approaches in Picrorhiza kurroa Royle ex Benth: An Endangered Medicinal Plant. International Journal of Biological Chemistry:1-6.
10. Machado, M. P.; Bergo, C. L.; Deschamps, C.; Bizzo, H. R.; Biasi, L. A. (2013).Effect of the natural and artificial drying of leaf biomass Piper hispidinervum on the chemical composition of the essential oil. Semina: Ciências Agrárias, Londrina. 34(1): 265-270.