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Research Article

A BIOLOGICAL STUDY OF GREEN PEA APHID (ACYRTHOSIPHON PISUM (HARRIS)) ON ALFALFA IN MAZANDARAN

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ABSTRACT
In recent years, green pea aphid-acyrthosiphon pisum (Harris) has been identified as one of the important post of alfalfa, and it has been active in most parts of Iran in alfalfa farms and caused damage to them, including, Mazandaran, Fars, Isfahan, Kermanshah, and Eastern Azarbaijan. The aphid is active in two alive winged and alive wingless forms within all farming year. According to studies conducted on this pest biologically, it's maximum activity has been occurred in May and at beginning of July when monthly maximum heat has been in a range from 28 to 30 C and relative humanity in range from 60% to 65%. For this reason, maximum damage to the alfalfa product caused by this aphid is accomplished within this time. On the basis of the conduct studies, sexual and adulation steps in this aphid has not been observed under the climatic conditions of Mazandaran. These aphids pass the winter in alive wingless female form. In spring they begin to be active upon favorableness of climatic conditions and generate wangled and wingless individuals by the parthenogenesis/thelytokous parthenogenesis in spring and are active and reproduce via this method throughout the year in case of existence of the host. In the performed studies, it has been shown that each viviparous female aphid has reproduced 26 to 71 Young. The young ones got maturated following 6 to 8 days and their life span was in a range from 11 to 12 days.

Keywords*: Green Pea, Alfalfa, Aphids, Young*

INTRODUCTION
Among the pests of alfalfa, aphids, although looks like small-body insect, yet it can be said that they are counted as important pests of alfalfa and cause a noticeable loss to alfalfa due to feeding on the vegetative extract. Meanwhile, a green pea aphid [Acyrothosiphon pisum (Harris)] is of special importance. This aphid like the other aphids, while feeding, leads to stoppage of growth and transfers some viral diseases and cause damages through this way as well (Egli and Bruening, 2000). Also when feeding, it excretes a lot of extract, leading to viscosity of alfalfas, and, thus, the product harvest often accomplishes with difficulty and trouble.
Marble reported that the green pea aphid causes stoppage of the plant entanglement and burning of the leaves and decreases of the products at the remarkable rate (Forcella *et al.*, 2000). Mittler and Sylvester realized that in some parts of the farms where the mentioned aphid excreted a lot of honey has been led to dryness of alfalfa bush because, in the alfalfas covered from honey, photo synthesis operations become disrupted and the plant loses his own growth (Harris, 2006). According to Heimer, the mentioned aphid in terms of dissemination is active on the pea Fava bean and alfalfa in majority of Middle East countries including Iraq, Israel, Lebanon, Turkey and Iran as well as Japan, U.S.A, Canada and Europe (Duman, 2006). Farahbakhs has reported existence of this aphid on the fava been, pea, lentil alfalfa and clover in Iran (Clark and James, 1991). Habibi has collected these aphids on the alfalfa around Karaj (Capron *et al.*, 2000). Kaiser and Shalk have reported activity of the green pea's aphid on the grains and transfer of the viral disease of leaf entanglement in the pea in Karaj and Shiraz (Egli and Bruening, 2000). Monajjemi and Esmaeeli have not mentioned activity of this insect on the alfalfa (De Figueiredo *et al.*, 2003). From viewpoint of morphology and biology, this insect is existed in two viviparous winged and wingless females from which are active in two above forms within all farming seasons. Eastop has reported that this aphid reproduces through parthenogenesis and viviparity forms in some parts with very cold winter throughout the year, while it creates a sexual generation in the cold region within autumn in which male and female individuals mate and lay eggs. The eggs pass the winter in the same manner and deliver the

young and generate the fondatrice individuals. Egli (1975) in this article it has been tried that in term of winter passage, length of life span, strength of son birthing and maximum activity of this insect within various seasons, biology of this insect is to be studied in the West of Mazandaran region.

MATERIALS AND METHODS

In order to determine length of life span, from the first-age young to death of complete insect, and, also number of young achieved by each aphid, the cylindrical screening chambers (with the height of 11 cm and diameter of 2 cm) were used. It is in such a way that an alfalfa stalk was passes through each cylindrical pipe and its lowered part was blocked by the cotton; then, after putting two aphids (the last age young) into the pipe, its upper part was blocked by the cotton as well (Figure 1). Following the maturity of the aphids, number of the resulted young, maximum time span of young ling up to puberty and maximum life span of the complete insect were determined (life span of aphid from birth to death in the second generation was conducted inside the cage. It was in such a way that, following the maturity of the first generation young's, birth date of the second generation young's was recorded and their biological activities were pursued). This experiment was carried out twice in 200 hectare farm of Agriculture College in May. In each turn of experiment five cylindrical screens were used each of which was installed on an alfalfa bush and at intervals of five meters from each other. In order to study status of aphids in terms of passing the winter, 100 alfalfa bushes along with root (within three years) were transferred from farm to laboratory every week, and they were studied in term of existence or inexistence of egg and determination of the various statues of growth. In order to study changes of the aphid's population in the green pea, two 200 hectare and 140 hectare farms were sampled from beginning of activity of the aphids to termination of their activity every week. The 200 hector farm locates in the south west of Karaj and in a distance of 5 kilometers far away from agriculture faculty with an approximate area of 90 hector in which alfalfa has been planted. Although 140 hector farm locates in the south west of Mazandaran, but in distance of 11 kilometers far away from agriculture faculty and its 50 hectares were under cultivation of alfalfa. Sampling was conducted by method of counting the aphids from the stalks as following:

