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# Field Assessment of the insect proof net and pesticide treatments for the control of two tomato diseases

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***Abstract:*** **Tomato leaf curl and *Alternaria* leaf blight are the most serious diseases of the tomato crop in Sudan. The present study was conducted in the winter season, to evaluate the effect of covering the tomato seedlings with mosquito nets in the nursery and frequently spraying with confidor insecticide. After six weeks the seedlings were transplanted into three farmers fields in three locations north of Khartoum; namely Saggai, Karary and Shambat, to serve as demonstration plots for the tomato growers in each locality. The results revealed significant decrease in the leaf curl disease incidence by 47.3%, 30.7% and 29.3% at Saggai, Karary and Shambat locations, respectively. The results of field spraying with Amstar Top fungicide in the farmer's fields decrease the incidence of early blight by 10.3%, 15.0% and 13.8% at Karary, Saggai and Shambat, respectively. The combined effects of covering the tomato seedlings in the nursery and fungicide spraying in the field resulted in significant increase in tomato yield at Karary and Saggai by 25.5% and 39.2%, respectively, but the increase in yield at Shambat was not significant due to the abnormal inoculum pressure on the plot. The farmers at Karary and Saggai have already adopted the present disease control techniques.**

***Keywords:*** **Tomato; Insecticides; Alternaria; Khartoum State.**

## I. INTRODUCTION

Tomato (*Lycopersicon esculentum* Mills.) is an important food and cash crop worldwide [1]. In the Sudan the area located for tomato production is about 43453 hectares producing about 484000 metric tones annually [2]. Tomato production in the Sudan

is considered low in quality and quantity. Such low yield and poor quality are attributed to several factors such as soil, climate, poor management, pest infestation and disease infection. Tomato leaf curl virus (TLCV) and tomato early blight diseases are the most devastating diseases of tomato in the Sudan.

Tomato leaf curl virus disease and its effect on tomato yield was reported in the Sudan as early as 1965 by Yassin and Nour [3] as a serious disease of tomato transmitted by the whitefly (*Bemisia tabaci*). TLCV infection yellowing, leaf curling, leaf shedding are commonly resulting in up to 100% incidence level and up to 75% or more reduction in fruit yield [3]. Beside the several attempts for the control of TLCV disease of tomato by Yassin [4], Geneif [5] and other scientists, yet the disease is still causing a serious threat to tomato production in the Sudan.

The early blight disease of tomato caused by the fungus *Alternaria alternata* is another serious foliar disease in the Sudan. It causes complete loss of the tomato yield as the result of the blight causing complete destruction of foliage. The fruits are directly damaged by the fungal infection and the sun blotch due to the defoliated plants [6]. Several trials to control the early leaf blight disease through cultural practices and/or application of fungicides were tried in the Sudan without satisfactory results [7].

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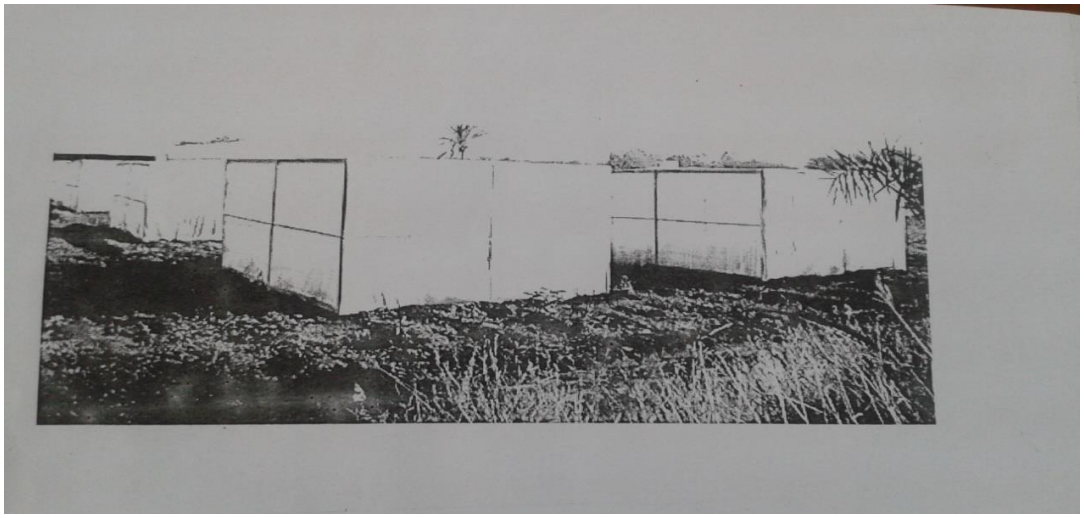
Hence the objectives of the present research project, which was generously financed by the Ministry of Higher Education and Scientific Research, were:

