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Summary

The present studies were carried out at the Experimental Farm of Shandweel Agricultural Rescarch Station, Sohag Governorate, during three soybean growing seasons (2001-2003) and two peanut growing seasons (2001&2002).

The aim of the prcsent studies had to be accomplished in the following four items in Shandwcel Agric. Res. Station, Sohag Governoratc:

1- Survey of arthropods (Insects and mites) associated with soybean and peanut plants.

2- Seasonal abundance of certain pests (insects and mites) infesting both crops, and the effect of certain variable factors [plant age and weather factors (maximum temp., minimum temp., average temp. and relative humidity R.H.)] on these pests.

3- Effeet of some agricultural practices on seasonal abundance of certain pests infesting both crops.

4- Control of spider mite on soybean plants.

1- Ecological studies:

1-1-Survey of arthropods species assoeiated with soybean and peanut plants:

Two experiments wcrc carried out in the experimental Farm of Shandweel Agricultural Research Station, Sohag Governorate during the growing season of 2001 in order to survey the various inseets and mites on soybean (Giza 35 variety) and peanut (Giza 5 variety) by using direct account.

1-1-1- Survey of certain arthropods associatcd with soybean plants:

Data revealed the presenee of 48 arthropod speeies belonging to 40 genera under 27 families from 12 orders. Out of total 48 arthropod species, there were 33 inseet species belonging to 30 genera under 22 families from 10 orders. In addition to, 15 mite species belonging to 10 genera under 5 families from 2 sub-orders. All species were well known.

1-1-2. Survey of arthropods associated with peanut plants:

Data indicated the occurrence of 36 arthropod species belonging to 31 genera under 21 families from 12 orders. Out of total 36 species, there were 26 insect species belonging to 24 genera under 19 families from 10 orders, as well as, 10 mite speeies belonging to 2 families from 2 sub-orders. It is cleared that all species were well known.

1-2- Seasonal abundance of certain pests infesting soybean crop and weather records:

This experiment was earried out during 2001, 2002 and 2003 seasons at the Experimental Farm of Shandweel Agrieultural Researeh Station, Sohag Governorate. The variety Giza 35, was cultivated at (April 15th) and (May 15th). The considered insects were the twospotted spider mite, *T. urticae* and sweetpotato whitefly, *B. tabaci*.

1-2-1- The two spotted spider mite *T. urticae* (movable stages):

The obtained results indieated that the first growing season (2001) of the first sowing date (April 15th) had the highest total number of mite eompared with the seeond growing season 2002 and the third one 2003. On eontrary, the second growing season (2002) in the seeond sowing date (May 15th) had the highest total number followed by the third growing season (2003) with difference. Moreover, the total number of mite in the first sowing date was higher than that in the seeond sowing date only during the first growing season (2001), while the total number during both the second and the third growing seasons (2002 and 2003), the total number in the second sowing date was higher than that in the first one.

It is also, eleared that in the first sowing date, the twospotted spider mite (*T. urticae*) had two peaks through the three growing seasons, in (1st July) and (22nd July) in 2001 and in (8th July) and (5th August) in both of 2002 and 2003 seasons. On the other hand, in the second sowing date, mite had only two peaks

(17th July) and (14th August) in 2001 season, while during 2002 and 2003 seasons, the mite recorded one peak at (31st July).

Average numbers were fluctuated through the three growing seasons and through the two sowing dates, this may be due mainly to the prevailing weather factors.

1-2-2-Sweetpotato whitefly, *B. tabaci* (nymphs) and weather records:

Generally, the results showed that the grand total numbers of season 2001 was higher than that of 2002 and 2003 seasons during both the first and the second sowing dates. It was cleared that the second sowing date (May, 15th) had the highest grand total numbers of *B. tabaci* than the first one (April, 15th) in the three growing seasons.

The results also, indicated that the grand averages of relative humidity in the second sowing date was higher than those of the first sowing date through the three growing seasons 2001, 2002 and 2003 (53.71, 53.02 and 51.71%, respectively) for the seeond sowing date, while in the first sowing date the grand average of relative humidity were (49.81, 49.18 and 46.91%) for the three seasons, respectively. This may be indicated that the relative humidity plays an important role in increasing the numbers of *B. tabaci.*

On the other hand, the results in the present study showed that *B. tabaci* had one peak in the first sowing date (24th June) through the three growing seasons. While, in the second sowing date the highest numbers were recordcd at the end of July (31st July) in 2001 seasons, and at (24th July) in 2003 season, whereas, in 2002 season the highest numbers were recorded earlier at (26th June).

1-3- Effect of certain factors on the population density of the twospotted spider mite and whitefly infesting soybean crop in the field through two sowing dates during 2001, 2002 and 2003 seasons.

