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Monitoring aphid (Homoptera: Aphididae) species and their population changes on potato crop in Erzurum (Türkiye) province throughout the growing season*

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Summary

This study was conducted in order to determine virus vector aphid species. The study was also performed to determine the abundance of these aphid species throughout each growing season between 1990 to 1992 in seed and commercial potato fields of Erzurum Province, Türkiye. Water-filled yellow pan traps and the aphid/leaf count method were used together to monitor alate and apterous aphid populations. A total of 34 winged aphid species were found with yellow pan traps during the survey period. Out of 34 species, 14 have been determined as vectors for potato virus diseases transmission. ***Aphis fabae*** and ***Myzus persicae*** accounted for 47 % of total collected aphids, with each amounting to 24.2 and 22.7 percent respectively. Compared to these two aphids, the populations of other species were minute. The 14 trapped aphid species account for less than 1 percent of total winged aphid species in nearly all locations. Average inflights of green peach aphid started on July 17 in highlands and on July 6 in valleys. However, the average collections of more than 5 aphids/trap occurred on August 21 in highlands and August 31 in valleys.

Data obtained from the aphid/leaf count method was different from data generated by yellow pan traps. Four aphid species were detected with the aphid/leaf count method. While apterous aphids accounted for 98.9 % of the total population,alate aphids amounted to 1.1 % of the total aphid population.

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However, ***Myzus persicae*** was determined to represent 98.5 % of the total population, while the remaining three species comprise only 1.5 %. After the beginning of September apterous green peach aphids exceeded economic threshold (20 aphids/trap) in three districts. Based upon the evaluation of survey results, with respect to years and sites,the aphid/leaf count method could not provide reliable figures for employing necessary control measurement.

Key words: Aphids, potato, virus vector
Anahtar sözcükler: Afitler, patates, virus vektörü

Introduction

Potato is grown in altitudes from 1650 to 1900 m on highland plateaus and valleys in the Erzurum province of Türkiye. Due to low incidence of some common potato diseases and pests, this area is known as one of the major seed potato growing areas of Türkiye. Özbek (1984) reported that the absence of ***Prunus*** spp. and ***Rosa*** spp. (Rosaceae) which are primary host for ***Myzus persicae*** (Sulzer) (Green peach aphid) and ***Macrosiphum euphorbiae*** (Thom.) (Potato aphid) (Homoptera: Aphididae), hard winter conditions and very low use of insecticides which are harmful for natural enemies, enable favorable seed potato production in Erzurum province. However, the production potential has not been sufficiently utilized so far. Since local farmers continue to plant their own seed as many as ten years, rather than use certified seed, potato virus diseases are very common in the region. These diseases include potato leafroll virus (PLRV), potato virus X and potato virus Y. Çıtır (1982) has found that 47.8% of farmers' fields was infected with one potato virus, 48 %, with two viruses whereas only 4.2 % was virus free. In the same study, as in the major potato virus, growing countries, (Peters et al., 1981), PVX was the most common virus with 43 % of infestation followed by PVY and PLRV with 40.5 and 10 % respectively. Considering vector efficiency, despite its low incidence potato leafroll virus was found to be the most damaging virus in the region. The aphids are one of the most efficient insects of virus transmitting vectors. Aphid species differ in their capacity to transmit viruses (Harrington, 1987). In temperate zones, the only significant correlation between the dissemination of potato viruses and aphids appears with ***M. persicae*** (Raman, 1985). Therefore, green peach aphid is probably the most important insect pest of potato (***Solanum tuberosum*** L.) (Solanaceae) on a worldwide ***M. persicae*** is known as a vector of several virus diseases of potato, the most important being PLRV (Canceledo and Redcliffe, 1979). Hence, identification, population studies, and control measurements should concentrate on this species.

Knowledge of aphid population dynamics is important for deciding where, when, and how to grow and protect seed potato crop.