1. To control the TLCV disease by covering the tomato seedlings in the nursery with mosquito nets for six weeks to exclude the whitefly vectors prior to transplanting.
2. To study the efficacy of the fungicide Amistar Top application for the control of the early leaf blight disease.
3. To conduct the trial within the tomato grower's fields to act as demonstration plots for the tomato growers.

## II. MATERIALS AND METHODS

The land of the nursery plot was prepared in the Demonstration Farm of the Faculty of Agriculture, University of Khartoum, Shambat. The land was ploughed levelled, ridged and divided into two plots. Eight cages were fixed in the first plot. Each cage was made of iron frames (4.5m x 3.5m x 2.0m high) covered with mosquito nets (plate. 1).

PLATE 1: SEEDLINGS COVERED WITH MOSQUITO NET IN THE NURSERY



Tomato seeds of the variety Peto 86 were sown late October in pre-watered ridges in both the covered and the uncovered control plots and then irrigated twice weekly with frequent hand weeding and twice nitrogen fertilization. The tomato seedlings under the cover were weekly sprayed with the systemic insecticide Setecron 270 EC at the rate of 2 ml/L.

Six weeks after sowing the covers were removed in the presence of several tomato growers and Agricultural Extensionists. The tomato seedlings under cages were showing large vigor than outside the cages (plate 2 and plate 3).

PLATE 2: THE COVERED SEEDLINGS SHOWING LARGE VIGOR THAN UNCOVERED SEEDLINGS

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PLATE 3: THE UNCOVERED SEEDLINGS SHOWING LESS VIGOR THAN UNCOVERED SEEDLINGS


The tomato seedlings were uprooted, packed in wet sacks (Shawals) and transplanted to each of the three locations for transplanting. Irrigation, weeding, insecticide spraying and fertilization were done as described before.

The disease incidence for both TLCV and leaf blight diseases were assessed as percentage of infection. The disease severity was assessed by using a rating scale of 0-4 as adopted by Harsfall and Barrat [8]. Picking of the ripened tomato fruits was performed at three to four days intervals and the total yield per unit area (tons/ha) was calculated.

## III. RESULTS

The results of covering the tomato seedlings with mosquito nets, combined with frequent insecticidal spraying for six weeks revealed vigorous and healthy tomato seedlings, where the uncovered seedlings were yellowish and stunted. The results of the overall means of the TLCV disease incidence at the three locations are shown in Fig. (1) which reveals significant difference between the covered and uncovered tomatoes. Nine weeks from transplanting the uncovered plants showed severe TLCV disease symptoms (Fig. 2) compared with the mild TLCV disease symptoms on the covered tomato plants. The highest incidence of the early leaf blight disease was obtained from the uncovered/unsprayed plants while the lowest disease incidence was obtained from the covered/sprayed tomato plants. However, there was no significant difference in leaf blight disease incidence between covered and uncovered plants.

As shown in (Fig. 3) the results of the tomato yield revealed significant differences between covered and uncovered tomato plants. The highest yield of the tomato crop (64.2 ton/ha) was recorded from Saggai while the lowest yield (15.0 ton/ha) was obtained from the uncovered tomato grown at Shambat location.

