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Impact Of Keedajadi *(Ophiocordyceps Sinensis)* Collection On Alpine Livelihood In Goriganga Valley, Kumaun Himalaya, India

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Abstract

The livelihood of the villages, situated in the Himalayan alpine region, is mainly dependent on traditional agriculture and animal husbandry. But, this is not enough to live a better life from the economic point of view. Therefore, a rural person depends on natural resources, viz. forest products and medicinal plants, for economic benefits. Keedajadi is a natural resource found in the high alpine meadows of the Goriganga Valley. It has emerged as a major cash resource for the villagers. The keedajadi is supplied from India to China via Nepal by traders. The medicinal herbs collection in the Goriganga valley started in 1995. 3425 people from 70 villages of the study area are involved in the Keedajadi collection. The total population engaged in keedajadi collection is 3425. Out of the total population 1815 (52.99 %) comprises Other Backward Classes, 960 (28.03%) Scheduled Tribe, and 650 (18.98%). Scheduled Castes. The people of 15 summer villages of the upper Goriganga River practice transhumance due to the extreme cold condition during winter. The population of these summer villages has increased 5.42% from 1971 to 2011

Keywords: *Keedajadi, Population change, Trade Route, Goriganga valley, Kumaun Himalaya.*

Introduction

The Himalaya, a storehouse for a wide range of medicinal plants which are used medicinal plants in some form or the other (Jain and Saklani1991). About 30% of the endemic species of the Indian subcontinent are found in the Himalaya, most of which are collected at high altitude areas (Farooquee and Saxena 1996). Ophiocordyceps Sinensis is a major medicinal plant found in the alpine meadows of the higher Himalaya. In Goriganga Valley Keedajadi (Fig.1) of the Kumaun Himalayan region. Keedajadi plays a prominent role in the socio-economy of rural people in the Himalayan region ((Kathayat and Joshi 2024) Shrestha et al 2014). Keedajadi is placed under the *Ophiocordycipitaceae* family. After 2007, Cordyceps is known as *Ophiocordyceps sinensis* (sen et al. 2023). Keedajadi (*Ophiocordyceps Sinensis*) fungus grows on larva of host insects, entire stage of which remains for 3 years to 4 years longer as underground (Wei et al.,2021; Negi et al.,2020). In winter Keedajadi get infected by the fungus and the fungul stroma come in earlier April last to May first from it (Winkler 2008; Wei et al.,2021).

Keedajadi is mainly found in the alpine meadows of the Tibetan Plateau, China, Nepal, India, and Bhutan at a height of 3000-5000 metre (Winkler 2009, Belwal et al. 2019, Karki et al., 2020; Byers et al. 2020; Kathayat et al.2024). Due to excessive demand and supply of KeedaJadi, the number of people engaged in its collection in the Himalaya is increasing. KeedaJadi collection and selling has improved the livelihood of the rural people. In the year 2014-2015, about 40,000 people were involved in the collection of keedajadi in Darchula district of Nepal (Karki et al.2020,). According to Winkler (2009) in China and Tibet 300,000 people were involved in Keedjadi collection and marketing. In the Uttarakhand state of India, 2511 people from 110 villages of Pithoragarh district are engaged in collection of keedajadi (Negi et al.,2015).
Per year keedajadi collection in the Tibetan plateau, Nepal and India is 80-175 tonnes, 1.0 -3.2 tonnes and 1.7-2.8 tonnes respectively. The income received from Keedajadi collection has become the main source of livelihood for Tibetan rural families (Winkler 2009).

Figure 1. (A) fungus part of keedajadi (B) keedajadi ready to sell in the local market after cleaning the soil; (c). keedajadi collection at Lambaladi bugyal; Source: Primary data collected during field visit.

Study area

The study area is located in the eastern region of the Central Himalaya of Uttarakhand which is bounded by the international border with the Tibetan region of China in the north and Nepal in the East. River Goriganga originates from Milam glacier (3600m) and making confluence at Jauljibi locality with Kali River at an altitude of 630 metre, which is later known as Sarda in Uttar Pradesh (neighbouring state of India).The Goriganga basin is situated between 79° 59' 11 to 80° 29' 25.95 longitude and 29° 44' 58.6 to 30° 35' 52.74 latitude. It covers a geographical area of 2244 Km^2. The altitude ranges from 559 m. at the confluence of river Goriganga with the Kali to 7383metre at the summit of Nandadevi East (Fig.2).