This study was carried out at the Experimental Farm of Shandweel Agricultural Research Station, Sohag Governorate, in order to explain the

influence of some variable factors on the population density of the spider mite, *T. urticae* and whitefly, *B. tabaci* on soybean crop (var., Giza 35) through two sowing dates during three seasons (2001, 2002 and 2003 seasons). The variable factors were plant age (X_1) and weather factors were represented by daily maximum temperature (X_2), daily minimum temperature (X_3), average daily temperature (X_4) and average relative humidity (X_5). The relationship between the population of the pests and the variable factors was analyzed by using Multiple Regression Analysis.

1-3-1-The two spotted spider mite, *T. urticae*:

Generally, results indicated that maximum temperature in 2001 season, average relative humidity in 2002 season and plant age in 2003 season expressed the most effect on the population changes of *T. urticae* on soybean at the first sowing date (Apr., 15th), during the period from May to August. Their efficiencies were (24.34%, 46.71% and 61.10%), out of the total of (41.98%, 74.27% and 95.53%) for 2001, 2002 and 2003 seasons, respectively. Also, Average daily temperature in 2001 and 2003 seasons and average relative humidity in 2002 season at the second sowing date (May, 15th) during the period from (June to Sept.) was an important factor on the population changes of *T. urticae*, it was responsible for (11.77%, 33.85% and 21.73%), out of the total (33.22%, 80.86% and 58.92%, for 2001, 2002, 2003 seasons, respectively

1-3-2-Whitefly, *B. tabaci*:

It can be concluded that at first sowing date, maximum temperature in 2001 and 2002 seasons and minimum temperature in 2003 season were the most important variable factors on population changes of *B. tabaci*, these variables were responsible for (39.38%, 16.33% and 30.74%) out of the total (55.52%, 37.68% and 47.02%), for 2001, 2002 and 2003, respectively. Also it is cleared that maximum temperature had significant and positive effect on population changes of *B. tabaci* during 2001 and 2003 seasons. While at the second sowing

date (May, 15th), maximum temperature in 2001, minimum temperature in 2002 and average relative humidity in 2003 season were the most important variable factors on population changes of *B. tabaci*, where they were responsible for (30.89%, 43.95% and 42.61%) out of the total (82.19%, 59.74% and 47.86%) for 2001, 2002 and 2003, respeetively.

Generally, the results showed that all variables had different effects on population changes of both of *T. urticae* and *B. tabaci*. At the first sowing date (Apr. 15th), maximum temperature, in 2001 season, average relative humidity in 2002 season and plant age in 2003 season, were effective variables on population ehanges of *T. urticae*. While maximum temperature in 2001 and 2002 seasons and minimum temperature in 2003 season were the most effective ones on population changes of *B. tabaci*. Whereas at the seeond sowing date (May, 15th), average daily temperature in 2001 and 2003 and average relative humidity in 2002 season were the most effective and important variables on population changes of *T. urticae*. Also maximum temperature in 2001 season, minimum temperature in 2002 and average relative humidity in 2003 season were the most effective variables on population ehanges of *B. tabaci*.

1-4- Seasonal abundance of certain pests infesting peanut crop:

1-4-1-The twospotted spider mite, *T. urticae*:

The results revealed that the grand total of *T. urticae* on peanut leaflets at the first sowing date was higher than that at the second sowing date during the two seasons (2001 and 2002). Generally, the grand total of this pest in the second season (2002) was higher than that in the first season (2001), either in the first sowing date (Apr., 15th) or in the second one (May, 15th). In addition, in the second sowing date the population of *T. urticae* appeared for a short period as compared with the first sowing date, either in 2001 season or in 2002 scason.

1-4-2- *Eutetranychus orientalis*:

It is cleared from results that the first sowing date (Apr., 15th) hardboured the highest grand total, either in the first or in the second growing seasons (2001 or 2002 season). Also, the population of *E. orientalis* in the seeond sowing date, either in 2001 or 2002 season, was represented by a low grand total and a short period of appearance. Moreover, the first growing season (2001) of the first sowing date, hardboured the highest grand total than the second growing season (2002), while the opposite result was reeorded in the second sowing date, whereas the first growing season (2001) hardboured the lowest grand total, as compared with the second growing season (2002).

1-4-3- Potato leafhopper, *E. fabae* (Harris):

From the results, it could be concluded that the grand total of the population of *E. fabae* during the first sowing date (Apr., 15th) in both seasons was higher than that in the second sowing date (May, 15th). Also, it is cleared that the grand total of the population during the first season (2001), either in the first or in the second sowing date, was lower than that in the seeond season (2002).

Generally, it is obvious that the population densities of the three sap-suckers pests (*T. urticae*, *E. orientalis* and *E. fabae*), were fluctuated through the two seasons and the two sowing dates, these may be relatcd to as tbe weather factors.