FIGURE 1: OVERALL MEANS OF TLCV DISEASE INCIDENCE AT THREE LOCATIONS

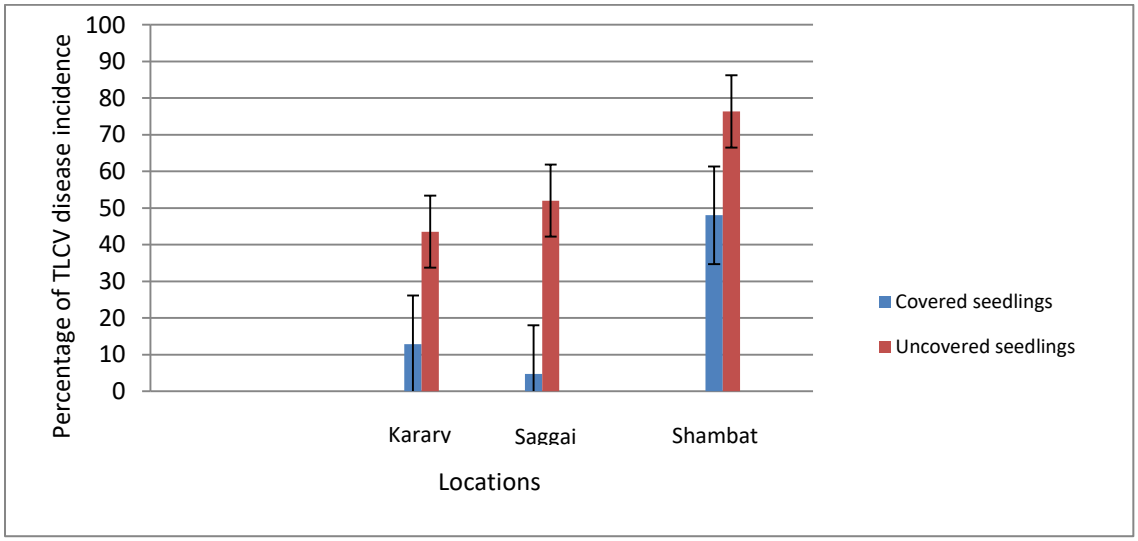

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FIGURE 2: OVERALL MEANS OF TLCV DISEASE SEVERITY AT THREE LOCATIONS

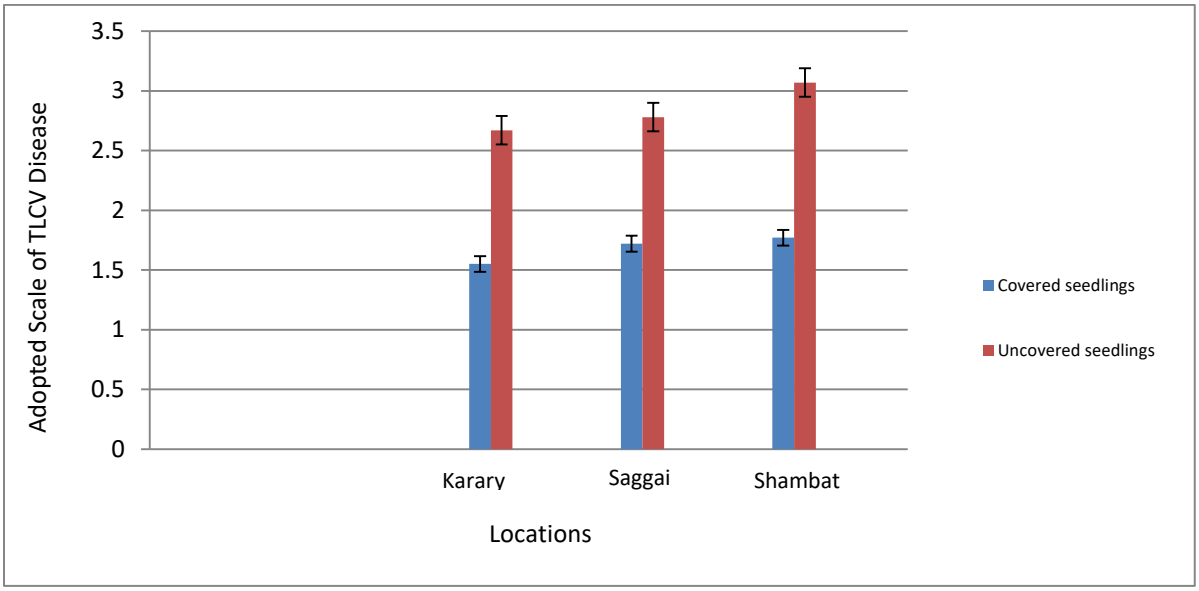
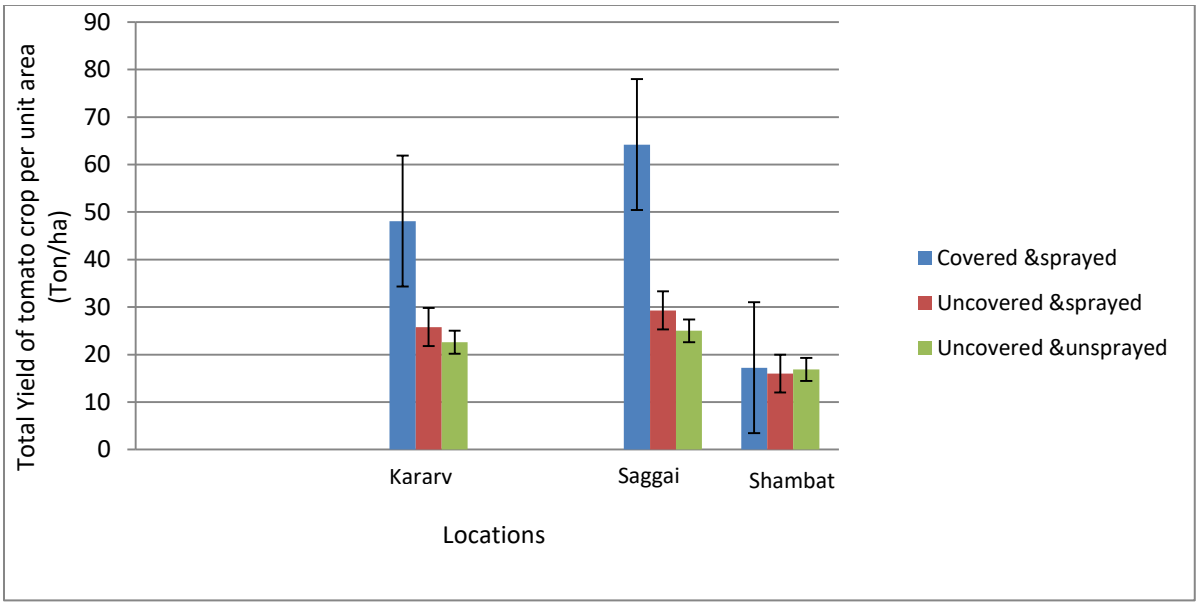



FIGURE 3: THE MEANS OF TOTAL YIELD OF TOMATO CROP PER UNIT AREA (TON/HA)




## IV. DISCUSSION

The results of the present study have shown that covering the tomato seedlings in the nursery with mosquito nets for six weeks prior to transplanting revealed healthy and vigorous seedlings with high plant density compared with the stunted plants with low density outside the cover. Such observations could be attributed to the exclusion of the insect pests inside the cover. Moreover, the modification of the microclimate inside the cage could be more favorable for the growth of the tomato seedlings. The previously covered tomato plants exhibited significant decrease in TLCV disease incidence and severity in the three locations studied. Similarly, Cohen and Antigenus [9] reported that growing tomato seedlings in an insect proof greenhouse resulted in significant decrease in TLCV disease infection. Similar to the findings of Guddewar *et al*. [10] the present work have shown that the application of Amistr Top resulted in significant decrease in the early leaf blight disease infection. The severe disease infection followed by the lowest tomato yield at Shambat location was attributed to the fact that the field chosen in Shambat was previously grown with infected tomato plants. Moreover, the tomato crop at Shambat was adjacent to an infected potato field. Hence it was recommended that the tomato growers should establish their healthy transplants in isolated disease free fields.

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