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Impact of Desert Locusts (*Schistocerca Gregaria*) on Livelihoods, Food Security and Its Management Practices in Ethiopia: Review

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Abstract:

Swarm of desert locust is grouped under species grasshopper and order orthoptera. Initial outbreak areas are in remote semi-arid areas in the Sahara, on the Arabian Peninsula. The locust can from three to ten months and the life cycle comprises of three stages: egg, hopper (nymph) and adult. Its' plagues have always been particularly destructive for Africa due to its ability to reproduce rapidly, migrate long distances. In east Africa, especially in Kenya, Ethiopia and Somalia the locust outbreak is threatening livelihoods, food security, environment and development. The population of the Ethiopia up to 80 percent depends on agriculture for their livelihoods. The worst desert locust outbreak in 25 years is destroying crops and pasture in the country. Swarms enter into Ethiopia from Somalia through Aysha. Over 75,219 hectares of land has been affected by desert locust. Above 8.5 million people in the country have face challenges of food security and feeds due to the invasion of desert locust. The most affected regional states in Ethiopia are Somali, Afar and Oromia. Early warning, Noising, Smoking, Digging trenches, Chemical control and Integrated Pest Management by building up of the natural enemies are major control ways of locust invasions.

Keywords: Desert locust, food security, livelihoods and management

1. Introduction

The desert locust (*Schistocercagregariaforskal*) is a species of grasshopper belonging to the family Acrididae, order Orthoptera (FAO, 2020). It includes most short-horned grasshoppers (WMO and FAO, 2016). Throughout history, humanity has always been affected by locust plagues, and these plagues have always been particularly devastating for Africa (Michel, 2001). These locust is considered to be the most hazardous of all migratory pest species in the world due to its ability to reproduce rapidly, migrate long distances, devastate crops, and also it has the ability to change its behavior and physiology (FAO, 2001).

In east Africa, the locust outbreak is threatening livelihoods, food security, environment and development in the region (Emily *et al.*, 2020). The situation is extremely alarming in Kenya, Ethiopia and Somalia (Heleenet *et al.*, 2020).

In Ethiopia, the significant reduction in pasture availability of 50 percent or more in Somali (61%), Afar (59%), Oromia (31%), Dire Dawa (35%), Southern Nations, Nationalities, and Peoples' Region (22%) and Amhara (28%) compared to normal situation prior to the invasion of the locusts and also different crops has damaged but the worst affected was cereal especially Sorghum where 113 639 hectares were affected followed by maize (41 341 hectares) and wheat (36 188 hectares). Oromia was worst affected with total cereal loss of 1 228 352 quintals (122 835 metric tons) on 41 051.4 hectares of cropland. Somali region experienced the second largest cereal crop loss of 1026 132 quintals (102 613 metric tons) on 90 076 ha of cropland (MoA *et al.*, 2020; Act alliance, 2020).

2. Origin and History of Desert Locust

For many centuries, the Desert Locust has been seen as a major threat to the agro-pastoral resources in the world's most warm and temperate climates, including south of the Sahara (Mohamed, 2012). Initial outbreak areas are in remote semi-arid areas as in the Sahara, on the Arabian Peninsula, and along the borders of India and Pakistan (Steen, 1995). The locusts are continually present somewhere in the deserts between Mauritania and India. If it gets favorable environmental condition such as good rains fall and green vegetation, it can rapidly increase in number and within a month or two starts to concentrate, gregarize (FSNWG, 2020; WMO and FAO, 2016). The cross-border movements of immature swarms along the borders of Kenya and Somalia are ongoing. Swarms that formed in Somalia are now moving into Ethiopia through Aysha and Hopper bands and a new generation of immature swarms is forming in the Oromia and Southern Nations, Nationalities, and Peoples' regions, including the Rift Valley the nation's breadbasket (FAO, 2020).