Counting of Aphids from Stalks

In this method, a piece of 30 x30 cm white colored cardboard was placed alongside the alfalfa bushes and ground surface a d shaken on it gently, and following fall of the aphids on the cardboards, their number was counted. In each sampling, 20 stalks, in 10 repetitions, (200 stalks totally) were selected from various parts of farm randomly and number of the aphids was counted. Sampling from two 200 hectare and 140 hectare farms began from March, 20 and continued until beginning of the winter. All samplings were carried out weekly within four years. Their average number has been calculated monthly and inserted in the related columns. In order to study the relationship of the non-alive factors (heat and humidity) with green aphids, statistics of meteorology related to the country's meteorology organization situated in 200 hectar farm of the farming college was used. It is in such a way that average of maximum heat and maximum humidity has been calculated and reflected and studied in the related columns.

RESULTS AND DISCUSSIONS

In the table 1, it is noted that majority of the aphids appear in the wingless individuals form (figure 2) which after a little time of reproduction via parathenogenosis methods their population is increased and the winged individuals are created. In climatic conditions of Mazandaran, appearance of the winged individual is usually preformed in the second half of the April. At this time, the winged individuals fly to various parts of the alfalfa farm. (In the farms where spraying insecticide and etc performs in the beginning of the April against the proboscis head of the alfalfa leaf, the aphils are eliminated and recontamination of these farms is to be occurred by these the same individuals). Both winged and wingless aphids reproduce through pothelytoqie method and this reproduction method and young birthing will be continued in the same manner during spring, summer, fall, and even winter. (In the case of existence of the host) [Table 1and 2]. According to the studies conducted in climatic conditions of Mazandaran, sexual steps and ovulation/eggs laying have not been observed in the green pea aphid

because sexual steps have not been observed or a trace this insect's egg has not been seen in samplings carried out in the winter during three years (table 3). As noted in table1, maximum population of this aphid is in May. (Average heat/monthly maximum is in a range from 28 to 30 C and average relative humidity/monthly/maximum is in a range from 60% to 65 %).

Table 1: Average Number of Green Pea Aphid Percentage of Alfalfa Stalk Average Maximum Heat and Monthly Maximum Humanity

Months	Number of the Aphids in Hundred Alfalfa Stalks (Average in 4 Weeks)	Average of the Monthly Maximum Heat	Average of the Monthly Maximum Humidity
March	100	19	66
April	163	22	65
May	578	28	65
Jun	18	34	56
July	9	35	56
August	18	33.5	49
September	14	28	62
October	31	20	69
November	16	14	72
December	7	8	74

Table 2: Number of the Young's Achieved from each Green Pea Aphid Life Span and the Time from Youngling to Puberty/Maturity. Chalous 200 Hector Farm of Agriculture College, 2016, May

Repetition	Average Number of the Young's Achieved by One Aphids	Maximum Life Span per Puberty/ Maturity per a day	Maximum Range from Young Ling to Puberty/ Maturity per Day
1	54	12	7
2	26	12	7
3	32	11	6
4	71	12	7
5	58	12	8

1. Yazdi Variety:
2. Above test has begun since half of May and ended in the late of May. Average of maximum heat has been in a range from 27.8 to 30.7C during two weeks and relative humidity has been in a range from 57 to 58% during two weeks.
3. Each repetition consist of a cylindrical screen or sieve which two last age youngs were placed in to each one them which following the completion of the aphids, number of achieved youngs, life span and youngling time until maturity were determined.

Table 3: A Study of State of Winter-Passing of the Green Pea Aphid. 200 Hector Farm of Chalous Agriculture Faculty

	Mature Applied		Young	
	December	January	December	January
The First Year	5	3	2	1
The Second Year	4	3	2	1
The Third Year	3	2	1	0

1. In each turn, 100 alfalfas were taken out with soil, from soil out of various parts of the farm randomly and transferred to a laboratory. Then, they were examined from viewpoint of inflection with aphid and

aphid egg (Two-year alfalfa). Gradually, following May and beginning of June, activity of these aphids slows down and their population decreases, but they can continue their own life and reproduce. In July, their growth decreases again and, in August, their activity and growth performs in a better manner via approaching of autumn (in comparison with July), but their population never reaches at rate of late spring (table 1). In table 2, it is observed that each aphid has given birth 26 to 71 youngs. After 6 to 8 days the young have been matured. (It is described that a low number of the Youngs have been maturated and the rest Youngs have been reached maturity limit after 7 days and, in some cases, after 8 days since birth time). From birth time to death, life span of the aphids has been in a range from 11 to 12 days.

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