SUMMARY

The work presented in this thesis was conducted throughout 1997 & 1998 cowpea summer season to investigate some aspects, i.e. varietal susceptibility, planting date and levels of phosphorous and/or nitrogenous fertilization on the rates of infestation by the most important sap-sucking pest species infesting cowpea plants. Those pests included spider mite, Aphid, Whitefly, Thrips, and leaf-hoppers. The dry pods yield from different treatments and control was also estimated/feddan. Field studied were carried out in the Agricultural Experimental Farm of the Faculty of Agriculture at Moshtohor, Tukh, Qalubiyah Governorate. The obtained results may be summarized as follows:

1- Effect of cowpea varieties on pests' infestation

One- Spider mite, *Tetranychus* sp.: Balady variety harboured, significantly, the lowest numbers of *Tetranychus* sp. Eggs & moving stages with averages 4.55 & 4.05/leaflet, respectively. Cream 7 variety was moderately infested by eggs & moving stages (averages 6.00 & 4.75/leaflet, respectively). While, Dokki 331 variety received the highest infestation levels (6.55 eggs & 5.05 moving stages/leaflet, respectively). These results indicated that the Balady variety of cowpea was more resistant to *Tetranychus* sp. infestations than Cream 7 and Dokki 331 varieties which appeared as more susceptible.

Two- Aphids: Dokki 331 variety harboured, significantly the lowest infestation rates by aphid nymphs & adults (0.75 individual/leaflet). Compared to Cream 7 & Balady varieties which harboured more individuals of nymphs & adults (1.3 & 1.1/leaflet respectively). Thus indicating that the two latter varieties were

more susceptible to aphids infestation than the former one which could be considered as more resistant variety.

Three- Thrips: Balady proved as the least infested cowpea variety by thrips nymphs (1.00 nymph/leaflet), while Dokki 331 & Cream 7 varieties showed higher infestation rates than those occurred to the former variety (1.25 & 1.3 nymph/leaflet, respectively). These results proved that Balady variety is more resistant to infestation by thrips nymphs than the two other varieties which proved as more susceptible. Thrips adult counts were also estimated on leaflets of the three cowpea varieties. The obtained results showed that the infestation rates on the three varieties varied insignificantly.

Four- White fly *B. tabaci*: Dokki 331 variety of cowpea harboured, significantly lower *B. tabaci*, immature stage numbers with average 2.1 immature stages/leaflet. While in the contrary, Cream 7 & Balady varieties associated with the highest numbers (2.65 & 2.45 immature stages/leaflet respectively). Thus indicating that the former variety (Dokki 331) is more resistant to *B. tabaci*, immature stage infestations than the two other varieties "Cream 7 & Balady varieties" which could be considered as more susceptible than Dokki 331 variety. In case of *B. tabaci*, adult counts, Balady & Dokki 331 varieties showed higher resistant as it harboured the lowest counts "1.1 & 1.15 adult/plant respectively". While cream 7 variety harboured more adult counts, being more susceptible than the two other varieties.

Five- *Empoasca* sp. Balady variety harboured, significantly lower *Empoasca* sp. Nymph counts (1.05 nymphs/leaflet). Cream 7 variety harboured, significantly, moderate *Empoasca* sp. Nymph counts (1.25 nymphs/leaflet). While Dokki 331 variety harboured significantly, higher numbers of *Empoasca* sp. Nymphs (1.4

nymph/leaflet) These results indicated that Balady variety may be considered as more resistant to infestation by leafhopper, followed by Cream 7 as a susceptible variety and Dokki 331 as a more susceptible variety.