Many researchers from different countries have studied aphid population dynamics in potato (Byrne and Bishop, 1979; Boiteau, 1985; Sigvald, 1990) and some of them have also correlated the spread of economically important viruses, such as PLRV and PVY with the population densities of certain potato aphids (Piron, 1986; Gibson, 1988; Hanafi et al., 1989). Use of virus data collected by various sampling methods has led to the development of mathematical or simple models to predict virus risk to the crop and appropriate timing to initiate control measurements.

Green peach aphid tends to be a low-density pest on potatoes, unless outbreaks are induced by insecticidial treatments selectively detrimental to natural enemies (Mackuer and Way, 1976) Unfortunately, once virus vectors are present on a crop, aphid enemies are not present in sufficient numbers and do not act quickly enough to provide economically acceptable control (Canceledo and Radcliffe, 1979). Insecticide use has increased in the region since the infestation of ***Leptinotersa decemlineata*** (Say) (Coleoptera: Chrysomelidae) (Colorado potato beetle), was noticed on the 1989 potato crop. The results of this study indicate, in recent years, significant increases in certain aphid populations such as ***M. persicae*** and ***Aphis fabae*** (Scopoli) (Homoptera: Aphididae) (Black bean afid). This may be attributed to the common use of insecticides which are also harmful to natural enemies; Coccinellidae in particular. Still, the importance of the natural enemies should not be misjudged (Alaoğlu and Özbek, 1987).

Despite these facts and the importance of potato crop for Türkiye, very little was known about vector aphid species and their population dynamics with respect to the spread of PLRV and PVY in the country. There was virtually no relevant research in Erzurum province. For the effective control of aphid-borne potato virus diseases in the region, data relating to vector species was essential. This study is the first about this topic and its objectives were to: a) detect vector aphid species; and b) collect data about vector aphid population densities and population changes during the growing season. Moreover, the study also aimed to discover a convenient monitoring method of aphid activity with which to forecast the risk of virus infection of seed and commercial potato crop production, providing necessary information for implementing appropriate control measurements.

Materials and Methods

Monitoring alate aphid populations: Monitoring of alate aphid populations was conducted in three counties of Erzurum province. Two of these counties, Erzurum Central and Pasinler, are located on a highland plateau, characterized by extremely hard continental climate with 6.2°C annual mean temperature. However, Tortum county is located in a valley where relatively warmer micro climate (8.2°C annual mean temperature) dominates. Yellow pan traps were used to monitor winged aphid populations. The dimensions of these rectangular traps were 50 cm long, 30 cm wide and 8 cm high with sides sloping outwards. One bottom corner of the tray had an outlet tube 2 cm in diameter and 4 cm long closed from the inside with a stopper. The bottom and lower 2 cm of the inner sides were painted yellow, the remaining sides and the exterior were painted dark gray. Traps were filled with fresh water and a few drops of detergent added to break surface tension and prevent aphids from escaping (Raman, 1985).

In each field, three traps were placed in the center row of a 60x60 field section adjacent to the access road, but halfway between the edges of each field. One trap was placed 15 m from the edge, and the second and third trap were placed 15 m apart from each other and on the platform approximately 60 cm above the ground. Yellow pan traps were emptied twice a week (Boiteau and Parry, 1985). They placed in position at the time of emergence of potato plants and monitored until topkill. The traps were emptied through the outlet tube into a bucket and aphids were collected in a muslin bag attached to the outlet. The aphids were taken to the laboratory in a vial containing 80 percent ethyl alcohol.

Monitoring apterous aphid populations: Virus transmission is more closely related to the progress of aphid infestation from plant to plant than the total number of aphids on a particular plant. Progress of aphid can be determined by the aphid/leaf count method (Raman, 1985). Aphid/leaf count method was carried out in six counties in Erzurum. Three of these counties, Erzurum Central, Pasinler and Aşkale, are located on a plateau with 1600-1950 m altitude and the remaining three, Tortum, Oltu, Narman, in valleys with 1000-1500 m altitude. Three villages in each county and one potato field with a 250 m^2 field section in each village were selected as aphid/leaf count survey

sites. Each field was visited once in ten days and 50 plants were randomly selected in each field section. On these 50 plants, three fully-expended compound leaves each from the top, middle and lower parts were inspected. The number of winged and wingless aphids were recorded and transferred to small bottles filled with 80 percent ethyl alcohol.