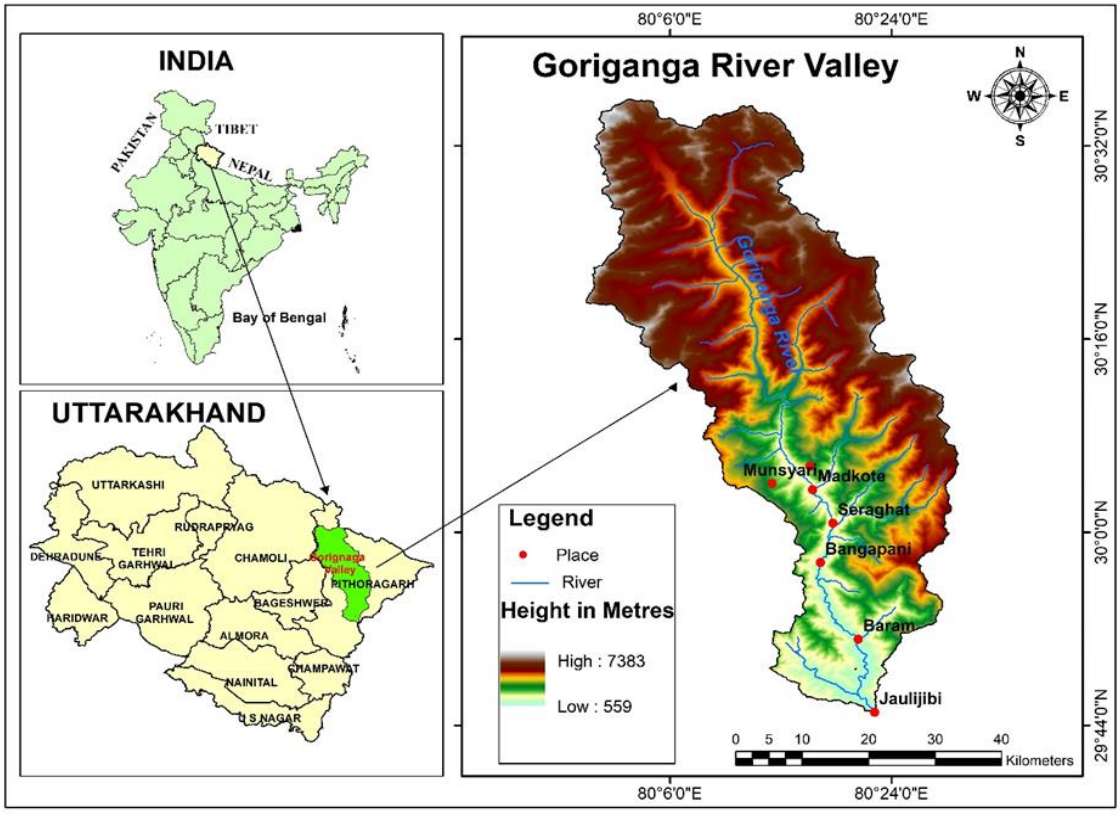

Figure 2. Location map of study area

Database and Methodology

The year wise details of keedajadi collection of 70 villages of Goriganga valley is shown through tables and figures. The number of Other backward classes (OBC), Scheduled Tribes (ST), and Scheduled castes (SC) involved in collection of keedajadi and the income obtained from keedajadi is calculated based on the data obtained from the primary and secondary sources. The decadal variation of total population in 15 summer villages, situated in upper Goriganga valley from 1971 to 2011 is studied. The international trade route of keedajadi from the local market is shown through a map (Figure.8). In the Goriganga valley, the families involved in keedajadi collection were surveyed through questionnaires in 70 Keedajadi collection villages. Population data was taken from census year 1971 to 2011. Location of the villages is shown in the map using GPS. For the final map preparation Google Earth pro, Arc GIS 10.2.8, and DEM have been used.

Result and Analysis

In the Goriganga valley, the collection of Keedajadi was first started by the people of Kanar village in 1995 in the Baslidanda Bugyal (Chiplakedar Range). But, the collection of keedajadi on a large scale in the entire Goriganga valley started only after 2001. It is evident from the table.1 that during the period 2001-2004, maximum number of people from 44 villages started collection of Keedajadi . However, out of the remaining 16 and 9 villages started keedajadi collection during the year 2005-2008 and 2009-2012 respectively. After 2013, no new villages started collection of keedajadi in the study area (Fig.3).