2- Effect of planting dates on pests' infestation

a- Spider mite, *Tetranychus* sp.: Cowpea plants (Cream 7 variety) which were sown in the second & third planting dates "April 15th & April 30th" harboured lower number of *Tetranychus* sp. Egg "5.6 & 5.5 eggs/leaflet respectively". While these sown in the first planting date "April 1st" associated with higher numbers "6.00 eggs/leaflet". These results indicated that the second & third planting dates led to resistant planting dates to infestation. As for the *Tetranychus* sp. Moving stages, plants which were sown in the first planting date harboured significantly, lower numbers (4.35 moving stages/leaflet). While the second & third planting dates associated with the higher numbers of *Tetranychus* sp. Moving stages infestation (4.45 & 4.50 moving stages/leaflet respectively).

b- Aphids: The second & third planting dates of cowpea plants (April 15th & April 30th) harboured, lower nymph & adult of aphid numbers (0.6 & 0.7 aphid/leaflet respectively). While the first planting date (April 1st) associated with higher numbers (2.05 aphids/leaflet). These results indicated that the second & third planting dates are more resistant to infestation by aphids while the first planting date is more susceptible to this infestation.

c- Thrips: Cowpea plants (Cream 7 variety) which were sown in the second & third planting dates (April 15th & April 30th) proved as the least infestation by thrips nymphs (1.20 & 1.25 nymphs/leaflet, respectively) While the first planting date "April 1st" showed moderate

infestation rates that the two other planting dates (1.35 nymph/leaflet). These results proved that the second & third planting dates are more resistant to infestation by Thrips. Nymphs than the former one which proved as susceptible to infestation. Thrips adult counts were also estimated on leaflet of the three planting dates (April 1st, April 15th & April 30th). The obtained results showed that the infestation rates by Thrips adults on the three planting dates were similar (0.65, 0,55 and 0.5 adult /leaflet, respectively).

d- White fly: The third planting date of Cream 7 variety "April 30th" harboured, significantly lower numbers of *B. tabaci* immature stages & adults with averages (2.00 immature stages/leaflet & 0.95 adult/plant) while the first & second planting dates "April 1st & April 15th" associated with the highest numbers (2.9 immature stages/leaflet, 1.15 adult/plant & 2.8/leaflet, 1.05/plant respectively). Thus indicating that the former one (Third planting dates) is more resistant to *B. tabaci* immature stages & adult infestations than the two other planting dates (First & second planting dates) which could be considered as more susceptible than the third planting date to infestation.

e- *Empoasca* sp., nymphs: The first planting date (April 1st) harboured, significantly the lowest infestation rates by *Empoasca* sp. Nymphs (1.1 nymph/leaflet) compared to the second & third planting dates (April 15th & April 30th) which harboured more counts of nymphs "1.35 & 1.35 nymph/leaflet" respectively. Thus indicating that the two latter planting dates were more susceptible to *Empoasca* sp. Nymphs infestation than the former one which could be considered as more resistant to infestation.

3- **Effect of different levels of fertilization on pests' infestation**

a- Spider mite, *Tetranychus* sp.: The plants which treated with high level of phosphate "250 Kg/F Calcium superphosphate 15%" showed highest numbers of *Tetranychus* sp. Eggs and moving stages with averages 7.35 eggs and 5.8 moving stages/leaflet respectively. While the plants of low level of mixture (75 Kg/F. calcium superphosphate + 25 Kg/F. ammonium nitrate) showed the lowest numbers of *Tetranychus* sp. Eggs & moving stages with averages 4.6 eggs and 3.85 moving stages/leaflet respectively. These results indicated that the plants of high level of phosphate is relatively more susceptible to *Tetranychus* sp. Eggs & moving stages infestations, while the plants of low level of mixture fertilizer is more resistant to infestation.

b- Aphids: The plants of low level of phosphate "150 Kg/F. Calcium superphosphate" revealed the lowest infestation rates by aphid nymphs & adults "0.59 aphid/leaflet" compared to the plants of normal level of mixture "100 Kg/F. calcium superphosphate + 50 Kg/F. ammonium nitrate" which harboured more counts of aphid nymphs & adults"6.78 aphid/leaflet". Thus indicating that the former one is more resistant to aphids infestation than the latter which could be considered as more susceptible to infestation.