Preparation and identification of aphids: Collected specimens were prepared for slide mounts using the Stroyan method (Blackman, 1974), with some modifications described by Düzgüneş (1980). Identification of the aphids were made by Prof. Dr. Seval Toros (Ankara Üniversitesi, Ziraat Fakültesi, Ankara), Associate Prof. Oya Zeren (Mersin Üniversitesi, Mühendislik Fakültesi, İçel) and Dr. Fatma Eraslan (Ege Tarımsal Araştırma Enstitüsü, Menemen, İzmir).

Results and Discussion

Monitoring alate aphid populations: During the three years of study, a total of 10278 aphids comprising 34 species in 26 genera were identified from the trap collections. The proportion of vector and non-vector alate aphids collected in yellow pan traps in 3 counties is given in Table 1. Out of 34 aphid species, 16 were identified to the species level, 13 to the genus level, but 3 species could not be identified. However the proportion of the unknown aphid species in the total population was only 0.72 %. The percentage of vector aphid species in the total population was approximately 72 % and the proportion of 17 aphid species was less than 1 percent. In comparison to Europe (Piron, 1986; Harrington and Gibson, 1989), the number of aphid species is quite low in Erzurum province. Relatively low crop diversity and hard winter conditions may limit the survival of many aphid species in the region. Moreover, out of 34 aphid species, 14 of them have been reported as potato virus diseases vectors (Van Hoof, 1980; Peters et al., 1981; Piron, 1986; Harrington and Gibson, 1989).

Table 1. The alate aphid species and their populations caught in yellow pans in three years

Vector aphid species	The mean number of aphids caught in 1 trap in the locations Erzurum	Pasinler	Tortum	Prov. mean	%
Aphis fabae (Scopoli)	92.66	98.77	85.33	92.26	24.23
Myzus persicae (Sulzer)	117.00	95.77	47.00	86.59	22.74
Brachycaudus helichrysi (Kalt.)	21.55	17.33	18.55	19.15	5.03
Aphis sp. (1)	13.44	18.44	24.33	18.74	4.92
Macrosiphum euphorbiae (Thom.)	13.66	13.66	8.00	11.77	3.09
Dysaphis sp.	9.66	7.22	16.55	11.15	2.92
Brachycaudus sp.	10.44	4.66	12.00	9.04	2.37
Aulacorthum solani (Kalt.)	11.22	7.00	7.44	8.55	2.24
Aphis sp. (2)	9.00	5.11	9.66	7.92	2.08
Hyperomyzus lactucae (L.)	7.11	4.00	5.55	5.55	1.45
Brachycaudus sp.	4.55	1.88	5.44	3.96	1.04
Uroleucon sp.	1.33	1.66	2.22	1.74	0.45
Aphis sp. (3)	1.88	1.22	2.11	1.74	0.45
Caveriella aegopodie	0.55	-	-	0.18	0.05
Non-vector aphid species					
Therioaphis trifolii (Monell)	71.11	18.00	9.22	32.77	8.61
Capitophorus elaegni (Del Guercio)	7.55	37.55	4.55	16.55	4.35
Hayhurstia atriplicis (L.)	15.22	13.88	3.88	11.00	2.88
Callaphis juglandis (Goetze)	-	-	28.55	9.51	2.50
Prociphulus sp.	8.77	7.55	5.00	7.11	1.86
Anoecia corni F.	6.44	4.11	7.22	5.92	1.55
Tuberculatus sp.	2.55	2.22	4.00	2.93	0.76
Hyadaphis sp. (1)	2.66	1.22	4.88	2.93	0.76
Diuraphis noxia (Mordvilko)	2.66	2.55	1.88	2.37	0.62
Schizaphis graminum (Rondani)	1.55	1.00	3.66	2.07	0.54
Macrosiphum sp.	2.55	1.00	2.11	1.88	0.49
Sipha maydis	2.00	2.00	0.77	1.59	0.41
Chaitophorus leucomelas Koch	1.33	0.55	1.22	1.04	0.27
Smynthurodes betae Westwood	0.66	0.77	0.55	0.66	0.17
Hyadaphis sp. (2)	1.33	0.11	-	0.48	0.12
Salthusaphis sp.	0.88	-	0.22	0.37	0.09
Cinera sp.	-	0.44	-	0.15	0.03
Unknown (3 species)	3.88	2.33	2.55	2.93	0.76
Total	445.33	372.11	324.55	380.66	100.00

