Seasonal Occurrence of the Tree Locust Anacridium Melanorhodon Melanorhodonon Acacia Senegal, North Kordofan State, Sudan

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Abstract:-The tree locust, Anacridium melanorhodon melanorhodon (Walker, 1870) (Acrididae: Orthoptera) causes sporadic damage mainly to trees. In Sudan, it is called night wanderer because of its nocturnal activity. It is commonly found on the Sudanese western sand plains, causing considerable damage to the gum Arabic producing Acacia trees. Field work was made at an Acacia Senegal plantation of the Acacia Project (Elrahad) site, during 2007/08 and 2008/09, North Kordofan State. Theobjectives of the study were to investigate the factors that influence the tree locust population movements and distribution. The results showed that, adults of the tree locust appeared in the field in May and high populations were recorded during the period from June to September reaching the peak (25.00±3.08 per tree) in November. Then the population decreased gradually and disappeared at the end of February. Sexual maturation began during May /June with the first rains and lasted for about 4 weeks. Oviposition period was during June and July and hoppers which have six stages, appeared between July and October and their development lasted 1-2 months. The hoppers density was at its peak during September (27.00±5.15 per tree).Rainfall and relative humidity coincide with the development of hoppers, while adults were encountered during periods of low rainfall and relative humidity.

Keywords:Treelocust, occurrence, North Kordofan, Sudan.

I. INTRODUCTION

Anacridiummelanorhodonmelanorhodon (Walker, 1870) (Acrididae: Orthoptera) is generally known as Sahelian tree locust. The species causes sporadic damage mainly to trees [4] hence the name tree locusts and there are twelve species causing the same type of damage in varying degrees to crops, particularly trees [5]. [16]assumed that A. m. melanorhodon is a mesophilous species which lives primarily in moderately humid habitats and it is also xerophilous and can live in dry habitat of open forest with thorny trees and shrubs. It is widely distributed in Cape Verde Island, Morocco, Mauritania, Senegal, Mali, Niger, Chad, Nigeria, Ethiopia, Eritrea and Sudan [22], [10], [11], [21] and [18].In Sudanit is called Sahelian tree locust, Sudan tree locust and night wanderer[17]and [9]. It is distributed in large areas forming a continuous belt from the east to the west spreading over Khartoum, Kassala, White Nile, Blue Nile, Kordofan, Darfur and Northern States [1]and [3] .It is more common in the Sudanese western sand plains associated with Acacia mellifera and Acacia senegal. Gum Arabic is often the principal source of income in these areas. In addition to gum production, A. senegal tree is used for sand dunes stabilization, microclimate improvement, soil amelioration through nitrogen fixation and a source of firewood and fodder for animals.

Other host plants include trees of the genus Acacia, Balanitesaegyptiaca and Zizyphusspina-christi. Tree locusts attack the flowers and leaves of fruit trees (mango, citrus, date palm and guavas). They also feed on vegetables and cause harm to crops such as cotton and sorghum [19] and [20] as well as tobacco, maize and millet. It is a serious pest of natural and planted forests [9]. The host plants of A. m. melanorhodon are scattered in the gum Arabic belt which lies between latitudes 10° and 15° N. of semi-arid land across sub-Saharan Africa and receives annual rainfall between 280- 450mm. The economic consequence of the tree locust infestation has been progressively more recognized in many countries, particularly in countries like Sudan, where a great deal of damage was caused by defoliation of A.senegal [7]and [6]. According to [23] Acaciasenegal suffers from the attack of tree locust especially during years of outbreak. The tree locust feeds onA.senegalleaves leading to low gum productivity. In the Sudan El Zian, (1994) mentioned that the loss in gum production caused by tree locust in seasons 1991 and 1992 was estimated at 86.5% of the total production. Furthermore, [2] recorded that the gum Arabic production in the Sudan declined due to many factors; including defoliation of trees by tree locust, especially in Kordofan State.

Control of tree locusts potentially restores incomes from gum Arabic, boosts foreign exchange earnings, and assists the livestock, forestry and horticultural industries [20]. Very few studies have been done on tree locust in Sudan. It is not known what factors trigger the upsurge of locust population, or whether natural control agents will ultimately reduce the population back to recession levels. This is a potentially valuable area for research [20].

II. MATERIALS AND METHODS

This study was carried out at Al Rahad, 57 Km south east El Obeid, Sheikan Locality, Northern Kordofan State, during (2007/ 08-2008/09) in a plantation (10.50 ha) of Acacia senegal trees. Regular surveys of the plantation were conducted twice a week to record tree locust populations during the period from May to October, as well as rainfall and % relative humidity were regularly recorded.

Counting of nymphs and adults:

The first hopper stages were counted in the morning between 08:30 and 10:30 h, a period of minimum locust activity, in ten replications of one meter square each (Luong-Skovmand2 2005) and converted to total number per hectare. The second to the sixth instar hoppers were counted in each marked tree, using a plastic cup which was placed under a branch and a stick was used to push the hoppers into the cup. The number of hoppers per tree and the number per hectare were thus determined at each site.Counting of adults was done similarly and was carried out in the morning between 08:30 and 10:30 h. The destructive sampling method was used according to Leather (2005). Fifty trees were selected for adult and hopper counting twice a week.