3. Life Cycle of the Desert Locust

Desert Locusts live from three months to six months or sometimes up to ten months. Apart from accidental death, the lifespan depends on how long they take to become sexually mature (Farm Africa, 2020).

The life cycle comprises three stages: egg, hopper(nymph) and adult. Ibrahim (2014) mentioned that, during mating the male locust mounts the back of the female, applies the tip of his abdomen to hers and passes sperms into her reproductive tract. The sperms are stored in a sperm sac in the female's abdomen, and as the eggs pass down the oviduct during laying, the sperms are released and so fertilize the eggs. Eggs hatch in about two weeks, depending on temperature (the range is 10–65 days). Hoppers shed their skins five or six times, each time growing in size. Adults mature in about three weeks to nine months but more frequently from two to four months, depending on environmental conditions, mainly temperature (WMO and FAO, 2016; NRT, 2020).

According to Food and Agricultural Organization of the United Nation (2001), the life cycle parameters of the desert locust are as follow:-

Stages	Egg,Hopper,Adult	
Duration	Egg	10-65days
	Hopper	24-95days(36daysaverage)
	Adult	2.5-5months
	Laying-fledging	40-50days
	Adult maturation	3weeks-9months(2-4monthsaverage)
	Total	2-6months
Larvalmoults	5-6(solitarious), 5(gregarious)	
Phases	Solitarious,transiens,gregarious	
Affectedarea	16millionkm ² (recession),29millionkm ² (invasion)	

Table 1

4. Crisis Overview

The desert locust is considered to be the most hazardous of all migratory pest species in the world due to its ability to reproduce rapidly, migrate long distances, devastate crops, and also it has the ability to change its behavior and physiology (FAO, 2001), in particular its appearance, in response to environmental conditions, and transform itself from a harmless solitarious individual to part of a collective mass of insects that form a cohesive swarm, which can cross continents and seas, and quickly devour a farmer's field and his entire livelihood in a single morning (Keith, 2016). A typical swarm can consist of up to 150 million locusts per square kilometer and can migrate as far as 150 kilometers in one day (IRC, 2020).

East Africa is already has 20 million severely food insecure people, who meet their basic needs each day (IRC, 2020). In this region, the worst desert locust outbreak in 25 years is destroying crops and pasture especially in Ethiopia and Somalia (FAO, 2020; FSNWG, 2020). Recently before some months, it begins upsurge in the Greater Horn of Africa and Yemen (FAO, 2020).

Women and girls are mostly vulnerable to riskas the situation deteriorates across the Horn and East Africa. In view of this, depletion of pasture lands and crop failure increase the distance and duration of migration for pastoralists who are primarily male. The absence of male partners and adolescent sons in pastoralist communities, increases women and girls' vulnerability to external threats, such as theft or violence. Additionally, women face an increased burden to manage the existing farms or small businesses and assume all unpaid care needs of their households and communities. Female headed households will be particularly vulnerable to crop failure and livestock needs with less mobility and access to agricultural support services (IRC, 2020). Currently, from the east African region that faces the challenge of food insecurity due to desert locust and other factors, three countries (Ethiopia, Kenya and Somali) shares approximately 12.7 million people in *Crisis* (IPC Phase 3) and among which 8.5 million in Ethiopia, 3.1 million in Kenya and 1.1 million people in Somalia (FSNWG, 2020).In addition to this, Ethiopia is among three major crises in the IGAD region and similarly among the 10 worst food crises in the world. In terms of prevalence of acute food insecurity,the country shares 27 percent (IGAD, 2020).In Ethiopia, food and feed security continues to be of concern due to desert locusts as the impact of this swarms on crops and pasture has been localized with relatively minor crop and pasture losses (FEWSNET and WFP, 2020).