With respect to the locations, a large variation was determined in the aphid population especially between valleys and highlands. Since there is a ecological difference between plateau and valleys, the large variation in the aphid populations was expected. However, in contrast to

the expectation, higher aphid numbers were measured in highland counties (Erzurum and Pasinler) than valley county (Tortum). Whereas, the majority of the researchers have reported an opposite view, indicating the decrease of aphid populations with the increase of elevation. This can be attributed to two main reasons: First, availability of relatively small acreage of potato population and large range of alternative host plant species for aphids in valleys; second, lack of crop rotation causes a high incidence of certain potato diseases (***Fusarium*** spp., ***Verticillium*** spp., ***Alterneria*** spp. etc.) causing early senescence of potato plants that limits feed supply and in turn, aphid numbers on the plants.

As it appears in Table 1, the population of the effective potato virus vector, green peach aphid was very high in Erzurum province. ***M. persicae,*** green peach aphid and ***A. fabae,*** black bean aphid made up nearly half of the total alate aphid population with 22.74 and 24.23 percent respectively.

Although there was a marked variation in the population of these two aphids with regard to the locations, these species ranked the first and second places in all locations. Despite the harsh winters and lack of ***Prunus*** spp. host plants, which restrict reproduction of green peach aphid in the province, temperature during the growing season seems favorable for the multiplication of ***M. persicae.*** Weekly maximum and minimum (day and night) mean temperature were found 22.3 - 24.8 and 3.2 - 8.6°C respectively. Kishore (1987) reported that, landing and settling of green peach aphid on potato, occurred at weekly maximum and minimum mean temperature, 20.4 - 24.9 and 3.5 - 7.7°C respectively. The corresponding temperature for rapid multiplication were reported as 25.3 - 25.6 and 6.3 - 9.5°C. At higher temperatures, the aphid populations had declined or disappeared. Kashyap (1988) agreed with the sharp decline of ***M. persicae*** populations at high temperature. In comparison to green peach and black bean aphids, minute populations of other vector aphid species were observed. Other vector aphid species populations never exceeded the economic threshold level in any location during the survey periods. Therefore, the contribution of these species to the spread of potato virus diseases is negligible. Seasonal abundance of major vector aphid species is illustrated in Figure 1.

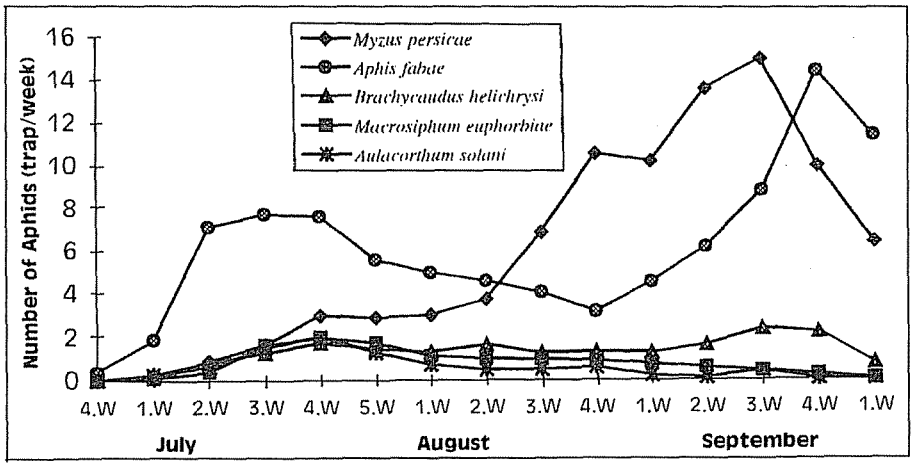


Figure 1. Population change of some important vector aphid species during the growing season (means of locations and years).