Table 1. Keedajadi collection started in Goriganga Valley since 2000

Year	No. of Village started collection
Before - 2000	01
2001-2004	44
2005-2008	16
2009-2012	09
After - 2013	00
Total	70

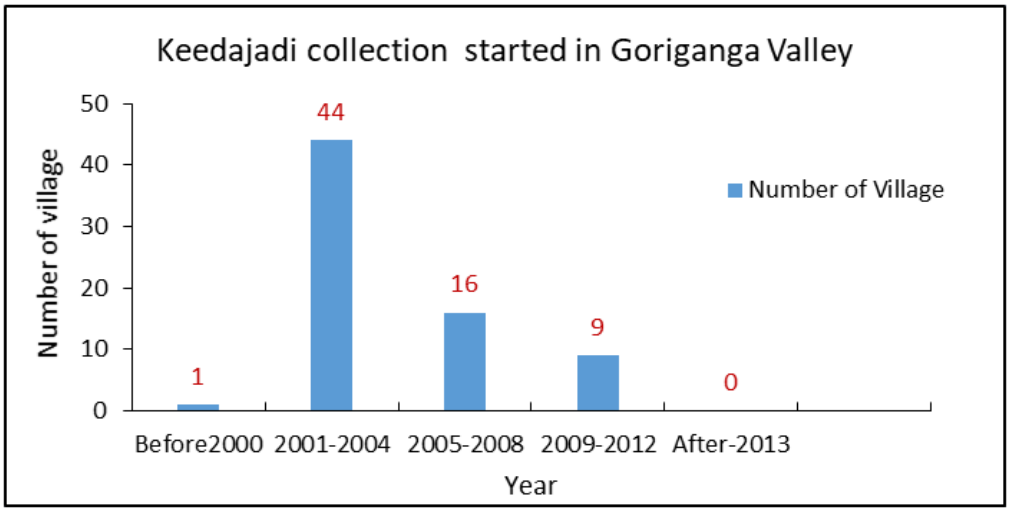

Figure 3. Number of villages starting keedajadi collection year wise

Keedajadi collection and income

A total of 3425 people from 70 villages in the Goriganga valley are engaged in the collection of Keedajadi. These people collected 175 .15 Kg of keedajadi in 2022 having an income of Rs. 56,252 per person at the rate of Rs. 11 lakh per Kg. The maximum number of Other Backward Classes (OBC) people involved in the collection of keedajadi were1815, which is 52.99% of the total person engaged in keedajadi collection. They collected 93.35 Kg of keeddajadi having an income of Rs. 56,575 per person. Around 960 people of Scheduled Tribes (ST) are engaged in keedajadi collection which is 28.03% of the total persons engaged in keedajadi collection. They collected an amount of 45.6 kg of keedajadi having an income of Rs. 52250 per person. Around 650 persons of Scheduled caste (SC) which is 18.98% of the total number of persons are involved in keedajadi collection. They have collected 36.2Kg keedajadi, having an income of Rs. 61,261 per person, which is the highest.

Table 2. Keedajadi collection and income in Goriganga valley 2022

Sl.N.	Caste category	Total population	Total population in %	Keedajadi Collection In Kg	Income INR /person
1	OBC	1815	52.99	93.35	56575
2	ST	960	28.03	45.6	52250
3	SC	650	18.98	36.2	61261
	Total	3425	100	175.15	56252

