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**TRUE MORELS (*Morchella* spp.) AND COMMUNITY LIVELIHOOD
IMPROVEMENT IN MANKIAL VALLEY, DISTRICT SWAT, KHYBER
PAKHTUNKHWA, PAKISTAN**

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ABSTRACT

True morels collected from wild provide an economic source for the rural community of Mankial valley (District Swat, Khyber Pukhtunkhawa, Pakistan). Sale of approximately 334 kg in dry weight of five species of true morels (*Morchella conica*, *M. esculenta*, *M. deliciosa*, *M. rotunda* and *M. semilibera*) fetch US\$ 57133 (under US\$ 2015-16 exchange rate) to Mankial community and generate a revenue of US\$ 62935 in Mingora (regional market) and US\$ 87011 in Islamabad (national capital) markets. *Morchella conica* (average annual dry weight harvested 156 kg) has a high market price value (US\$ 2964-44616) in all the three markets. *M. esculenta* (average annual dry weight harvested 120 kg) the second most harvested species (fetching US\$ 20640-32040), *M. deliciosa* (34 kg; US\$ 4216-6460), *M. rotunda* (13 kg; US\$ 1482-2223) and *M. semilibera* (11 kg; US\$ 1155-1672) appeared in decreasing order.

Key words: *Morchella* spp., Mankial valley, Mingora, *Morchella conica*, dry weight

INTRODUCTION

True morels (*Morchella* spp.) or spongy mushroom are edible wild fungi (Kuo, 2005) having unique taste (Rotzoll et al., 2006), high market value (Weber, 1995; Kuo, 2005) and increasing demand in international market (Wang et al., 2015; Yang et al., 2016). It is a supplementary resource of earning for local people in different regions/localities (Bhardwaj and Ghakar, 2005; Lakhanpal et al., 2010; Bunyard and Nicholson, 1994). Morels attract consumers from USA, Mexico, China, India, Turkey (Pilz, 2008; Prasad et al., 2002) and European countries (Pilz et al., 2007). An estimated annual consumption of dried morels in the world is about 900,000 kg with average price of US\$ 160/ kg (Du et al., 2015). Morels grow in wild temperate forests, including broad-leaved and conifer forests (Negi, 2006) in different parts of the globe including Pakistan (Pilz et al., 2007).

Morels are found in Mankial valley (district Swat, Khyber Pukhtunkhwa, Pakistan) and play a vital role as a resource of income for the local community. Information on economic value of morels harvested in Mankial valley is not available. This study attempted to report the contribution of morel harvesting in livelihood of Mankial valley (district Swat, Khyber Pakhtunkhwa, Pakistan) community.

MATERIAL AND METHODS

Study Area

Mankial valley (35° 15' 18" to 35° 25' 17" N; 72° 36' 11" to 72° 47' 5" E; 1,300 ha) is located in the north-east of district Swat (Khyber Pukhtunkhawa, Pakistan) is a mountain valley (1430 -5726 m above sea level) having coniferous and Quercus forests (Ullah and Rashid, 2014: Figure 1).

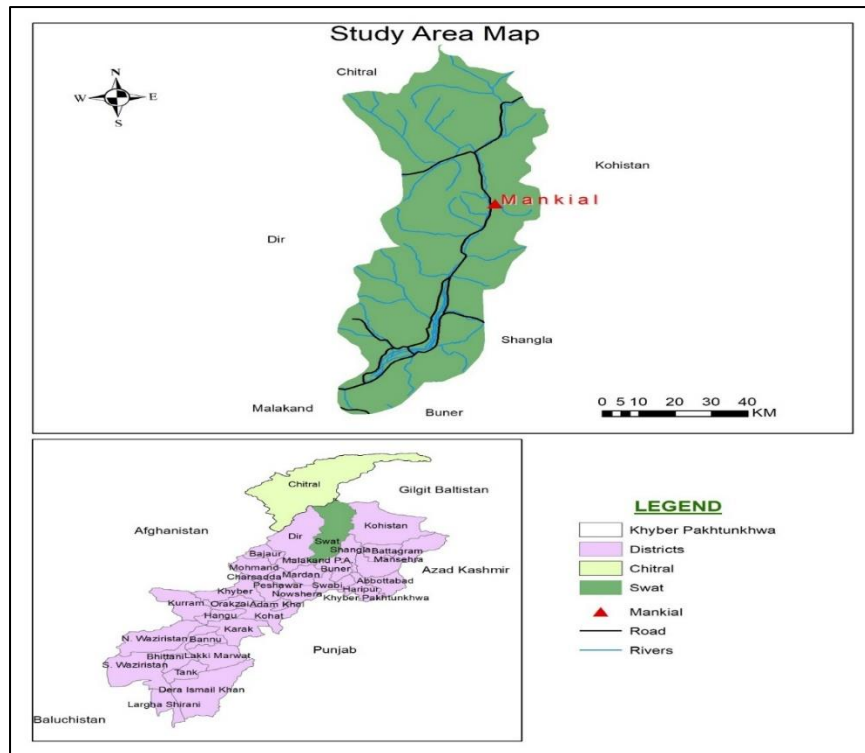


Figure 1: Map location of Mankial valley (green), District Swat.