With regard to survey years, a great variation was found in the seasonal abundance of aphid species. Total aphid population considerably increased from 2761 to 3813 individuals between 1990-92. The same trend was seen in green peach aphid population as well. However the climatic data showed no significant differences among the survey years, except the lack of early frosts in late September and early October in 1991. This gradual increase may partly be explained by the increasing use of insecticide against ***L. decemlineata***, which has been disseminated in the region in recent years. It is estimated that the insecticides have negative pressure on natural enemies of aphids such as the family Coccinellidae, the most common family in the region (Özbek and Çetin, 1991). Within the potato field, natural enemies reduce the number of invading migrants developing or overwintering on the other hosts crops. This is important in potato pest management. Since there is a direct correlation between vector aphid population densities, the intensity of migration and the probability of virus transmission (Cancelado and Radcliffe, 1979). In addition to natural enemies, other environmental factors certainly have positive or negative effects on the population accumulation of aphids to some extent.

Population change of ***M. persicae*** slightly differed from the total aphid population by reaching its highest number in 1991 rather than

1992. Nevertheless, like total aphid population there was also a substantial difference in green peach aphid population densities between 1990 and 1991-92. Seasonal changes in the aphid populations differed from year to year and from location to location. But, with respect to population fluctuations the same trend was found in all survey years. Similar results have been reported by Byrne and Bishop (1979) and Sigvald (1990). When the effectiveness and population size of aphid species is taken into account, among the aphid population, the population change of green peach aphid should be given special consideration. In addition to green peach aphid, only black bean aphid which had the highest population, exceeded the threshold level (5 aphids/trap) (Figure 2). Although the population densities of green peach aphid varied from year to year in Erzurum Central and Pasinler counties, population fluctuations maintained the same trend in both locations in survey years. Green peach aphid had the similar flight density in 1990 and 1992 in Erzurum Central county. The population of this aphid exceeded the economic threshold level for a short period in these two years, but a considerable rise was observed in Erzurum in 1991.

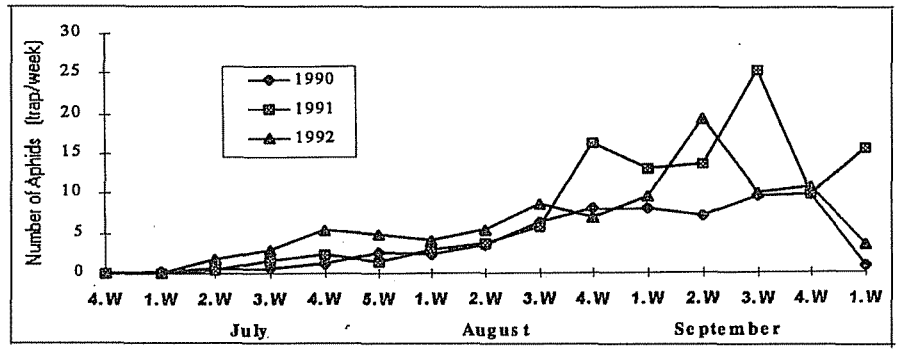


Figure 2. Population change of ***Myzus persicae*** in survey years (means of locations).