Source: Field visit 2022-23

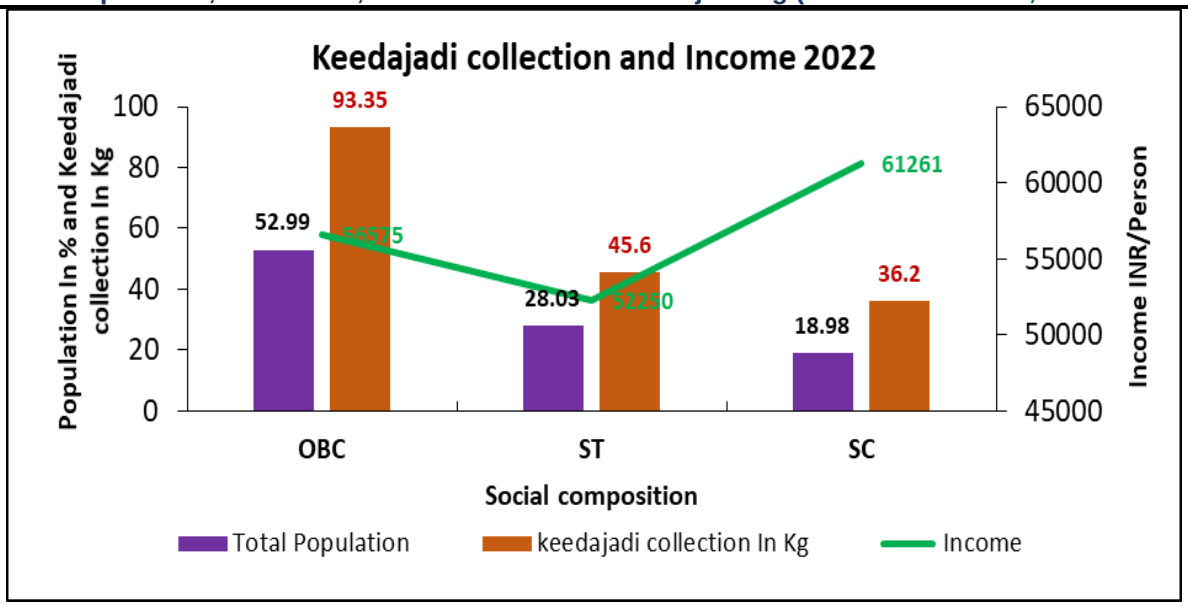

Figure 4. Cast category wise Population and income

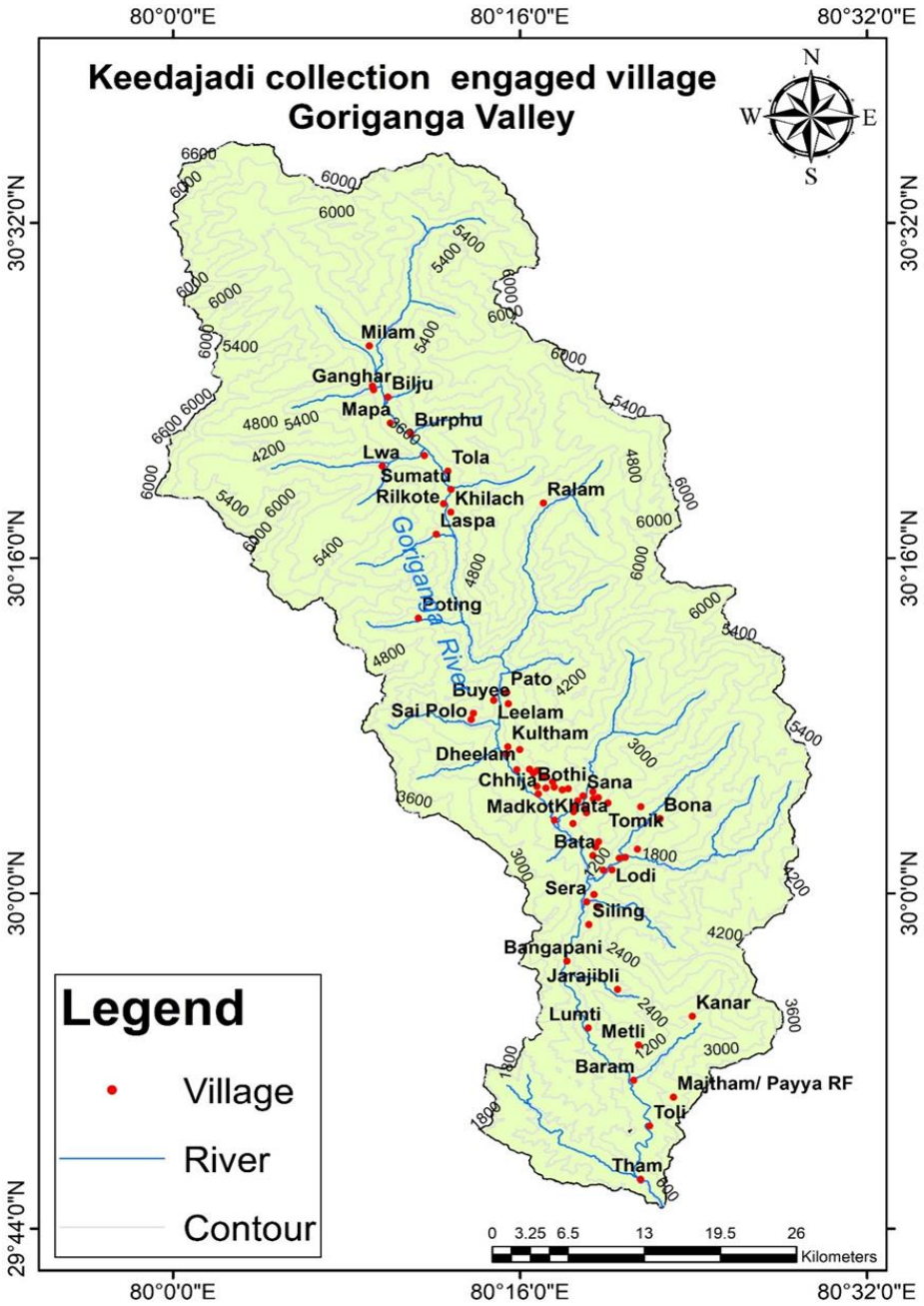

Figure 5. Keedajadi collection engaged village location map

Summer village Population in Goriganga Valley

There are 15 summer villages located in the upper Goriganga valley at altitudes ranging from 3000 to 3700 metres. The change in population of these villages from 1971 to 2011 is 5.43%. The population change in 7 villages (Table-3) out of above mentioned 15 villages has been positive. In Bilju village the total population change has been positive i.e. 1166.67%. The most negative population change is in Khilach village i.e. -101% and is an uninhabited village. Similarly, there is no residence in village Poting after 1991.

Table . 3 Population change summer village in Goriganga Valley 1971-2011.

Sl.N.	village	1971	1981	1991	2001	2011	Population Change 1971-2011	Change in % 1971-2011
1	Milam	71	99	50	37	135	64	90.14
2	Bilju	3	9	7	11	38	35	1166.67
3	Panchhu	59	56	37	30	23	-36	-61.01
4	Ganghar	43	14	6	9	14	-29	-67.44
5	Mapa	41	28	13	10	21	-37	-48.78
6	Burphu	111	98	100	55	94	-17	-15.31
7	Tola	73	52	30	20	56	-17	-23.28
8	Martoli	32	27	31	25	40	8	25
9	lwa	0	0	7	7	10	10	1000
10	Sumatu	0	0	0	0	0	0	0
11	Laspa	92	31	31	19	109	17	18.48
12	Khilach	70	38	34	19	20	-71	-101
13	Ralam	104	80	42	102	158	54	51.92
14	Rilkot	4	3	5	10	39	35	875
15	Poting	15	11	0	0	0	-15	-100
	Total	718	546	393	354	757	39	5.43

