Variability study on Katha recovery in Konkan region of Maharashtra state

MINAL G KHAWALE, VINOD M MHAISKE, VINAYAK K PATIL, AJAY D RANE and SATISH S NARKHEDE

College of Forestry, Dr Balasaheb Sawant Konkan Krishi Vidyapeeth
Dapoli, Dist Ratnagiri 415712 Maharashtra, India
Email for correspondence: vinod.mhaiske@gmail.com

 Received: 03.02.2023/Accepted: 15.03.2023

ABSTRACT

Khair (*Acacia catechu* Willd) is a deciduous tree containing dark red heartwood inside the sapwood belongs to the family Fabaceae. It yields mainly two products Katha and cutch which have many medicinal benefits and industrial uses. The present study was carried out to assess the Katha recovery in mechanical method of extraction by selecting heartwood of Khair trees from two locations namely Thane and Ratnagiri. Results showed that recovery from chips to dry Katha was obtained 8.79 per cent in both the districts. On the basis of analysis, it was concluded that the variation in dry Katha recovery from chips did not occur in between the two locations of Konkan region.

Keywords: *Acacia catechu*; Katha; recovery; variation; locations

INTRODUCTION

*Acacia catechu (*Willd) is a deciduous and gregarious tree with a light feathery crown known as one of the most promising medicinal plants of family Fabaceae (Bhattarai et al 2020). This species is common in dry regions where annual rainfall varies from 500 to 2,160 mm. It is a strong light demander (Troup 1921) and usually 2.5 feet in girth and 25 feet in height (Kulkarni 1956).

Khair tree occurs throughout India but is distributed mainly in Uttar Pradesh, Bihar, Madhya Pradesh, Andhra Pradesh, Gujarat and Maharashtra (Jain 1980). It is found growing in both natural and plantation forms (Singh and Lal 2006) and occurs in tropical moist deciduous forest, dry tropical forest and thorn forest (Champion and Seth 1968).

The gum from Khair is said to be of very good quality and is regarded as the best substitute for true gum Arabic (Tewari 1995). The heartwood of Khair is durable and is much prized for boat making, railway sleepers, poles and posts etc (Trotter 1929). Timber of Khair is very hard and used for construction. From silvicultural view, it is important for plant succession where it acts as pioneer tree species in the riverain succession (Kumar 1998). Katha is regarded as astringent, cooling and digestive and is useful in sore throat, cough, diarrhea and acts as astringent and cooling application to ulcers, boils and eruptions on the skin. It is an indispensable ingredient of Paan preparations. Because of leguminous nature and soil binding abilities of Khair, it could be a suitable species for wasteland development (Singh and Lal 2006).

The total area under Khair is estimated to be about 5,800 sqkm in the country with annual consumption of 63,000 tonnes of Khair heartwood. It has been estimated that about 3,000 to 3,500 tonnes of Katha is produced annually by small scale and cottage industries in the country (Wanage et al 2013). Its trees are sold on weight basis in the Konkan region of Maharashtra. Sometimes, trees are sold by auction (Wanage 2010). In Indian markets, the cost of Katha extracted from heartwood of Khair ranges from Rs 400 to 950 per kilogram (https://indianjadibooti.com/Jadistore/Khair-chaal).

It has been estimated that about 3,000 to 3,500 tonnes of Katha is produced annually by small scale and cottage industries in the country. However, the annual demand of this species is increasing

exponentially as numerous small cottage industries are established every year (Wanage et al 2013).

Khair tree has more medicinal and industrial uses and it is a scientifically more important plant. It appears that the gap between the demand and supply of Khair wood has been increasing (Khawale et al 2022). Many Katha industries are registered in Maharashtra state but limited research has been conducted on recovery of Katha (Anon 2022). An understanding of the Katha recovery in Maharashtra state is a prerequisite. Therefore, present investigations were conducted to study the variation in Katha recovery with respect to locations.

MATERIAL and METHODS

The present study was carried out in Ratnagiri and Thane districts of Konkan region of Maharashtra state. Availability of Khair logs in adequate quantity favours the establishment and growth of Katha producing industries in this region. As per the records of the state forest department there are total 69 Katha processing industries presently operating in Ratnagiri district (Anon 2022).

