



Traditional beehives in a tree.

Photo: Jörg Böhling

BEEKEEPING IN ETHIOPIA'S WHEATBELT – A WAY TOWARDS SUSTAINABLE AGRO-ECOSYSTEMS

With its Growth and Transformation Plan, Ethiopia's government has set itself the task of transforming subsistence agriculture to market production, with a special emphasis on supporting women and youth. What role could apiculture play in this regard?

By Susanne Dollmann, Diana Diekjürgen, Laura Kübke, Rebecca Younan and Sophia-Marie Zimmermann

Ethiopia, with a population of around 100 million people, is the second most populous country in Africa. Not only is it famous for its coffee and *injera* (sourdough-risen flatbread), Ethiopia is also the biggest honey producer in Africa and is ranked ninth in the world. The Ethiopian honey sector has a long tradition. National production of honey amounted to 50,800 tons in 2015/16. A total of 5.92 million beehives are found in 1.4 million households. However, it is estimated that the amount of honey being produced only accounts for ten per cent of the actual full potential.

The Government of Ethiopia aims to promote employment of women and youth as well as honey production in the country. Against this background, the Green Innovation Centre in Addis Ababa commissioned a study in order to identify possibilities and give recommendations concerning the enhancement of beekeeping in Arsi Zone in the Oromia Region (see Box on page 44). According to the country's Growth and Transformation Plan II (GTP II), the region is Ethiopia's wheatbelt, producing

its highest crop yields. The aim of the study was to delineate ways to connect honey production and crop farming to increase sustainability. At the same time, opportunities for income generation and employment were to be identified, especially for women and youth, along the entire value chain of honey.

Research data was collected within two *woredas* (districts) in Arsi Zone: Lude-Hitosa and Arsi Robe. Various qualitative and participatory research tools (e.g. semi-structured interviews, focus-group discussions and transects) were applied to collect the required data.

CHALLENGES FOR BEES ARISING FROM AGRICULTURAL PRACTICES

Apart from extensive livestock production, Arsi Zone is characterised by a semi-intensive crop production focusing on wheat and teff (*Eragrostis tef*), which is the basis of Ethiopian staple food *injera*, as well as cereals like barley and maize. On the one hand, wheat and teff are predominantly grown on a partly mech-

anised basis and with a relatively high level of external inputs. On the other hand, crops and vegetables for daily life, like beans or tomatoes are cultivated with oxen ploughing, broadcast seeding and a low external input level. The average farm size amounts to 1.4 ha. The average harvest for wheat is 3–4 t/ha, which is comparable with the world's average yield.

The crop management found in Arsi Zone is multifaceted. Production increase is the main goal of the Ethiopian government's Growth and Transformation Plan II, where subsistence agriculture should be transformed to market production, stressing support of women and youth. However, this strategy goes along not only with monocultures but also with an increased usage of chemical pesticides – both major threats to bees.

WHY BEE-KEEPING REMAINS A SIDE-ACTIVITY

Although many interviewees showed interest in apiculture and honey production, knowl-

edge of the environmental and economic importance of bees, such as pollination services, was very limited. Nevertheless, most of the people were well aware of the nutritional value of honey and its additional benefits (e.g. use of honey as medicine or treatments).

In Ethiopia, all rural and urban land is under public ownership, and peasants only have user rights. They may not sell, exchange or pledge land. The government gives support to the apicultural sector by focusing on policies, extension services and the situation of small-scale farmers and by regulating land access to guarantee security for peasants against market forces. At the same time, critics underline the negative impacts of such land use, e.g. reduced investments, which is a consequence of the Ethiopian peasants' lack of land rights. However, no priority is given to beekeeping within the extension service in Arsi Zone, where the focus is clearly set on intensifying crop production. This described lack of infrastructure and of proper and essential equipment but also the short value chain of honey are additional factors why beekeeping is mainly, almost exclusively, seen as a side-activity among farmers. Alongside other factors, this explains the untapped potential of the honey production and lack of awareness concerning the importance of bees in the region.