Methodology

Focus group discussion (FGD) methodology was adopted (Moser and Kalton, 1971; Shackleton, 2001) during April-June 2015 for collection of data. Species of Morels were identified with the help of authentic literature (Ali and Nasir, 1989-1991; Nasir and Ali, 1970-1989 and 1990-2005; Ali and Qaiser, 1993-2018). The participants of FGDs were well acquainted with the types of morels and were questioned using photographs and local names of morel species. Five focus groups, i.e., wildlife watchers of Mankial, morel collectors from Mankial, and morel dealers from Mankial, Mingora and Islamabad participated. Each member of the discussion groups was contacted personally or in groups and asked questions about: types (species) of morels collected in Mankial, average market rates for different species of morels and quantity of dried morels collected annually on average basis. The mechanism of traditional drying of morels locally and supply to different markets was inquired

from the relevant participants in the FGDs. The average quantities of Morel species collected and supplied to Mankial, Mingora and Islamabad, the Morels supply chain from Mankial to Mingora and finally to Islamabad was also inquired.

Value of the morels collected; sold in different markets was then calculated through mathematical conversion. Number of responses received to different questions is presented in Table 1.

RESULTS

Types of Morels

Majority (85%) knew the number and type of the morel species collected from Mankial valley. All dealers from Islamabad (100%) and majority (67%) did not know the types collected from Mankial (Table 1). Five species of morels viz., *Morchella conica*, *M. esculenta*, *M. deliciosa*, *M. rotunda*, and *M. semilibera* (Table 2) were reported as present/collected from the study area.

Market Rate

All participants (100 %) of five FGDs (Table 1) reported the prevalent rates for each of five morel species collected from the valley (Table 2). Market rates for all the species were lower in Mankial market followed by those in Mingora and the highest reported for Islamabad market. Market rates also varied with the morel species. The dominant species, *Morchella conica* was sold at highest price (US\$ 190 in Mankial, US\$ 32740 in Mingora and US\$ 286 in Islamabad). The second dominant species was *Morchella esculenta* with per kilogram rate in local market Mankial at US\$ 172, US\$ 190 in Mingora and in Islamabad at US\$ 267. The third dominant species was *Morchella deliciosa* with market rate per kilogram in Mankial at US\$ 124, in Mingora at US\$ 133 and in Islamabad at US\$ 190. While, the market rate per kilogram of the remaining two species was in the descending range of US\$ 114-105 in Mankial, US\$ 123-114 in Mingora and US\$ 171-152 in Islamabad.

Annual Quantity Collected

All the participants (100%) of FGDs (Table 1) responded on the question on the annual collection/marketing of dry weight

of different morel species. Respondents indicated total annual average collection of 334 kg in dry weight of all the different morel species. *Morchella conica* was collected with a dry weight of 156 kg, followed by *M. esculenta* (120 kg), *M. deliciosa* (34 kg), *M. rotunda* (13 kg) and *M. semilibera* (11kg).

Annual Average Market Value

Major part of the participants (63 %) suggested total market values of the five morel species coming from Mankial valley (Table 2). The market value of morels collected from Mankial valley was US\$ 87011 in Islamabad market, US\$ 62935 in Mingora and US\$ 57133 in Mankial. *Morchella conica*, being the dominant, species having higher average dry weight and market rates was valued at US\$ 44616 in Islamabad, followed with US\$ 32760 in Mingora and US\$ 29640 at Mankial. *M. esculenta* was valued at US\$ 20640, US\$ 22800, US\$ 32040 in Mankial, Mingora and Islamabad respectively. *M. deliciosa* (US\$ 4212-US\$ 6460), *M. rotunda* (US\$ 1482-US\$ 2223), and *M. semilibera* (US\$ 1155- US\$ 1672) in different market places.

Table 1: Number of responses from different FGDs about morels of Mankial valley district Swat.