Generally, from all the previous results it could bc mentioned that for the three sap-sucker pests (*T. urticae*, *E. orientalis* and *E. fabae*), the grand total of these pests on peanut, in tbe first sowing date (Apr., 15th) was higher than that in the second one (May, 15th), during both seasons (2001 and 2002), while the grand total of *T. urticae* and *E. fabae* in tbe first season (2001) was lower than that in the second season, either in the first sowing date or in the second sowing date. Moreover, the grand total of *E. orientalis*, only in the second sowing date, the first season (2001) was lower than that in the second season (2002). In

addition, the maximum monthly pereentages for the mite (*T. urticae* and *E. orientalis*) were recorded in July allover the two seasons (2001 and 2002), either in the first sowing date or in the second sowing date. While, for the *E. fabae*, the maximum monthly percentages were recorded in August, in both seasons (2001 and 2002), either in the first sowing date or in the second one.

2- Agricultural practices:

2-1- Soybean:

2-1-1-Effect of sowing dates, soybean varieties and different application time of potassium fertilizers on the population of certain pests infesting soybean plants.

2-1-1-1- The two spotted spider mite, *T. urticae.*

Finally, from the previous it was obvious that the highest population of *T. urticae* was recorded on the upper level of the plants. While, the lowest was recorded on the lower level of plants in all seasons (2002 and 2003). These may be due mainly to the effect of leaves age.

On the other side, the highest population of *T. urticae* was recorded in the second sowing date (May, 15th), during the two growing seasons (2002 and 2003). These results may be attributed to the weather factors prevailing in each growing season.

The results also, indicated that the varieties influenced the population of *T. urticae* with significant differences. Generally, Clark variety harboured the lowest average numbers of *T. urticae*, while Giza 35 variety harboured the highest average numbers and Giza 111 variety in between.

Data in the present study also, indicated that the application times of potassium fertilizer influenced the population of *T. urticae*. The lowest average numbers of *T. urticae* was recorded on plants received potassium fertilizer at the third time of application.

2-1-1-2- Sweetpotato whitefly, *B. tabaci* (Genndins):

In conclusion, the results indicated that the highest population of *B. tabaci* was recorded on the upper plant level during 2003 seasons, whereas on the lower one during 2002 season.

Moreover, the highest population of *B. tabaci* was occurred on plants cultivated in the second sowing date (May 15th) during the two growing seasons. The differences between the two sowing dates were significant during the three seasons. These results may be attributed to the weather factors presented in the area of experiment during the two growing seasons, espeeially temperature and relative humidity.

In conelusion, the three soybean varieties had significant differences among them to whitefly infestation.

Moreover, the recent results indicated that the applieation times of potassium fertilizer affected on the population density of *B. tabaci* on soybean plants. It is obvious that the early supplied time of potassium fertilizer caused the lowest population of *B. tabaci.*

2-1-1-3- Limabean pod borer, *E. zinckenella* (Treitschke):

Data revealed that sowing dates, soybean varieties and application times of potassium fertilizer affected on the infestation percentages with *E. zinckenella* during two growing seasons (2002 and 2003).

Data also, showed that the plants cultivated at the first sowing date (Apr., 15th) recorded average percentages of infestation lower than that at the second sowing date (May, 15th) with significant differences during the two growing seasons.

Also, the soybean varieties affected markedly on the infcstation pcrcentages by *E. zinckenella.* Clark variety had the lowest percentage of infestation during the two growing seasons. While, Giza 35 variety exhibited the highest percentage of infestation by this pest with significant difference.

Furthermore, the results revealed that the differenees between the applieation times of potassium fertilizer were insignifieantly during 2003 seasons but signifieantly between the first and third times of applieation during 2002 season.

2-1-2- Effect of sowing datcs, soybean varieties and different application times of potassium fertilizers on the yield weight (Kg/fed.):

Generally, data obtained revealed that the three studied faetors (sowing dates, soybean varieties and the applieation times of potassium fertilizer) influenced on the seeds yield of soybean (Kg/fed.).

It is cleared that the seeds yield (Kg/fed.) during the second sowing date was higher than that during the first sowing date, through 2002 and 2003 seasons, these results were regardless of the soybean varietics and the application times of potassium fertilizer.

On the other hand, irrespective of the sowing dates and the application times of (K) fertilizer, the three soybean varieties follow the same trend through the two growing seasons. Clark variety was the highcst seeds yield, followed by Giza 111 variety, while Giza 35 variety was the lowest seeds yield with significant differences.