VALUE CHAIN CHARACTERISTICS

There are three different types of beehives used in Arsi Zone (see Box). Most of the registered beekeepers (96.5 %) use traditional beehives, which are placed in trees (see photo on page 42). The traditional hives require low construction costs and minimal management, while at the same time having low productivity. The second type – the transitional hive – is also called the top-bar hive because its frames only have a top bar, and no sides or bottom bar. Many farmers and beekeepers in the two *woredas* know about this technique, but it is rarely used in practice mainly due to high investment costs, the advanced management level needed and missing tools. The modern hive is made of wood and contains various chambers and a composite cover with galvanised sheet metal.

31.4 per cent of the country's honey production originates from around three million beehives. Harvest per hive at national level ranges from 8.3 kg/year (traditional) to 18.3 kg/year (transitional) and finally 15.5 kg/year (modern hive). Based on our own research results, yields of 9 kg, 15.3 kg and 23.3 kg are

THREE TYPES OF BEEHIVES

Traditional hives are cylindrical, slightly over one metre in length and 20–40 cm in diameter. They are built from readily available natural materials like wood, bamboo, tree branches and barks, manure and clay (see photo on page 42). Made from local timber and plastered with clay, the **transitional hive** (top photo) normally holds between 27 and 33 top bars. The hive bodies or supers all have the same size and the same number of frames. While the bottom hive body is mainly used for reproduction (brood) and the queen, the upper ones are there for honey storage. The **modern hives** (bottom photo) are based on the assumption of Lorenzo Lorraine Langstroth (1810–1895; apiarist and creator of the modern Langstroth hive) that bees always leave the same space between the combs when building their hives. Depending on the availability of bee forage and the size of the bee colony, further boxes can be mounted on top of each other. For inspection or harvest purposes, the frames can be taken out individually without disturbing other combs or squashing bees. In comparison to traditional or transitional hives, modern hive management above all requires advanced knowledge and training.



reached respectively. Despite the high yields from modern hives in Arsi Zone, their number is still decreasing because of lack of proper processing instruments and management skills. In Oromia (the administrative region for Arsi Zone), 98.07 per cent of the beehives are traditional, 1.31 per cent are transitional and only 0.61 per cent are modern types. Our own calculations showed gross margins at farm gate per hive to be 388 Ethiopian Birr (ETB)/year for traditional hives, 676 ETB/year for transitional hives, and ETB 2 010 ETB/year for modern hives, with the highest investment costs at 4,300 ETB.

The value chain of bee products in Arsi Zone is short as products are limited to honey, beeswax and tej – a locally brewed honey wine. Around 50 per cent of the honey produced is consumed at home. Honey is most commonly stored in plastic bags, kettles or plastic containers and – if not used for home consumption – sold at farm gate. Wax is not extracted, and 82 per cent remains unprocessed at the farms. The lack of processing tools limits honey processing. Most of the honey produced in the selected *woredas* was not traded to surrounding towns like Ithaya or Asela or Addis Ababa. Despite this, some interviewees rated market access as generally good.

Women have a big portion of the beekeeping workload. They are responsible for cleaning around the beehives, feeding the bees (in the dry season), smoking the hives during harvesting and protecting the bees from predators. The catch of the colonies is exclusively reserved for men since this task is thought to be too risky for women. Since young people only have land access when organised in a co-operative, renting or sharing or through their families, their involvement in beekeeping is limited.