5. Impacts of Desert Locust on Livelihoods of Ethiopia

The people of Ethiopia do not have the necessary resilience to endure further disruptions to their livelihoods, such as economic and physical barriers to food due to Desert locust containment measures (FAO, 2020).The vastmajority of the population of the country up to 80 percent depends on agriculture for their livelihoods. According to the FAO (2019), the disclosed that the rapid invasion ofthe Desert Locust across many regions ofEthiopia has already resulted in significantjeopardized thelivelihoods of smallholder farmers thatdepend on crops and livestock.These farming and herding communities heavily rely on rainfed production systems, with the timing, duration and quantities of rainfall playing a critical role in rangeland rejuvenation and crop production.According to the joint assessment finding report of Ministry of Agriculture, FAO, Save the Children, FEWS NET and WFP, on April, 2020, the desert locust caused an estimated

cereal crop loss of 3 562 856 quintals (356 286 MT) affecting about 806 400 farming households, 197 163 hectares of cropland and 1 350 000 hectares of pasture and browse and among the regional states of the country, in Somali and Oromia the damaged pasture land by desert locust attacks is around 50 percent.

6. Impacts of Desert Locust on Food Security of Ethiopia

Beyond drought and flooding, human and animal diseases, including the rift valley fever outbreak in 2018 and the outbreak of desert locust, have also negatively impacted agricultural production and household incomes during recent years (FAO, 2020).

According to the assessment report done by Ethiopian government with Food and Agricultural Organization of the United Nation in 2020 and Act alliance, 2020, over 75,219 hectares of land has been affected by desert locust in Ethiopia of which the highest areas affected by crop losses and food insecurity are Oromia and Somali regions. In addition to this, about one million individuals in the country have been affected by the desert locust invasion and require emergency food assistance. Of these, about 390 000 are in Somali, 360 000 in Oromia and Dire Dawa city (combined), 100 000 in Afar, 72 000 in Amhara, 43 000 in Tigray and 13 000 in Southern Nations, Nationalities, and Peoples regions (FAO, 2020).

Desert Locusts damage a wide variety of wild and cultivated crops and consume about their own weight of fresh vegetation each day. Half a million locusts each weighing 2 grams can collectively eat about one ton of vegetation each day. This amount is believed to be enough to feed about 2,500 people (Farm Africa, 2020). According to the most recent IPC analyses, widespread food insecurity in Ethiopia is approximately 8.5 million people in *Crisis* (IPC Phase 3) (FSNWG, 2020). Food insecurity is exacerbated by the desert locust swarms currently observed across the country where widespread breeding is in progress and new swarms are starting to form, representing an unprecedented impact on food security and livelihoods at the beginning of the cropping season (DRCet al., 2020).

7. Control Measures of Desert Locust

In control operation of the desert locust, a guideline which is safe (minimum negative effect on humans and the environment), effective (controls locusts successfully) and efficient (effective with minimum cost) must be followed. In action process to curb the spread of desert locust: assessments, early warning and forecasting, locust control operations (aerial and spraying), ground surveillance and impact assessments (FAO, 2020).

According to direction given by Farm Africa in 2020, the spread of desert locust can be controlled in three ways: 1. Mechanically by early warning, Noising, Smoking and Digging trenches; 2. Chemical control by band spraying of the immobile young hoppers; 3. Integrated Pest Management by Building up of the natural enemies populations in areas prone to locust invasions. There are two broad approaches to locust control: plague suppression and plague prevention. The first is a 'reactive strategy', occurring as an emergency operation if plague status is reached and when swarms and hopper bands are disseminated in many countries, far from their initial breeding and outbreak areas. Concerning the second approach which is preventative more precisely it is an 'upsurge prevention strategy' to achieve plague prevention through population reduction, by trying to eliminate the appearance of the first gregarious populations (Michel, 2001). Early intervention promises to reduce the size of upsurges and plagues further and so help protect recent agricultural developments and the crops and grazing of the very poor subsistence farmers in recession area (Magoret al., 2008).

Figure 1: Summary of the Control Process
Source: FAO, 2001

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