Source: Census of India

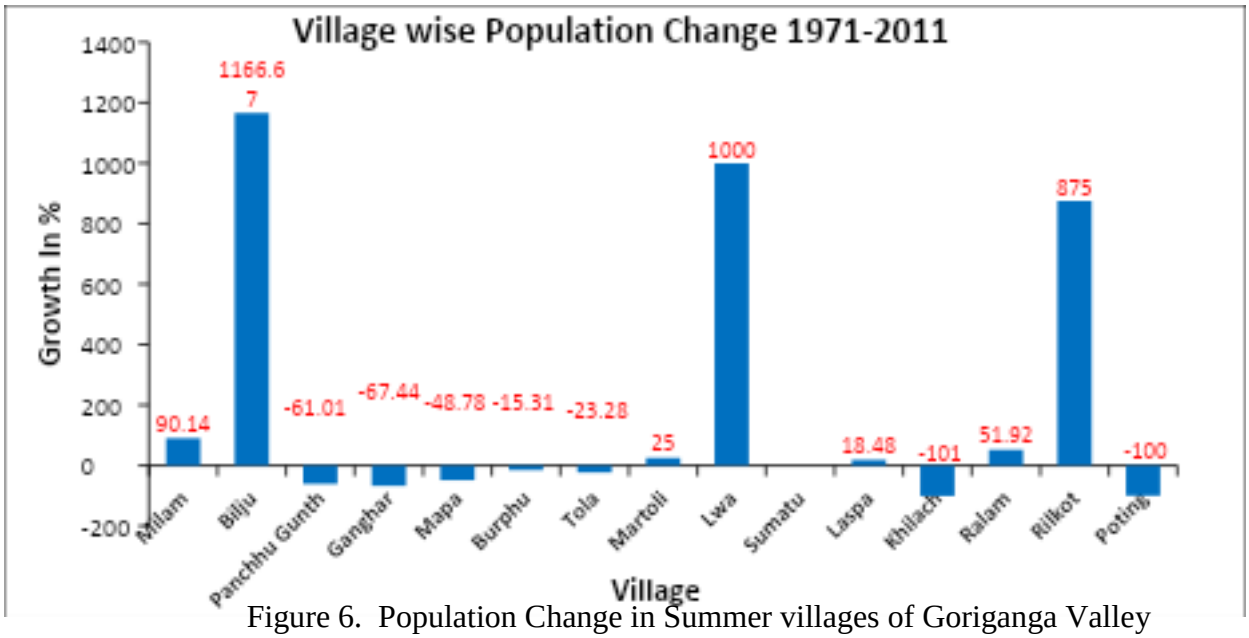

Figure 6. Population Change in Summer villages of Goriganga Valley

The impact of the Indo-China war of 1962 was also seen in the villages of the Goriganga valley. After the 1962 war, due to the closure of Tibet trade, these villages started to abandon the agricultural land and residential houses. The decadal change has increased by 5.43% between 1971 and 2011. Between 2001 and 2011, the total population increase is 403, which is 113.96%. During this decade, the collection of medicinal herbs (Keedajadi) started in the Goriganga valley. Most of the people of the study area are returning to their original villages to collect medicinal herbs and do their traditional agriculture. Due to which the decadal growth rate between 2001-2011 is the highest in the Goriganga valley.

Table.4 General Variation in Population during summer migration of villages in Goriganga Valley 1971-2011

General Variation in Population			
Census year	Population	Decadal Variation	
		Total	Percentage
1971	718	-	-
1981	546	-172	-23.96
1991	393	-153	-28.02
2001	354	-39	-9.92
2011	757	+403	+113.84
Total variation since 1971	757	+39	+5.43

Source: Census of India

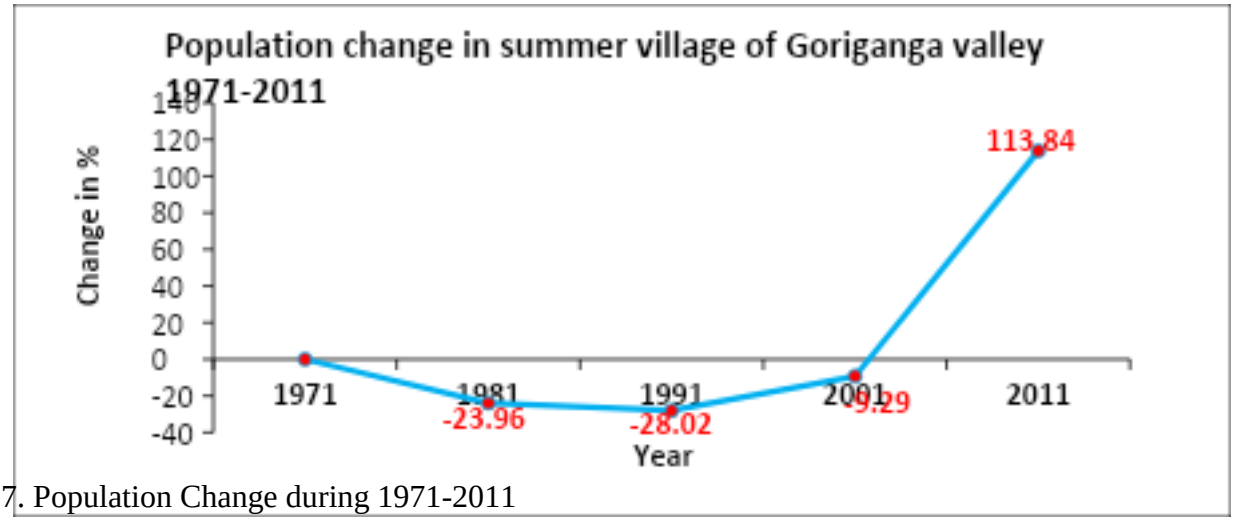

Figure 7. Population Change during 1971-2011

International trade route of Keedajadi

Kiadajadi is mainly found in the Bugyals of the higher mountains of India, China, Nepal, and Bhutan. After collection of Keedajadi, it is sold to the local contractor which is transported for sale through Nepal to the international markets including China, Thailand, Hong Kong (Pant et al.2020). This trade route of Keedajadi is shown in the map (Figure.8).