HOW APICULTURE AND AGRICULTURE INTERACT

The intensification of agriculture has left the landscape of Arsi Zone marked through deforestation, limited crop rotation and less wild vegetation, leading to a reduced variety of blossoms for the bees. Additionally, the usage of pesticides has increased in the last years. All beekeepers interviewed during the survey related the absconding of bees to the increased application of pesticides during the last three years. Here, the results of the survey reveal the existing potential of growing plants with additional benefits to bees as forage and for the farmers. The ones identified are: living fences

The study was conducted by participants of the Centre for Rural Development/ Seminar für Ländliche Entwicklung (SLE) training course at Humboldt University Berlin. The research was commissioned by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)/ the Green Innovation Centre, based in Addis Ababa, as part of the “One World, No Hunger” Initiative of Germany’s Federal Ministry for Economic Cooperation and Development (BMZ). A team of five junior consultants and their team leader in collaboration with five students from Ethiopia’s Mekelle and Jimma Universities assessed the scope for apiculture and agriculture integration in Arsi Zone, which is one of the 18 zones within the Oromia Region, the largest region in Ethiopia. The complete study can be downloaded at: www.sle-berlin.de/index.php/aktuelles/499-neue-ergebnisse-der-auslandsprojekte

or edge strips (e.g. *Opuntia cylindrica*), intercropping plants (e.g. lentils or faba bean) or trees (e.g. *acacia* or *wanza* (*Cordia africana*)). More examples are listed in the full text study (see box).

ASSESSING THE POTENTIAL

A total transformation of Arsi Zone into a leading honey producing area is unrealistic (and, moreover, not in line with GTP II). This is related on the one hand to the agricultural practices relying on an increasing amount of agrochemical inputs, but also to deforestation and a lack of bee forage. On the other hand, the region’s honey sector itself was identified as a rudimental value chain. However, further integration of beekeeping into the wider agricultural system could lead to positive synergy effects. Key potentials identified included plants serving multiple purposes in the farming system both as bee forage and to diversify the landscape, resulting in increased landscape resilience towards environmental hazards. An integrated system could strengthen crop rotation to decrease reliance on agrochemicals and increase soil fertility conservation. A system approach would benefit from a bee-friendly pesticide strategy.

Besides, most of the interviewed small-scale farmers possess basic knowledge on beekeeping practices and showed a keen interest in receiving training and gaining more knowledge in this field. The production and sale of honey could be a possible income-generating activity, especially for women and youths. Women were highly motivated and interested in getting involved in beekeeping or playing major roles in the sector. But a lack of specific trainings, practical and social barriers, limited market access and a low socio-economic status turned out to be main constraints. Therefore, trainings on beekeeping should be made more accessible, especially to women. The content should be developed based on specific knowledge gaps and needs and include basic training in business skills.

Gross margin calculations show that beekeeping can be a lucrative side activity supplementing other farming or income generating activities, but nevertheless requiring investments. Research and data collection revealed that, for various reasons, transitional hives are a good alternative to modern hives in the region. In general, transitional hives are moderately effective for managing honey bees, conducting hive inspection and shifting frames. The combination and division of colonies or moving

the brood inside the hive was feasible for the beekeeper, and their yield was clearly higher than that of traditional hives.

Not only beekeepers, but also processors or other value chain actors might play a role in ensuring the market links for the honey products. Therefore, financing schemes or alternative approaches are necessary to allow beekeepers and other actors to take the risk of new practices. In addition to knowledge dissemination, the availability of necessary tools and suitable beekeeping material inputs would have to be addressed. Strengthening beekeeping youth co-operatives, facilitating access to land as well as knowledge sharing and improvement of market access for all beekeepers is necessary. Players along the value chain of honey should be enabled to connect more effectively, which results in mechanisms to ensure continuous quality of the products.

Any steps towards the integration of beekeeping will contribute to the improvement of the current farming system and its sustainability – environmentally, socially and economically. The diversification of crop rotation will preserve bee colonies and their pollination service for crop production. The decrease and technically improved application of agro-chemicals would not only be of economic value for the farmers; implementation of a bee-friendly pesticide strategy and integration of plants with additional benefits would balance the agricultural system. Hence, the landscape will benefit from these measures in the long run – and so will the bees and the people.

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Crop diversity can help preserve bee colonies. A field in Arsi-Robe.

Photos: Diana Diekjürgen

For a list of references, see online version of this article at: www.rural21.com