The population curves of ***M. persicae*** were similar to each other in all three years until the third week of August in Erzurum and Pasinler locations. But after this point the aphid populations formed two peaks in Erzurum county, the first one in the fourth week of August and

second in the third week of September, with 34 aphids/trap and 64 aphids/trap respectively. Conversely, the green peach aphid population reached its highest level in the Pasinler location in 1992, with a peak of 42 aphids/trap in the second week of September. Population change of this aphid in Tortum was found to be quite different from highlands. No similarity was observed between the years with respect to seasonal population fluctuations of ***M. persicae***. The aphid made two peaks in Tortum; the first one relatively small (8 aphids/trap) but early in the third week of July, and the second (10 aphids/trap) in the second week of September in 1991. In the remaining two years, only one peak was observed in the forth week of August and the third week of September, 1992 and 1990 respectively. Both of these peaks occurred around 8 aphids/trap.

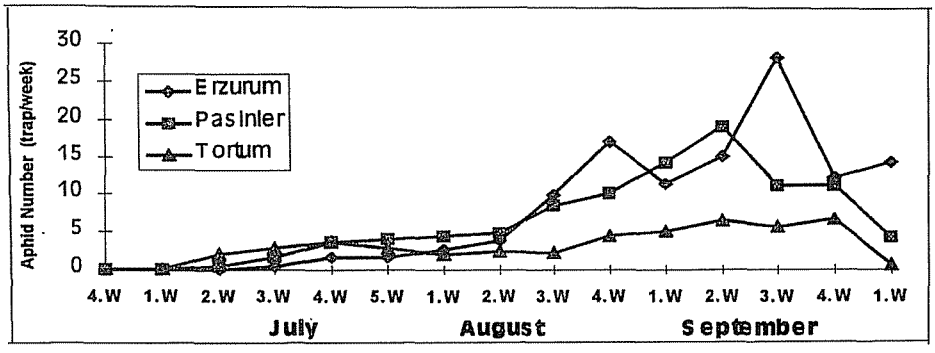
The first inflight of aphids varied from year to year and from location to location. The first green peach aphid was caught around July 17 (July 13 to 21) in the highlands, during the survey years. The average date of first catch in the valleys was July 6 (July 3 to 9). The first catch of the second important virus vector ***A. fabae***, had occurred about one week earlier than ***M. persicae*** in all survey sites. The average dates for the first cumulative catches of more than 5 green peach aphids in one trap in high plateau were similar among the locations. These dates slightly changed between years, varying from July 18 to 24. But the dates of accumulation of more than 5 winged aphids in one trap differed in the valley (August 24 to September 8) from that of high land areas, from year to year.

Thermal summation (the number of degree-days above the developmental threshold temperature of 4°C) (Kishore, 1987), was calculated for the first inflight of green peach aphid in each locatios. A significant yearly variation was found in the timing of the first catch of ***M. persicae*** in any trap, in the regions. On the other hand, these dates were quite similar in high elevated Erzurum Central and Pasinler Counties with 1065 and 1078 DD (degree days) respectively. The first cumulative catches of ***M. persicae*** coincided with the thermal summation of 1043 DD in Tortum county.

Population change of ***M. persicae*** during the survey years is shown by location in Figure 3. Survey results indicate that, the green peach aphid population exceeds economic threshold level (5 aphid/trap) for 1.5 months, beginning the second week of August and reaching its peak in the middle of September in high plateau. Since the peaks form

late in the growing season, the risk of virus infection for seeed potato production can be eliminated without yield loss using early haulm killing in the first week of September. Potato haulm killing is an effective method for the control of virus spread especially late in the growing season. This methods is often implemented in seed potato growing areas in many countries (Manzer, 1982). The findings of an experiment which was carried out to avoid Micoplasma infection by early potato haulm killing in the region, support this idea. Potato foliage was harvested, on the 3rd, 13th, 23rd of August and the 3rd of September. 986, 1610, 2392 and 3211 kg/da yields were obtained from the first to forth harvest respectively (Tahtacıoğlu et al., 1991). The last foliage cut did not cause any reduction in potato yield in Erzurum province, hence, potato haulm killing at the beginning of September was recommended to the seed growers in the region. In addition, it is widely known that aged potatoes become resistant to the aphid infestation and the rate of PLRV infection by aphid is lower in this period (Tamada and Harrison, 1981).