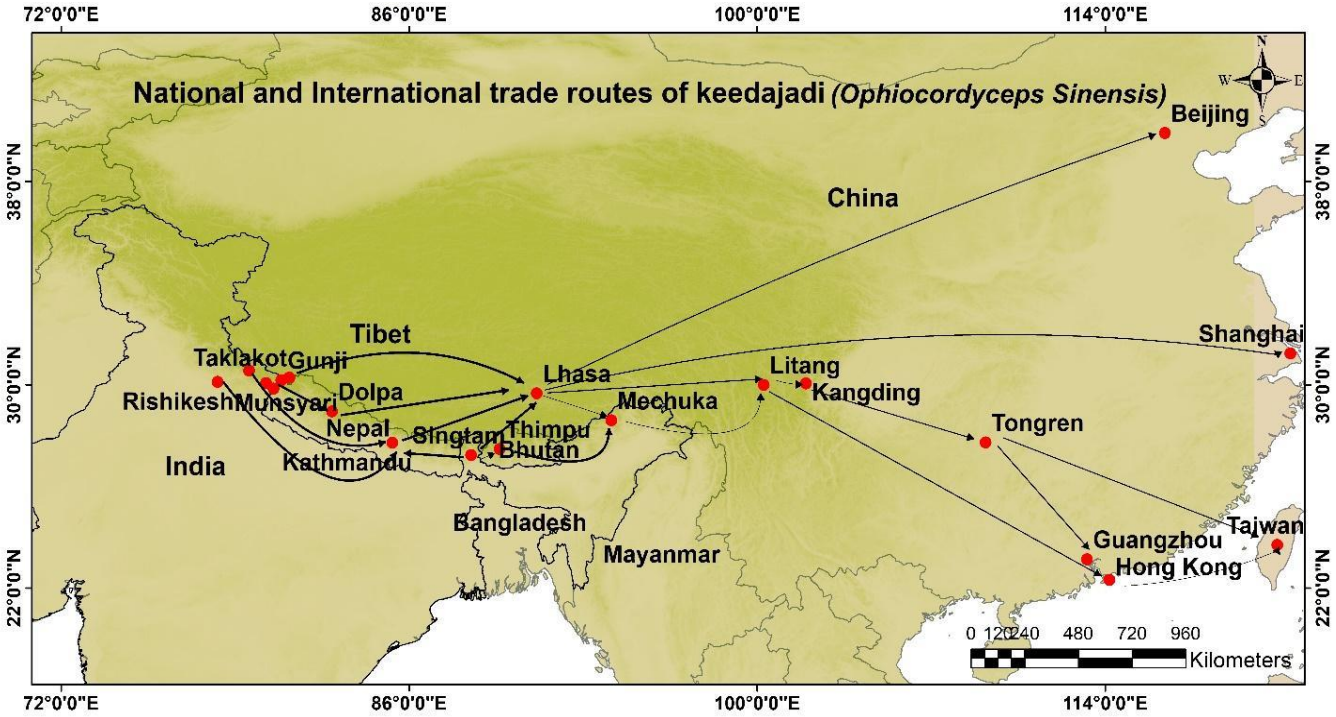

Figure 8. Keedajadi trade route map

Conclusion

Keedajadi collection in Goriganga was started in between 2001 and 2004 mostly by the people of 44 villages. During the field survey in 2022 the number of Keedajadi collectors increased. In 2010 the total production was 277.2 Kg which decreased to 175 kg in 2022. In 2022 the rate was 11 lakh per kg so the income per person was Rs 56252 INR. The 15 summer villages in Upper Johor recorded a decadal growth rate of 113% between 2001 and 2011. Currently, Keedajadi has emerged as a major resource in Goriganga Valley and proving to be suitable as a rural employment.

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