Opinions	FGD-1 (n = 2)	FGD-2 (n =10)	FGD-3 (n = 10)	FGD-4 (n = 3)	FGD-5 (n = 2)	Total n =27 (%)
Types of morels	2	10	10	-	-	23 (85)
Market rate	2	10	10	3	2	27 (100)
Annul Dry weight collection	2	10	10	3	2	27 (100)
Value of dried morels	2	-	10	3	2	17 (63)

FGD-1 = Mankial wildlife watchers, FGD-2 = morel collectors, FGD-3= Mankial village dealers, FGD-4= Mingora dealers, FGD-5= Islamabad dealers.

Table 2: Dry weight (kg), rates (US\$ / kg) and value (US\$) of morels collected from Mankial valley, District Swat, in different national markets.

Morel species	Local name	Dry weight (Average)	Market					
			Mankial		Mingora		Islamabad	
			Rate	Value	Rate	Value	Rate	Value
<i>Morchella conica</i>	Kohistan Kasee Gujai	156	190	29640	210	32760	286	44616
<i>Morchella. esculenta</i>	Spina Gujai	120	172	20640	190	22800	267	32040
<i>Morchella deliciosa</i>	Pashakalai Gujai	34	124	4216	133	4522	190	6460
<i>Morchella rotunda</i>	Ghounda Gujai	13	114	1482	123	1599	171	2223
<i>Morchella semilibera</i>	Topai Saweeri Gujai	11	105	1155	114	1254	152	1672
Total		334	-	57133	-	62935	-	87011

DISCUSSION

Five species of true morels occur in Mankial valley (district Swat, Khyber Pukhtunkhwa, Pakistan). Hamayun et al. (2006) reported seven species from district Swat and Kanwal et al. (2011) reported five species from Western Himalayan region of India. Kakakhel (2015) reported five species from Utror valley (Kalam, Swat) and Richard et al. (2015) 21 species from Europe and 22 from North America. No previous report is available on morel diversity in Mankial valley.

Focus Group Discussion (FGD) is normally adopted as a tool to collect scientific data from individuals and communities regarding a specific subject matter (Mukherjee et al., 2018; Chakraborty and Gasparatos, 2019) and is also applied in conservation sciences. FGD is basically adopted for examining interventions under taken by organizations or strategies which are formerly available (Mukherjee, et al. 2018). FGD was chosen for this research as this approach gives chance to various stakeholders to reflect

on conservation issues of their thoughts. FGD is effective in accepting the information flow to progress gradually, therefore, aids in revealing facts and opinions of individuals and may help in obtaining different data about morels marketing. All five true morels recorded from the Mankial valleys are sold/ traded at three markets. Gradually increasing rates from Mankial to Mingora to Islamabad markets. The expected market rates per kilogram of dried morels were US\$152-286 (Islamabad), US\$ 114-210 (Mingora) and US\$ 105-190 (Mankial). Kakakhel (2015) reported that rates in Utror (Kalam, Swat) ranged between US\$ 7-40/kg. Hamayun et al. (2006) recorded that morel rates fluctuated (US\$ 30-50) in various markets. This suggests a recent rise in the market rates of morels in different market places in Pakistan.

An annual gross quantity of 334 kilogram of five *Morchella* species were collected and sold in the market. Kakakhel, (2015) also reported annual collection of 2200 kg of morels from Utror (Kalam, Swat). The present is a baseline

study which can be used to indicate the future trend of morel collection in the valley. It is also to be seen whether the present collection is within biological sustainable range.

Globally, consumption of morels has risen (FAO, 2004). These are majorly supplied from Asia to North America and Europe (FAO, 2004; Wang and Hall, 2004). Nepal exports an average of 19 tons and earns an average annual revenue of US\$ 988,500 (Olsen, 2005). Christensen and Larsen (2005) reported annual exports of about 1.7 - 6.5 tons of morels from Nepal and 181 - 900 tons from China (Du et al., 2015; Liu et al., 2018). Pérez-Moreno et al. (2008) reported that wild edible mushrooms generate US\$ 40,000 annually in Mexico.

CONCLUSION

Five species of true morels occur in Mankial valley (district Swat, Khyber Pakhtunkhwa, Pakistan), which were collected from wild and sold in the local market and supplied to Mingora and Islamabad markets. Collection and sale of morels fetch approximately US\$ 57133 in the local economy and support livelihood of local communities by US\$ 87011 in national market. The middle man gets the maximum benefit US\$ 28878. Trainings on collection, drying and marketing of morels at local level are though offered by different organizations in the district Swat. However, lack of implementation badly affects the sustainability of collected morels. Efforts are required for collection and preservation of morels on scientific footings, to have a properly managed harvesting system, to avoid both over- and under-harvesting so that this resource is maintained.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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