c- Thrips: Normal level of mixture fertilizer (100 Kg/F. Calcium superphosphate 15 % + 50 Kg/F. ammonium nitrate 33 %) of cowpea plants revealed the highest thrips, nymph & adult numbers with averages 2.00 nymphs & 0.7 adult/leaflet. While plants of low level of phosphate (150 Kg Calcium superphosphate 15 %) showed the lowest thrips, nymph numbers with average 1.45 nymph/leaflet. Also plants of high level of phosphate (250 Kg./F. Calcium superphosphate 15 %) plants of normal level of phosphate (200 Kg/F Cacium superphosphate), plants of low level of nitrogen (50 Kg/F. ammounim

nitrate 33 %) and plant of low mixture (75 Kg/F. calcium superphosphate 15% + 25 kg/feddan ammonium nitrate 33 %) showed the lowest thrips, adult numbers with averages 0.55 adult/leaflet. Thus indicating that the former level of fertilizer (the normal level of mixture fertilizer) is more susceptible to thrips, nymph & adult stage infestations than the other levels (low level of phosphate, high level of phosphate, normal level of phosphate, low level of nitrogen and low level of mixture fertilizers) which could be considered as more resistant to thrips nymph & adult infestations.

d- White fly: Plants of high level of phosphate (250 Kg./F. calcium superphosphate 15 %) revealed the highest *B. tabaci* immature stage numbers with average 3.05 immature stages/leaflet. While in the contrary, plants of normal level of mixture fertilizer (100 Kg/F. Calcium superphosphate 15% + 50 Kg/F. ammonium nitrate 33 %) associated with the lowest numbers 2.05 immature stages/leaflet. Thus indicating that the former level of fertilizer (high level of phosphate) is more susceptible to *B. tabaci* immature stage infestations than the latter (normal level of mixture fertilizers) which could be considered as more resistant to infestation. In case of *B. tabaci* adult counts, plants of low level of phosphate (Calcium superphosphate 15 % "150 Kg/F."), plants of normal level of nitrogen (100 Kg/F. ammonium nitrate 33 %) and plants of low level of mixture fertilizer (75 Kg/F. Calcium super phosphate 15% + 25 Kg/F. ammonium nitrate 33 %) showed high susceptible to infestation as it harboured the highest counts "1.3 adult/plant" while plants of low level of nitrogen (50 Kg/F. ammonium nitrate 33 %) associated with the least adult counts (1.0 adult/plant) being resistant to infestation than the other levels of fertilizers.

e- *Empoasca* sp., nymphs: Normal level of nitrogen (100 Kg/F. ammonium nitrate 33 %) of cowpea plants showed the highest numbers of *Empoasca* sp. Nymph with average 1.7 nymphs/leaflet while plants of high level of mixture fertilizer (125 Kg/F. calcium superphosphate 15 % + 75 Kg/F. ammonium nitrate 33 %) associated with the least numbers of infestation (1.1 nymphs/leaflet). Thus indicating that the former level of fertilizer is more susceptible to *Empoasca* sp., nymph infestation than the other which could be considered as more resistant to infestation.

4- **Effect on yield:** The obtained dry pods yield from different treatments was transferred to that produced per Feddan.

a- Varieties: Dokki 331 gave the highest yield with average 906.64 Kg/F. followed by Cream 7 variety with average 634.11 Kg/f. while, Balady variety gave the lowest yield with average 419.85 Kg/F.

b- Planting date: Plants of the first planting date "April 1st" gave the highest yield with average 285.75 Kg/F. followed by those of the third planting date "April 30th" with average 256.96 Kg/F. while plants of the second planting date "April 15th" gave the lowest yield of dry pods with average 218.64 Kg/F.

c- Phosphorous and nitrogenous fertilizers at different levels plants of ammonium nitrate at normal rate (100 Kg/F.) or P & N mixture fertilizers at the highest rate (125 Kg/F. calcium super phosphate + 75 Kg/F. ammonium nitrate) gave the highest dry pods yield at average 635.22 or 626.75 Kg/F. respectively. While plants of normal level of phosphate (200 Kg/F. calcium superphosphate) gave the lowest yield at average 185.11 Kg/F.