With the consultation of forest officers, 3 mechanical Katha producing industries from Chiplun forest range and 1 mechanical producing industry from Dapoli forest range were selected randomly. Heartwood of Khair from Thane district was processed at Industry I_2 (units 1 and 2) and from Ratnagiri district at industries I_1, I_3 and I_4. For the research purpose three replications of each selected industry were taken and observations were recorded.

Processing and extraction

Available Khair logs in Katha producing units were selected for the experiment. Bark and the sapwood of Khair logs were removed using bark remover and special saw. Accordingly, the heartwood was separated from the logs and selected for further process. Chipping machine was used to make chips of heartwood logs. Collected chips were filled in the sacks and the weight of sacks was taken with the help of weighing balance.

Mechanical method of Katha extraction is boiler method. Main source of Khair logs for Katha industry was from Ratnagiri and Thane districts. Available containers of 10,000, 8,000, 2,000 and 1,000 liter capacity were used for the experiment. A ratio of 1:3 of heartwood chips to water was maintained and this mixture was allowed to boil in containers for 2 hours. Temperature of mixture was maintained between 95 to 105°C and pressure between 5 to 5.5 Pa. The extract was transferred in another vessel for boiling again for 2 hours.

Specific gravity was measured using twaddle hydrometer showing 24° reading and liquid was allowed to cool. Sample of 100 g of cooled liquid extract of heartwood was collected in the sample bag and kept in Petri plates at room temperature for drying purpose. Daily observations on weight of samples were taken using weighing balance till it became dry and solid. For statistical analysis, quantity of heartwood chips used in Katha estimation was converted to 2,000 kg for industry I_2 (units 1 and 2) and industry I_3 for comparison purpose. Heartwood of Khair from Thane district was processed at Industry I_2 (unit 1 and 2) and from Ratnagiri district at industry I_1, industry I_3 and industry I_4.

RESULTS and DISCUSSION

From the data presented in Table 1, it can be seen that mean value for chips to liquid extract recovery in Thane district was 25.93 per cent, whereas, in Ratnagiri district it was 25.89 per cent. The recovery of dry Katha from liquid extract was 33.94 and 33.89 per cent in Thane and Ratnagiri districts respectivley. However, recovery from chips to dry Katha was 8.79 per cent in both the districts.

On the basis of these results, it can be concluded that the much variation did not occur in between the two locations (Thane and Ratnagiri districts) for recovery of Katha. It could be due to similar climatic conditions, soil type, cultivation practices used and method of extraction. Konkan comprises the districts of Palghar, Thane, Raigad, Ratnagiri and Sindhudurg and coastal saline soils occur in these districts (Patil et al 2016). Similarly, annual rainfall in these areas varies between 3,000 to 4,000 mm (Sahu et al 1982).

The recovery of Katha is attributed to various factors (Khawale et al 2022). Yield of Katha is mainly governed by locations (Jain 1980), annual rainfall (Dobhal and Beri 1981), locality factors (Hill 1952), age factor (Wanage et al 2013), locality factors, site quality, general form of trees, density of other associated species (Kumar 1998) and disc position of the heartwood of Khair (Luna et al 2009).

Table 1. Variation in Katha yield with respect to locations

Component	Thane district			Ratnagiri district			
	I_2 (Unit 1)	I_2 (Unit 2)	Mean	I_1	I_3	I_4	Mean
Weight of chips (kg)	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Weight of liquid extract (kg)	541.33	496.00	518.66	516.67	545.33	496.66	519.55
Weight of dry Katha (kg)	183.57	168.52	176.04	175.05	179.31	173.37	175.91
Chips to liquid extract (%)	27.07	24.80	25.93	25.59	27.27	24.83	25.89
Liquid extract to dry Katha (%)	33.91	33.98	33.94	33.88	32.88	34.91	33.89
Chips to dry Katha (%)	9.18	8.41	8.79	8.75	8.96	8.66	8.79

I = Industry

Anon (2020) reported that recovery percentage of Uttar Pradesh Khair wood was about 4 to 5 per cent which was less than the Khair wood of the other states. Present results are in accordance with the findings of Dobhal and Beri (1981) who reported no variation in Katha and cutch yield for thick and open forest of Maharashtra and Gujarat states.

