factors that may affect the role of sphaerodema urinator duforas mosquito predator

mona fawzy abdelazeez

This work aimed to study some factors that may affect the role of this insect as mosquito predator, such as environmental factors (water depth, water surface area, vegetation present and water quality) some meteorological factors (temperature, photoperiod and light intensity) the effect of insecticides used as mosquito larvicides on nontarget predator and the interspesific competition of S. urinator as mosquito predator with other prevailing predators.Factors that may effect the role of S. urinatoras mosquito predator:-1.Water depth: -Results of this work indicated that the duration of each nymphal instar or total nymphal instar duration reared in three different water depths was not significantly different. But nymphal mortality was insignificantly increased with the increase of the water depth.Preoviposition and postoviposition periods not significantly different in all treatments and a non significant difference was observed in oviposition period between adults reared in low and medium or medium and high water depths, whereas a significant reduction wasobserved in this period in case of insects reared in high water depth than those reared in low water depth . Also the fecundity (which was represented by number of egg rafts and number of eggs laid per female and number of eggs/raft) of adults reared under different water depths was not significantly different.Our results revealed also that the longevity of males and females reared in different water depths was not significantly different. Moreover no significant difference in the average daily consumption of gh mosquito larvae by S. urinator nymphs and adults reared in different water depthsAll of these results may indicate that nymphs and adults of S. urinator can live in different water depths as this factor not significantly affected the different biological aspects of nymphs and adults and had no effecte on the role of the water bug as mosquito predator.2.water surface area:-Results of the present work indicated that the experimented water surface area had no marked effect on the biology of the water bug S. urinator. As the average total duration of nymph stages reared in low, medium and high water surface areas were not significantly different from each other in all treatments, also mortality percent of nymphs was insignificantly increased with the increase of water surface areas.Adults reared in all treatments had no significant difference in preovipostion and ovipostion periods. whereas a significant reduction in postoviposition period was observed between adults reared in low and high water surface areas only.Also the fecundity of females reared in different water surface areas was insignificantly affected as the number of egg rafts/female and eggs/raft laid by females reared in

different water surface areas was not significantly different. The number of eggs laid per female was significantly difference between females reared in low and high water surface areas but was not significantly different between females reared in low and medium or medium and high water surface areas.In the present investigation, it was found that longevity of females reared in three different water surface areas were not significantly different, also the results show that no significant difference in the longevity of males reared in low and high or medium and high water surface areas. whereas males reared in low water surface area had shorter life than those reared in medium water surface area.The daily consumption of the 4th larval instar of mosquito larvae by 1’ and 5th nymphal Star and adult stage was not significantly different in all treatments of the experiment.These results may clarify those nymphs and adults of S. urinator can be reared in the laboratory in aquaria with any surface area.3.water flora: -Results of this experiment revealed that the duration of lst and 2nd nymphal Stars reared in water covered with Lemna sp. was significantly longer than those reared in plantless water while a slight non-significant increase was observed in the other nymphal. Stars that reared in water covered with Lemna than those. reared in plantless water. Regarding the total duration of nymphal stage, the nymphs reared in water covered with Lemna had non-significant increase than those reared in plantless water. But the percentage mortality among nymphs reared in water covered with Lemna (12%) was slightly decreased than those reared in plantless water (16%).The preovipostion period of females reared in water covered with Lemna sp. was -significantly longer than those reared in plantless water. While a slightly non significant decrease in the oviposition period was observed among females reared in water covered with Lemna than those reared in plantless water, also the postovipostion period in both treatments was not significantly different.Insignificantly slightly decreased than those reared in plantless controlled water. As the number of eggs per female was significantlyreduced in case of females reared in water covered with Lemna than that reared in plantless water. The data obtained also indicated that the number of egg rails per female and number of eggs per raft not significantly different between insects reared in water covered with Lemna or plantless water. Also the longevity of adult males and females are not significantly different.The daily consumption of mosquito larvae by the 5th nymphal instar, male and female was not significantly different among insects reared in water covered with Lemna or plantless water. In the same time a significant reduction in the number of mosquito larvae consumed by thestinstar nymphs reared in planted water than those reared in controlledplantless water.4. Water quality: -Three water sources from breeding sites of mosquito and S. urinator were used to determine the effect of water quality on the development of different stages of S. urinator. Our results indicated that the average total duration of the nymphal instars reared in water of flax fermentation basins was significantly longer than those reared in water of Beltan irrigation canal. In the same time the duration of nymphs reared in Meet El- Attar irrigation canal was not significantly difference than those reared in water of Beltan irrigation canal. The highest rate of morality was observed during nymphal instars reared in water of flaxfermentation basin, also it was observed that most of mortalities occurred during the molting. As a whole,

