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REVIEW ARTICLE

CURRENT TRENDS OF HONEY BEE GENETIC RESOURCES IN ETHIOPIA

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ABSTRACT

In this article we reviewed honeybee genetic resources and honey production in Ethiopia. Books, journals newspapers and fact sheets were used. In Ethiopia, honeybees are known for their roles in apiculture since the third AD. Honey and bees wax have been contributing to the national and local economies as well as human nutrition for centuries. Moreover, honeybees have been playing immense roles in the overall economic development of the country as agriculture is the driving economic sector and honeybees are one of the major primary agents of pollination thereby ensuring sustainability of the later. Ethiopia is endowed with diverse honeybees genetic resources, amazing ecological diversity and climatic variation that is favorable for apiculture. Attributed to various manmade and natural factors, however, their productivity has been by far below their potential. In order to tackle these challenges that contribute for lower productivity and decline in honey bees colonies, ecosystems and biodiversity friendly and sustainable solutions need to be designed.

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INTRODUCTION

Apiculture was already known in Ethiopia during the rule of King Ezena, in the third century AD. Thus, honey was produced over the centuries with indigenous knowledge that has played a vital role in passing the traditional knowledge to the next generations (Melaku, *et al*., 2008). According to Hartmann (2004), Ethiopia is probably with the longest tradition of beekeeping in the world. Gezehagn (2001a) also noticed beekeeping in Ethiopia might even date 5000 years back, and the Hieroglyphs of ancient Egypt refers to Abyssinia as the source of honey and bee wax. According to Dietz (1986) the present bee fauna probably originated more than 70 million years ago. Currently, eleven families of bees generally recognized, only some of which are identified by derived traits setting them apart from other bee families. There are about 1000 genus (and sub genus), combined with sub genera, approximately 600 generic groups and an estimated 20,000 living species of bees, in the order Hymenoptera, residing in the world's museums (Roubik, 1989). There are three families of social bees, which produce honey. These are: the Bombidae, Meliponidae and Apidae (Smith, 1960). The Bombidae are found mainly in temperate climates and are of no commercial importance except as pollinators of certain plants.

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The Meliponidae, or stingless bees, occur throughout the tropical regions of the world. The family Apidae, to which the honeybee belongs, is indigenous only to Europe, Africa and Asia (FAO, 1986). *Apis mellifera* species and sub-species of honeybees were originated in Ethiopia. As a result of genetic changes and impact of environment on the existing *Apis mellifera* species for the past many years, about five sub-species or races were found to exist in Ethiopia in different geographical places. These are *Apis mellifera monticola*, *A.m. jemenitica*, *A. m. bandasii, A. m. scutellata* and *A. m. woyi-gambela* (Amsalu *et al*., 2004). Ethiopia's wide climatic and edaphic variability have endowed the country with diverse and unique flowering plants (Chala, *et al*., 2013), thus making the country highly suitable for sustaining a large number of bee colonies and the long established practice of beekeeping has placed the country to possess over 12 million bee colonies which include both feral and hived ones. This put the country with the highest honeybee population in Africa (Girma, 1998; Gezahegn, 2007; USDA, 2010; Gidey and Mekonen, 2010). Despite the long tradition of beekeeping, having the highest bee density and being the leading honey producer as well as one of the largest beeswax exporting countries in Africa, the share of the sub-sector in the GDP is only about 2.4% (Custom and Revenue Authority, 2011). Thus, the share has never been commensurate with the huge numbers of honeybee colonies and the country's potentiality for beekeeping (Nuru, 2002). Currently, honey production estimate represents only 8.6% of

the country's production potential. Productivity from traditional hives is very low, with an average of 5-6 kg per year, while production from improved hives reaches levels of 15-43 kg per year, depending on the level of improvement. Despite this, beekeeping has been and still playing significant role in the national economy of the country and subsistence smallholder farmers. Though difficult to assess the contribution of bees and bee products, is probably one of the most important small-scale incomes generating activities for hundred thousands of farmer beekeepers.

Different reports indicated that the number of the honeybee colonies in the country has been declining (CSA, 1995) and consequently the honey and beeswax production as well as export earnings are falling down (Gezahegne, 2001b). Ever expanding population pressure; deforestation; poor quality control for production of honey; indiscriminate use of insecticides, pesticides, herbicides; global warming and unforeseen changes in climatic changes; lack of infrastructure for producing genetically superior queen bees for supply to beekeepers, lack of technical knowledge for efficient management of bee colonies for higher honey yield, absence of awareness about yield increase in crops by beekeepers through pollination, inadequate research for disease management and control and low consumer awareness about honey and its products can be mentioned could be some of the most important challenges Ethiopian honey bee genetic resources and their productivities are facing (Girma, 1998; Mekonen, 2010 and Chala, *et al*., 2013). Thus, threats to pollinator conservation and sustainable honey production are very much related to overall threats and barriers to sustaining both productive and environmentally friendly development (FAO, 2015).

In the contrary, in Ethiopia, beekeeping industry has got some opportunities. Among these, it does not require sophisticated technology and high capital investment or infrastructure, presence of diversified agro-climatic conditions; the great self-help potential of beekeeping for the rural people, marginal and small farmers, land-less labour: Honey has great food value and provides cash income both in local and foreign currencies. Beeswax which is twice as much costly as honey is in great demand. Moreover, other products, namely: bee-collected pollen, propolis, bee-venom and royal jelly are much more costly than honey and beeswax; Providing bee pollination services to farmers for increasing crop production and productivity of honeybees. While considering the current scenario of honey production in Ethiopia, it is one of the countries of the continent which has immense production potential for honey and beeswax, the national annual honey and beeswax yield is estimated at 53,680 tons and 3,658 tons respectively (Belay *et al*., 2013). This places the country as the leading honey and beeswax producer in Africa and 10th largest honey producer all over the world (AMP, 2007). Production and supply of honey by regions shows that Oromia accounts for over 55% of the bee colonies and 53% of the Honey production, followed by Amhara which accounts for about 20% of the colonies and 21% of the honey production. The Southern Nations, Nationalities Peoples Regional State, on the other hand, accounts for about 15% of the bee colonies and 17% of the honey production. Tigray and Benishangul account for 4.5% and 3.6% of the total bee colonies, and 5.5% and 3% of the total honey production respectively (CSA, 2005)

Conclusion

Even though Ethiopia has a longer tradition of beekeeping than all countries in the world and possess a wide climatic and edaphic variability and with diverse and unique flowering plants currently, honey production estimate represents only 8.6% of the country's production potential. As a result of genetic changes and impact of environment on the existing *Apis mellifera* species for the past many years, about five sub-species or races were found to exist in different geographical places. In order to tackle the most common constraints attributed for bee colony decline need to be designed new solutions that are biodiversity friendly.

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