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What role did edible insects play in the traditional practices and nutrition in sub-Saharan Africa?

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Abstract

Food insecurity and undernutrition in sub-Saharan Africa has been aggravated over the last decade by increased population pressure and climate change. Undernutrition currently affects over 200 million people with over 300 million experiencing food insecurity. In 2017, 30% of children in Africa were suffering from chronic malnutrition, and 7% were affected by wasting. This may be partly due to over-dependence on rain-fed agriculture on production and livelihoods, with rains strongly influenced by climate change. For healthy growth and development of humans and animals, sufficient protein is a key element, and animal protein is of higher quality but expensive. Therefore, it is necessary to promote alternative animal protein sources such as insects. The utilization of insects as a cost-effective highly nutritious protein source is expanding globally. Wild harvested insects are consumed traditionally in many parts of the world, with Africa having a major share in the consumption. Traditional culture have rich lessons that can be improved to provide solutions to current problems. Learning from African culture on sustainable wild harvesting of edible insect, cultural uses of these insects, and improving their availability through rearing may be a solution to the looming animal protein crisis, and a source of other environmental and medical benefits.

Keywords: Culture, feed, food, health, wild harvesting

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Introduction

To end hunger and achieve global food security, food production must become more sustainable. Advancing climate change is one of the greatest challenges in this regard (Jusop 2020). Establishing sustainable agriculture for all is therefore the top priority for the coming years and

decades. Intensified insect breeding and the associated generation of a high-quality protein source can be part of the solution and will be highlighted in this short review.

Use of edible insects as food and feed

Edible insects of different kinds are consumed by humans, animals and poultry as food and feed in Africa, Asia, and Latin America, although it's slowly spreading to the rest of the world (van Huis 2016). Many people have lived in cultures where insects have been eaten since their ancestral times, as a snack or a seasonal food (Ramos-Elorduy, Moreno et al. 1997). In most countries within the African region, insects are consumed as complimentary food and feed for livestock, determined by culture, availability, and usefulness (Niassy, Musundire et al. 2018). Before the invention of farming tools, insects were part of the human and animal diet, with primates helping humans in identification of tasty and appealing species (Katayama, Ishikawa et al. 2008). Wild harvested insects are consumed traditionally in many parts of the world, and cannot be sustained with the current population pressure and effects of climate change. The insects consumed have different uses depending on the indigenous people and serve mainly as a source of protein and minerals. Various wild-harvested insects are a delicacy in different regions in the Sub-Saharan region of Africa. Within this region, there are several areas with particular climatic conditions that harbor a wide variety of edible insects, some of which are found in widespread regions, while others are found only under specific climatic conditions.

Some insects are eaten raw as they are collected, with often minimal processing to allow storage. Usually the insects are sundried and mixed with corn and honey for extended use. The mixture, which is particularly valuable for the native, is retained and used only in emergencies of extreme drought (Kipkoech 2020). Insect reserves are usually not exhausted until there is another sufficient insect swarm, which sometimes may happen once in 3 years. Termites and grasshoppers are largely consumed in Africa when the season allows, as their swarming depends on the short and long rains. Grasshoppers are a major source of income for collectors during the swarming in sub-Saharan region (Mmari, Kinyuru et al. 2017). Based on traditional collection methods, efforts have been made to increase the collection by improving drums and light traps (Wu, Wang et al. 2017, Sengendo, Subramanian et al. 2021).

Food security and expensive animal protein source is a major concern in developing countries and there is a need to look for alternative sources to curb malnutrition. Developed countries are largely food secure, but one of their primary concerns is the environmental sustainability of food production. Among the insect harvesters, insects are affordable hence a cheap protein source, with current scientific analysis supporting their nutritional and health importance (Hlongwane,

Slotow et al. 2020, Nowakowski, Miller et al. 2020, van Huis 2020). Common proteins from livestock production requires more land and produces greenhouses gases that destroy the environment. This calls for new ways that can increase the availability of animal protein sources and increase other nutrients such as essential fatty acids and minerals while addressing climate change, food quality, and environmental sustainability. Insects can greatly contribute to providing high-quality animal protein in an ecologically sustainable manner. The rearing of edible insects is increasing, and more efforts should continue to establish sustainable protein production through insect rearing by research, policy and agriculture. In addition to the above-mentioned high protein content and benefits of insect consumption, other components of edible insects have the potential to benefit human health. These components include chitin, gycosaminoglycans and fatty acids (Nowakowski, Miller et al. 2020). Supplementing adults' diets with cricket powder for 14 days helped increase the probiotic bacteria (Stull, Finer et al. 2018), *in vitro* studies have also shown that the chitin derivative chitosan has the ability to reduce pathogenic bacteria while increasing growth of probiotic bacteria (Kipkoech, Kinyuru et al. 2021). Feeding rainbow trout with Black soldier fly larvae increased gut microbial diversity, which promoted resilience. Similarly, 0.4% dry mealworms helped reduce *E. coli* and *Salmonella* infections in broilers. (Islam and Yang 2017). In rodents, gycosaminoglycans from insects have significant anti-inflammatory effects by suppressing C-reactive proteins and rheumatoid factor (Ahn, Kim et al. 2019). It is likely that interest in consuming edible insect as food and feed will increase due to their nutritional, nutraceutical, and medicinal potential.

From the local knowledge concerning insect consumption in the sub-Saharan region, it is evident that the use of insects has a cultural rooting among most communities and therefore a diminishing key source of nutrients in humans and animal diets. The reduction in usage is partially due old customs being forgotten, though climate change, use of pesticides and over reliance on wild harvesting have collectively contributed to reduced edible insect. It is necessary to farm edible insects to ensure food safety and high nutritional content. At the same time, to preserve natural diversity and provides sufficient quantities to meet increasing demand.

Conclusion

Traditionally, insects have been primarily an important source of nutrients in Africa, and there is a need to increase the capacity of smallholder farmers to raise and process insects to increase production. Some communities have used insects as a source of medicines, and further research is likely to reveal important constituents in insects that could be isolated and purified for use in

disease prevention or treatment. It is possible to improve traditional knowledge to solve current problems facing humanity.

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