

**Full Length Research Paper****Changing Scenario of Traditional Beekeeping in Garhwal Himalaya: A Case Study from Gairsain Block of district Chamoli, Uttarakhand****P. Tiwari, J. K. Tiwari and Dinesh Singh****Department of Botany & Microbiology, Post Box -22, HNB Garhwal University, Srinagar Garhwal-246174, Uttarakhand***Corresponding Author: Dinesh Singh***Abstract**

Present study was carried out in Gairsain block of district Chamoli of Uttarakhand state. The data was collected through the direct interview of local inhabitants by administering a set of structured questionnaires during the year 2011-2012. The present study revealed that the number of traditional wall hives and colonies were decreasing with parallel to increasing modern cemented houses. As such the total average number of wall hives/ house decreased from 11.23 in 1980 to 8.44 in 2010. This average will reach below as the traditional houses will complete their life span in near future. If the trend is not checked, then there will be no wall hives in the region in coming future. Thus, there is urgent need to conserve the traditional beekeeping to sustain the bee habitat and to provide nesting site for honey bees.

Key words: Wall hive, Traditional house, Honey bee, Nesting site.

Introduction

Beekeeping is an environment friendly, agro-forestry based, traditionally adopted occupation among the mountain communities and is the part of natural and cultural heritage (Verma 1989, Mishra1995, Singh 1995, Pohkrel et al. 2006). It has enormous potential for poverty alleviation and sustainable use of forest resources (FAO, 1990). Besides this it is an important subsidiary occupation providing supplementary income to most of the farmers and to a large number of rural, hilly and tribal populations (Riskin 1980, Zwanul Islam 1986, Crane1975, Free 1977, Attri et al. 2010, Singh & Saxena 2009). Beekeeping with *Apis cerana* F. is a common practice in hills of Garhwal Himalaya which is carried out mostly by using traditional methods since long past and is stationary in nature. In this method honey bees are mostly kept in wall, log and miscellaneous hives (Gaur 1983, Tiwari et al. 2012). Apart from providing various bee products, the role of honey bees in agro-ecosystem is evident in enhancing the crop yield, but this potential is yet to be tapped (Verma & Pratap 1993, Kumar et al. 1994, Jay 1986, Omoloye et al. 2006). Agricultural based activities are the main source of livelihood to large population of the Uttarakhand state. About 75-90% population of the state is engaged either in the main occupation of agriculture or its allied practices, dominated by traditional subsistence on cereal farming (Sati 2005, Negi et al. 2009, Chandra et al. 2011, Maikhuri et al. 2011). The Uttarakhand state is extremely rich in bee forage plants but the use of these resources is not being made properly (Gaur & Nawani 1989, Gaur & Tiwari 2000, 2001). Thus present investigation has been carried out to study the changing scenario of traditional beekeeping in the Gairsain block of district Chamoli, Uttarakhand

Materials and Methods**Study area**

Geographically, Gairsain block lies between 29° 55' N to 30° 05' N latitudes and 79° 05' E to 79° 21' E longitudes with the altitude range from 1200 to 3067 m and occupying an area of 70500 ha (Figure 1). Its diverse climatic conditions are marked by the significant fluctuation in precipitation and temperature. In winter severe frost and snow fall occurs at elevations above 1500 m. The average annual temperature of study area is 20° C with the maximum temperature recorded during the months of May and June was 25-35° C, and minimum in the months of December and January (1-10° C). The average annual rainfall is 110 mm. Relative humidity reaches near to the absolute humidity during July and August (80-92%) and minimum during the months January and December (30-40%). The average annual relative humidity is 42% which decreases with increase in temperature and altitude. Gairsain has submontane to montane type of vegetation presented by the panoramic view of the dense forests dominated by Oak-Abies mixed forest, Oak-mixed forest, Oak forest, Pine-mixed forest with Pine and Scrub forest along with grassy floors present in some parts. It is bestowed with three dense forest ranges as Dudhatoli, Painsar and Angyari. Agriculture is dominated by the cultivation of subsistence cereal farming, which is carried out traditionally in narrow patches of terraced fields. Western Ramganga River is the main water body, besides providing perennial water source it forms habitat to many plant and animal communities.