the total mortality was increased in case of nymphs reared in water of flax fermentation basins than those reared in the other water.In case of insects reared in water of Beltan and Meet El Attar irrigation canals the sex ratio skewed toward male whereas in case of nymphs reared in water of flax fermentation basin the sex ratio was equal (1:1)The present investigation clarified that females reared in water of flax fermentation basins had lower sexual maturation than those reared in water of Beltan irrigation canal, as these insects had the longer preoviposition period and the shorter oviposition period. whereas a non-significant difference in these periods was observed between females reared in water of Meet El Attar and Beltan irrigation canals. The results revealed also a significant reduction in the fecundity of females reared in water of Meet El Attar irrigation canal and flax fermentation basins than those reared in water of Beltan irrigation canal.The incubation period of eggs not significantly different among all treatments. The highest percentage of egg hatchability was observed in case of insects reared in water of Beltan irrigation canal followed by Meet El Attar irrigation canal and finally insects reared in water of flax fermentation basins.Also water of flax fermentation basins and Meet El Attar -irrigation canal had passive effect on the longevity of the females. whereas a non significant reduction in longevity was observed among males reared in all treatments. Water quality had no effect on the daily consumption of mosquito larvae by different stages of the water bug S. urinator.5. Water temperature: -Results of the present work indicate that the water temperature had a marked effect on the duration of S. urinator nymphs. The duration of nymphal instars of insects reared under different conditions of water temperature (25, 30, and 35°C) was significantly decrease with the increase of water temperature. Mortality of S. urinator nymphs was decreased with the increase in the water temperature. The total mortality percentages observed during the nymphal instars reared under 25, 30 and 35°C were 28, 16 and 12respectively. The sex ratio of adults emerged from nymphs reared under different temperatures skewed towards male when temperature increases.Our results revealed that females reared at 35 °C gave lowest egg productivity than those reared at other degrees of temperature. A significant increase in number of egg rafts /female , number of eggs /female and number of eggs per raft were among data reported for 30 and 25°C than that reported for 35°C. also the data showed that nosignificant difference existed between the fecundity of females reared under 25 and 30°C.The fertility and the incubation period of eggs decreased as the temperature increased. As the lowest incubation period (6.17 days) combined with the lowest egg fertility (56.92%) was recorded at temperature 35°C. The rate of daily consumption of mosquito larvae by different stages of the water bug increased obviously with the increase of the temperature.On the basis of the previous information, it is clear that water temperature is one of the most important factors that must be taken into the consideration when this predator is reared in the laboratory or when included in programs of mosquito control. Also it appeared that temperatures 25-30°C is adequate to rearing this predator in the laboratory.6.Photoperiod: -Results of the present work indicated that the duration of each nymphal instar as well the total duration of the nymph stage was decreased with the increase of the photoperiod. Nymphs reared at long day had significantly shorter duration (26.70days) than