CONCLUSION

Khair tree has traditional, commercial and tremendous ecological significance. Efforts have been made to attract the commercial attention to the Khair cultivation on larger scale. The product of Khair ie Katha is regarded as astringent, cooling agent and shows many medicinal properties. The demand of Katha in national and international markets is continuously increasing but supply of Katha is less. Results of this study revealed that the variation in Katha yield was not observed in between the two locations (Thane and Ratnagiri districts) of Konkan region of Maharashtra. Climatic conditions, soil type, management practices and method of extraction decide the Katha recovery. The recovery of Katha is governed by various factors; therefore, further in-depth research is needed to increase the recovery so that domestic and international requirement of Katha could be fulfilled.

ACKNOWLEDGEMENT

The authors are grateful to the Divisional Forest Officer, Chiplun, Ratnagiri, Maharashtra for granting permission to conduct the research experiments at Chiplun and Dapoli Forest Ranges, Ratnagiri. Thanks are also due to owners of Katha industries for providing necessary facilities to carry out this research work.

REFERENCES

Anonymous 2020. Study to know the percentage and value of the raw material sourced through UP forests by plywood and Khair (Kattha) industries in UP. Project Report, Department of Planning, Economics and Statistics Division, Government of Uttar Pradesh, India.

Anonymous 2022. Office record data. State Forest Department, Divisional Forest Office, Chiplun, District Ratnagiri, Maharashtra, India.

Bhattarai R, Sharma P, Wagle B, Adhikari A and Acharya S 2020. Revision and compilation of health management plan of Khair (*Acacia catechu*). Grassroots Journal of Natural Resources **3(1):** 15-28.

Champion HG and Seth SK 1968. A revised survey of the forest types of India. Manager of Publications, Delhi, India, 404p.

Dobhal NP and Beri RM 1981. Note on the Katha content of *Acacia catechu* Willd growing in thick and open forests. Indian Forester **107(4):** 252-254.

Hill AF 1952. Economic botany: a text book of useful plant products. McGraw Hill Book Company, Inc, New York, 560p.

https://indianjadibooti.com/Jadistore/Khair-chaal (Accessed 06.01.2023)

Jain PP 1980. A note on production of Kattha and cutch in India. Indian Forester **106(8):** 563-573.

Khawale MG, Mhaiske VM, Patil VK, Narkhede SS and Rane AD 2022. Recovery of Katha in India- a review. International Journal of Farm Sciences **12(3):** 139-141.

Kulkarni DH 1956. Heartwood volumes and Katha yields by Indigenous method from dry type Khair of central India. Indian Forester **82(8):** 403-405.

Kumar S 1998. Studies on biomass and Katha yield estimation in Khair (*Acacia catechu* Willd) in Himachal Pradesh. PhD (Forestry) Thesis, Dr YS Parmar

University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh, India, 170p.

Luna RK, Kamboj SK and Thakur NS 2009. Sources variation in Katha and cutch contents in Khair (*Acacia catechu* Willd) in Shiwalik hills of Punjab. Annals of Forestry **17(1):** 89-96.

Patil KD, Vanave PB, Borse DK, Vartak VR, Palkar JJ and Khobragade SS 2016. Coastal saline soils of Maharashtra, Khar Land Research Station, Dr Balasaheb Sawant Konkan Krishi Vidyapeeth, Panvel, District Raigad, Maharashtra, India, 34p.

Sahu RK, Chavan KN and Kadrekar SB 1982. Ground water characteristics of coastal saline soils of Maharashtra. Current Agriculture **6(3-4):** 142-145.

Singh KN and Lal B 2006. Notes on traditional uses of Khair (*Acacia catechu* Willd) by inhabitants of Shivalik range in western Himalaya. Ethnobotanical Leaflets **10(1):** 109-112.

Tewari DN 1995. Monograph on Khair (*Acacia catechu* Willd). International Book Distributors, Dehradun, Uttarakhand, India, 127p.

Trotter H 1929. The common commercial timbers of India and their uses. Government of India Central Publication Branch, Government Place, West Calcutta, West Bengal, India, 153p.

Troup RS 1921.Silviculture of Indian trees. Vol II, Clarendon Press, Oxford.

Wanage SS 2010. Heartwood and tannin yield estimation in *Acacia catechu* Willd for cutch and Katha. MSc Thesis, Dr Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, District Ratnagiri, Maharshtra, India.

Wanage SS, Rane AD, Gunaga RP, Narkhede SS and Bhave SG 2013. Yield table of *Acacia catechu* for the lateritic-humid tropics. Journal of Tree Sciences **32(1-2):** 8-13.