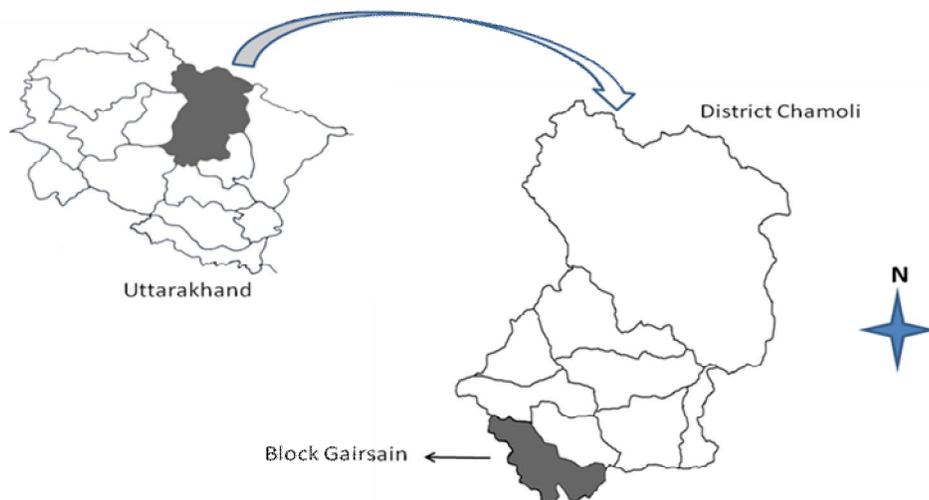


Figure 1. Location map of the study area

Survey and data collection

Extensive field surveys were made during the year 2011-12 to collect data from the ten randomly selected villages of the Gairsain block where traditional beekeeping is in practise. A structured set of questionnaire was administered on 270 villagers with at least 25 from one village to collect information on different aspects of traditional beekeeping in these villages. Data was collected on traditional beekeeping practice, type and year of house construction, number of wall hives in each type of house, number of bee colonies, causes of decline of honey bees and hives, etc. Only primary and reliable data collected from the respondents has been presented in this study.

Results and Discussion

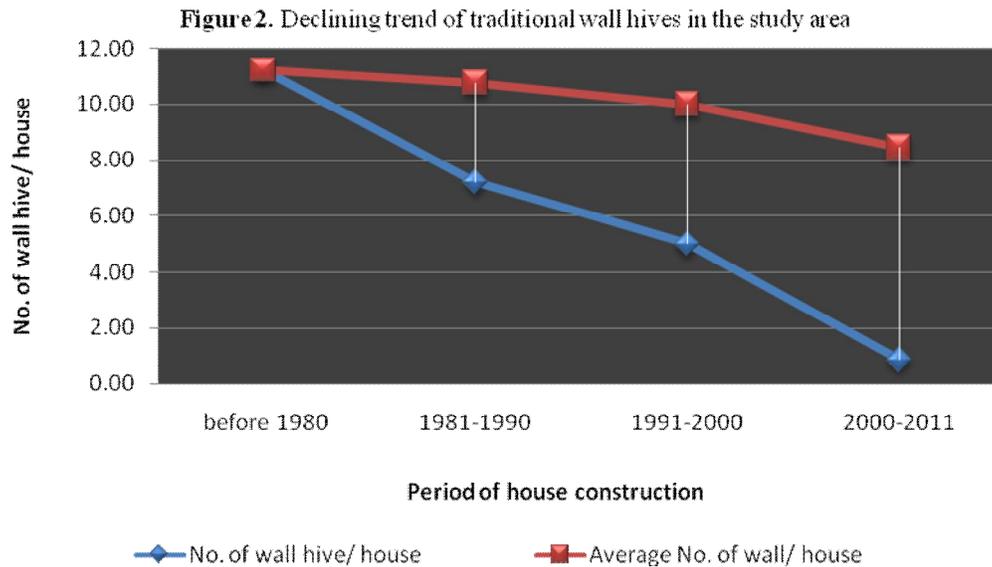
Nest-construction behaviour in social insects is a very complex and highly cooperative phenomenon (Wilson 1971, Belic et al. 1986, Yang et al. 2010). The hill inhabitants leave several rectangular spaces in the walls of houses at the time of construction, because of *Apis cerana* built nest in the dark cavities (Crane 1999, Thomas et al. 2009, Hisashi 2011). Generally one hive is made in each wall but number may vary from 2-3 or 4. These traditional wall hives (locally known as *Khadra*, *Jaala* or *Jalota*) serve as nesting site for the bees and are common in use. The interiors of hives are smoothed with cow dung and clay. Thick walls provide considerable insulation during the cold conditions in the hill areas thus in higher altitudes these hives are best suited to local conditions (Crane 1998). The number of wall hives varies with size of house; cattle sheds contained 2-6 wall hives while traditional houses with 4-12 or more. In the modern houses the number were either nil or rarely 2-4. Yet most of the old houses of hill people are decorated with wall hives but a large number of traditional hives remain ignored (Tiwari et al. 2012).