Moreover, regardless of the sowing dates and varieties, it is obvious that the application times of (K) fertilizer didn't follow the saine trend through the two growing seasons. During 2002 season, there were significant differences among thc application times of (K) fertilizer, the highest seeds yield was obtained from plants subjected to potassium fertilizer at the third time of application, while the lowest seeds yield was obtained from plants subjected to potassium fertilizer at the second time of application. During 2003 season, the highest seeds yield was obtained from plants subjected to potassium fertilizer at

the first and second application times, whereas the lowest seeds yield was obtained from plants subjected to potassium fertilizer at the third application time.

Generally, it is cleared that the seeds yield during 2003 season was higher than that during 2002 seasons.

Generally, the infestation of soybean plants by (spider mite, whitefly and limabean pod borer) may be played role on yield and on the responses of soybean yield to the three factors (sowing dates, varieties and the application times of potassium fertilizer).

Moreover, data obtained from the recent study revealed that the differential responses of yield weight may be attributed to soybcan varieties.

2-2- Peanut:

2-2-1- The effect of sowing dates, peanut varieties and the application times of potassinm fertilizer on the population of certain pests iufesting peanut plants.

2-2-1-1- The twospotted spider mite, *T. urticae:*

Data of the present study showed that the late sowing date (May, 15th) exhibited the highest infestation by most studied pests as compared with early sowing date (Apr., 15th).

Furthermore, the present study indicated that the three studied peanut varietics of peanut were infested by studied pests, with different degrees. Balady variety exhibited the highest infestation by all studied pests.

On the other hand, the present study showed that the application timcs of potassium fertilizer influenced the infestation by all studied pests.

Considering the pods yield of peanut, the results in this study showed that thc three variables (sowing dates, peanut varieties and the application times of potassium fertilizer) influenced the pods yield of peanut. The differential responses of peanut yield may be attributed to the infestation by these pests.

3- Control studies of spider mite, *T. urticae* on soybean crop:

3-1- Field trails:

3-1-1- Effect of certain compounds on the population density of the twospotted spider mite, *T. urticae* infesting soybean plants and subjected to three sprays programmes:

This experiment was carried out during 2002 and 2003 seasons at Shandweel Research Station. The soybean variety Giza 35 was used.

The results indieated that, for each compound, 2-sprays and 3-spray programme gave high reduction pereentage as compared with 1-spray programme, and eould be recommended for the control of *T. urticae* on soybean plants. 2-sprays programme could be preferable than 3-sprays programme, causing pollution lower than 3-sprays programme.

Also, abamectin 1.8%EC and propargite 73%EC at low concentration of each ($30cm^3$/100lit. water and $300cm^3$/fed.) gave high reduction pereentages after three weeks from spraying and could be recommended for eontrol *T. urticae* rather than the recommended concentration, bccause of decreasing pollution.

In view of the intervals after spraying, the obtained results during both seasons (2002and 2003), indicated that the intervals after spraying could be arranged descently according to the reduction percentages as follows: after one, two, three and four weeks from spraying. It is obvious that the highest reduction pcrcentages were achieved after one week from spraying. Moreover, the results in affirmed that after three and four wceks from spraying, highly reduction percentages were obtained by using abamectin 1.8%EC, propargite 73%EC and fenpyroximate 5%SC at both recommended and lower concentrations of each compound, It could be recommended that these compounds could be used at low concentrations in controlling *T. urticae* for economical an healthy reasons.

Worth mentioning, propargite 73 % EC was forbidden recently by Ministry of Agriculture and Land Reclamation. On the other side, abamectin 1.8

% EC, fenpyroximate 5% SC and Bio Fly gave satisfactory percentages reduction of *T. urticae*. So, the later compounds (abamectin 1.8 % EC, fenpyroximate 5% SC and Bio Fly) could be recommended for control *T. urticae* instead of propargite73%EC.

3-1-2- Effect of tested compounds on the yield increment:

Data of the combined effeet of spray programmes and the tested eompounds with their eoncentrations revealed that all treatments were efficient in augmentation of soybean yield with different percentages ranged from 8.76 to 58.17 % in 2002 season and 2.69% to 35.20% in 2003 season.

3-2- Laboratory tests:

3-2-1-Susceptibility of the two spotted spider mite, *T. urticae* to certain compounds under laboratory conditions.

Tested compounds could be arranged in descending order (depending on LC_{50} values (ppm) established from 24 hrs. mortalities) as follows: abamectin 1.8 % EC (0.1185), fenpyroximate 5% SC (10.1690), sulfur 70% WP (96.0543), propargite 73% EC (117.9137), KZ oil 95% EC (440.0378)and Bio Fly $30x10^6$ cells/cm^3 (100% SC) (1949.409).

abamectin 1.8 % EC and fenpyroximate 5% SC were the most toxicity, while KZ oil 95% EC and Bio Fly $30x10^6$ cells/cm^3 (100% SC) were the lest toxicity and the remain compounds were in between.