those reared at short day (31.23days). The total percentage mortalities were decreased with the decrease of the photoperiod. The total mortality observedAn increase in number of preys consumed by 1’ instar nymphs reared under long day than those reared under short day. A slight non-significant increase was observed in the daily consumption of mosquito larvae that consumed by 5th instar nymph, male and female of S. urinator reared under long day than those reared under short day.7.Light intensity:-Our results revealed that the average total duration of the nymph stage reared under low light intensity (27.17days) was significantly longer than those reared under high light intensity (24.99days). In the same time the duration of nymphs reared in medium light intensity (26.7days) was not significantly different than those reared in low or high light intensities. Mortality of S. urinator nymphs was increased with the increase of light intensity. The total mortalities observed during the nymphal stage reared in low, medium and high light intensities were4, 28 and 24% respectively.The sex ratio of adults emerged from nymphs reared under different regimes of light intensities was skewed towards males with thedecrease of light intensity.Also the results indicated that the preovipotion and postoviposition periods were not significantly different for females reared at different experimental conditions. Females reared at low light intensity hadlonger oviposition periods than those reared in high light intensity, while no significant difference was observed in the oviposition period among females reared in low and medium or medium and high light intensity.In the same time females reared at low light intensity gave higher egg-productivity than those reared at medium and high light intensity. No significant difference existed in number of egg rafts /female among recorded data for females reared in all treatments of the experiment.. Females reared at low and medium light intensities produced higher number of eggs/raft and number of eggs per female when compared with females reared under high light intensity.Slight non-significant increase in the incubation period of eggs produced by females reared under high light intensity than those produced by females reared under low or medium light intensities.Longevity of females reared under low light intensity was significantly longer than those reared under high light intensity on the other hand non-significant difference was found between females reared in low and medium or medium and high light intensity. Longevity of males reared in different experiment regimes not significantly differentfrom each other.8.Insecticides used as mosquito larvicides:- 8. I. Toxicity of insecticides to different stages of S. urinatorThe present results revealed that the different stages of S. urinator were markedly affected by the doses of the insecticide Sumithion; botanical extract and insect growth regulators Dimilin and Sumilarve recommended for control of mosquito larvae. As Sumithion induced 100% mortality among 1st instar nymphs. The less rate of mortality was observed among 5th instar nymphs followed by adult stage. But NeemAzal induced 100% mortality among all stages treated with it.Also our results revealed that the insect growth regulators, Sumilarve and Dimilin, reduced the rate of hatchability of S. urinator eggs as compared to the check group. Dimilin was more effective on the egg stage than Sumilarve as it produced highest sterility percentage.As compared to_the check group Dimilin induced 64.67 and 48.3% among 1st and 5th instars, while Sumilarve induced 78.7 and 63.43% among the same instar nymphs. It could

be noticed that various evidences of abnormalities might occur as a result of treatment of egg stage and lst and 5th instar nymphs with Dimilin and Sumilarve8.2. Effect of insect growth regulator in the development of the immature stage:-When 1st instar nymphs of S. urinator were treated with Dimilin and Sumilarve the total nymphal duration of these treated insects was increased than those untreated (check group). The present results show that the two used IGRs prolonged the total duration of nymph instar.When early st instar nymphs treated with Dimilin or Sumilarve, most mortality occurred during molting or after molting directly, also the rate of mortality decreased with the increase of the age.The sex ratio of adults emerged from nymphs treated with Dimilin and Sumilarve skewed towards females as compared to the sex ratio of ,adults emerged from untreated nymphs.8.3. Effect of IGRs on some biological aspects of the adult stage:-Our results revealed that treatment of newly molted 5th instar nymphs with Dimilin and Sumilarve did not significantly affect the preoviposition period of females. But treated females had significantly shorter ovipostion period compared to the females of the check group. The postovipostion period of females treated with Dimilin was significantly shorter than the check group, at the same time nosignificant difference was observed in this period in case of females treated with Sumilarve.The two compounds caused a significant reduction in the fecundity of treated females. But Dimilin was more effective .A non-significantdifference was observed in the incubation period among all treatments of the experiment. The data also indicate that their was no marked effect on the hatchability of eggs laid per females which resulted from treated 5th instar nymphs with Dimilin. But the percentage hachability of eggs produced by insects treated with Sumilarve was slightly affected.9.Relative efficacy of S. urinator as mosquito predator compared to other predators:Our results indicated that the combination of S. urinator and dragonfly nymphs Orthetrum sp. or adult of backswimmers A. sardea did not affect the number of mosquito preys consumed. While the interspecific interaction between S. urinator and diving beetle H. leander reduced the efficacy of the two predators.