A total 1004 houses with 8473 wall hives and 210 colonies were recorded in the ten selected villages of the study area (Table 1). Three main types of houses were observed viz., cattle sheds (37.3%), traditional (53.3%) and modern houses (9.5%) in area. The scenario of building construction is changing with the ratio of modern houses increasing rapidly in comparison to the traditional ones. The traditional and modern houses were 61 % and 2% before 1980; they were 26% and 31% respectively during the period 2001-2010. At present construction of modern houses are increasing rapidly in comparison to the traditional houses. It is hard to see a modern cemented house with wall hive.

A considerable decrease has been observed in bee colonies in the traditional hives from 2001 onwards. Out of the 210 colonies, 81% were observed on the wall hives of traditional house and 19% on the cattle sheds. No colonies were present on the wall hives of modern houses. Of these 74.8% colonies were present on the wall hives of the houses constructed before 1980 and only 1.4% was on the wall hives of the houses constructed during 2001-2010. The colonies may decline due to habitat deterioration, climate change, bee management stress such as poor nutrition and unscientific agricultural practices (Johnson 2010, UNEP 2010).

The present study revealed that there were 11.23 wall hives/ house present in the houses constructed before the year 1980 and 5 wall hives/ house in the houses constructed during 1991-2000), while drastically reduced to 0.87 hives/ house in the constructions during 2001-2010. It was decreasing with parallel to increasing modern cemented house in the area. As such the total average number of wall hives/ house decreased from 11.23 in 1980 to 8.44 in 2010. This average will reach below as the traditional houses will complete their life span in near future. If the trend is not checked, then there will be no wall hives in the region in coming

future. Thus there is urgent need to conserve the traditional beekeeping to sustain the bee habitat and to provide nesting site for honey bee.



Suggestions

1. Inhabitants in this area are shifting to construction of brick houses in place of mud and stone. Brick walls with 25 cm width are inadequate to house wall hives as compared to mud and stone wall at 45 cm. Provisions need to be made with wooded hives made in the brick walls. This requires awareness and training to the villagers to sustain and propagate their bee colonies, through the use of wall hives.
2. Old houses and cattle sheds represents valuable nesting sites of honey bees. The renovation of old houses and cattle sheds should be done with the consideration of wall houses in them.
3. More research is needed to improve the indigenous methods and adapting to modern scientific methods of bee keeping. Creation of research projects at local level focussing with diversity, conservation and sustainable beekeeping.

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Table 1. Status of wall hives and bee colonies in the houses of study area.

Name of Village	Period of house construction															
	Before 1980				1981-1990				1991-2000				2001-2010			
	H ¹	W ²	C ³	W/H ⁴	H	W	C	W/H	H	W	C	W/H	H	W	C	W/H
Airoli	54	607	16	11.24	6	34	2	5.67	11	70	0	6.36	16	14	0	0.88
Andrapa	72	760	27	10.56	8	58	4	7.25	8	52	2	6.50	17	12	1	0.71
Devpuri	58	678	14	11.69	12	90	7	7.50	14	62	1	4.43	21	20	0	0.95
Gogna	93	1123	23	12.08	8	69	0	8.63	9	42	0	4.67	13	14	0	1.08
Malla																
Kunikhet	81	1047	15	12.93	13	110	9	8.46	12	78	3	6.50	19	18	0	0.95
Kusrani	40	510	8	12.75	9	70	0	7.78	9	86	4	9.56	24	28	1	1.17
Malsi	56	591	18	10.55	7	40	2	5.71	12	36	1	3.00	9	10	0	1.11
Sarkot	39	362	9	9.282	10	84	5	8.40	10	40	0	4.00	14	10	0	0.71
Silpata	62	671	16	10.82	5	24	3	4.80	10	34	2	3.40	16	8	1	0.50
Syuni Mall	84	827	11	9.845	4	12	5	3.00	16	56	0	3.50	23	16	0	0.70

¹Number of houses constructed in given period; ²Number of wall hive present; ³Number of colonies at present time; ⁴Average wall hive/house.

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