III. RESULTS

Field distribution of Adults and hoppers

Figure 1 shows that Anacridium melanorhodon melanorhodon adults appeared in the field in May, which is the beginning of the rainy season. High population density was recorded during June, at which time females gathered at egg laying sites. In July hoppers appeared in reasonable number reaching the peak in September (27.00±5.15 per tree). The adults generated from these nymphs appeared in the field in September reaching the peak in November (25.00±3.08 per tree), but their density decreased gradually and they finally migrate at the end of February.

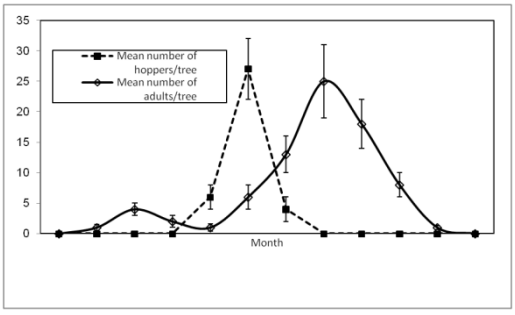

Figure 1. Mean number of the treelocust (adults and hoppers) per tree in the fieldduringseasons 2007/08 and 2008/09.

Distribution of the different hopper stages

First hopper stage appeared at the beginning of July and prevailed until mid- August. The second hopper stage appeared in mid- July. There was overlapping between other hopper stages, but the sixth hopper stage appeared during September and October (Fig. 2).

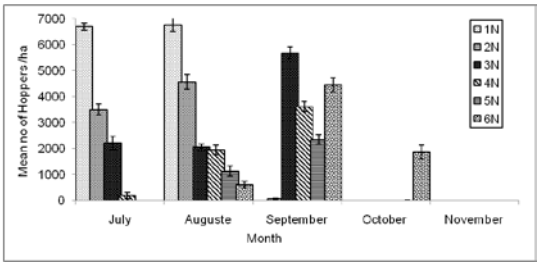

Figure 2. Meannumber of the treelocusthopper instars in the fieldduringseasons 2007/08 and 2008/09. N= Hopper nymph stage.

Relationship between rainfall and population density of adults and hopper

Figure 3 shows that the number of hoppers increased between July and August due to hatching while that of adults decrease because of death after oviposition. In September and October hoppers transform to fledglings adults then the number decreased. Therefore the number of hoppers increased during the rainy season but the number of adults decreased.

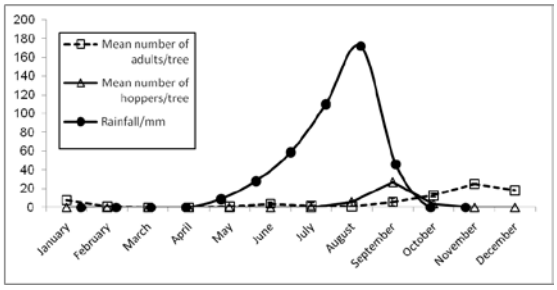

Figure 3. Meannumber of the treelocustadults and hoppers per tree in the field in relation to rainfall (seasons 2007/2008 and 2008/2009).

Figure 4 shows that the mean number of hoppers per tree increased with the increase of RH%, and the mean number of adults per tree decreased with the increase of RH.

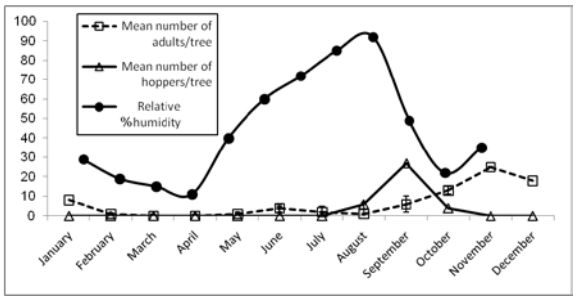

Figure 4. Meannumber of the treelocustadults and hoppers per tree in relation to relative humidity (seasons 2007/2008and 2008/2009).

IV. DISCUSSION

The tree locust, Anacridiummelanorhodonmelanorhodon adults in North Kordofan State appeared in the field in May, and high population density was recorded during June and increased in September reaching the peak in November. Then their density decreased gradually and they finally disappeared at the end of February. This could be due to; beginning of the rainy season the accessibility of food throughout these months because all acacia trees completed their greenness, and adult locusts possibly migrated to the other alternative hosts after February. The results agreed with Meinzingen (1993) who reported that the Sahelian tree locust, A.m. melanorhodon, lays eggs during June-July, hoppers develop in August and September and adults emerge at the end of the rainy season and the onset of the dry season (October and November).

There were six hopper stages. The first hopper stage appeared at the beginning of July and prevailed until mid-August. The second hopper stage appeared at the mid of July. There was overlapping between other hopper stages, but the sixth hopper stage appeared during September and October. This is because the favorable condition initiates females to lay eggs at that period. These results agree with Luong and Popov (1997) who reported that imagoes remain in a resting maturation stage until the first rain of the following year in May- June. They take four weeks before copulation, and then females lay eggs and hoppers hatched during the period from July to October.

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