The green peach aphid population which exceeds the economic damage threshold after the second week of August is a potential risk for the spread of potato virus diseases. Farmers are not willing to kill potato foliage early in August. Therefore, some other control measurements need to be explored and implemented. The seasonal abundance of green peach aphid in valleys follows distinctly different trend. The ***M. persicae*** population exceeds the economic damage threshold late in the season for a short period and climaxes at a relatively low level. Because of the reasons explained in previous paragraph, green peach aphid population above threshold level posses no considerable risk for the spread of potato crop late in the season.



Figrue 3. Population change of ***Myzus persicae*** in three locations (means of 3 years).

In comparison to green peach aphid, vector efficiency of black bean aphid is lower (Harrington and Gibso, 1988). However, in addition ***A. fabae***'s biggest population, its population exceed the economic threshold level very early in the season. This reflects the period when the physiological stage of plants are vulnerable to the acquisition of virus from source plants and infection of the healthy plants. Considering this fact, the role of black bean aphid in the spread of potato virus diseases should not be ignored in Erzurum province.

Monitoring apterous aphid populations: Virus transmission is more closely related to the progress of aphid infestation from plant to plant than the total number of aphids on a particular plant. Progress of aphid infestation can be observed by aphid/leaf count method (Raman, 1985). Unlike yellow pan traps just 4 aphid species were detected in aphid/leaf count method in six counties of Erzurum province. Three of these species, ***M. persicae, M. euphorbiae*** and ***Aulacorthum solani*** (Kalt.) (Homoptera: Aphididae) (Foxgloveaphid), are colonizers of potato crops but ***A. fabae*** is an non-colonizer. One of the most interesting findings of the apterous aphid survey was, the dominance of green peach aphid in the aphid population of the region. ***M. persicae*** accounted for 98.5 percent of the total wingless aphid population. Hence, aphid populations determined by the aphid/leaf count method may be considered as apterous populations, comprised mainly of green peach aphid. This observation agrees with that of Ioannou (1989), who determined that 95 % of apterous aphid population was ***M. persicae*** in Cyprus, yet disagrees with Sigvald (1990), who reported that 99 % of the apterous aphid population in Sweden was ***A. nasturtii*** (Buckthorn aphid) and ***A. frangulae*** (Homoptera: Aphididae) (Melon aphid). As was presented in Table 2, in the aphid/leaf count method, apterous aphids comprised 98.9 % of the total aphid population, while the alate population was only 1.1 %. With respect to location, a significant variation was found among the aphid populations. The same variation was observed in survey sites within the same location. Wingless aphid populations were also higher in the highlands than in the valleys, with the exception of Erzurum Central County. Despite the high winged aphid population, in comparison to other highlands, the wingless aphid population was relatively low in Erzurum Central County.

Table 2. The number of apterous aphids detected on 100 leaves in the counties in one season (means of sites and survey years)

Aphid species	Erzurum	Pasinler	Aşkale	Oltu	Tortum	Narman	Province mean	%
Myzus persicae	181.0	309.0	376.0	226.0	66.0	136.0	216.0	95.5
Aulacorthum solani	2.0	0.7	-	0.3	1.7	-	1.6	0.7
Macrosiphum euphorbiae	2.0	1.8	1.3	0.3	0.7	-	1.0	0.4
Aphis fabae	1.6	2.2	1.6	0.3	-	-	0.9	0.4

While the highest apterous aphid number was determined in Aşkale, it was the lowest in Tortum. The reasons for the low population build up of green peach aphid in valleys were explained before. The number of aphids counted on 100 leaves were varied from site to site but the variation between the survey sites was enormous in Aşkale, Erzurum and Otlu Counties. To obtain more reliable data, the survey period needs to be extended for more years. The differences in the aphid numbers between locations and sites could be explained with different ~~micro~~ environmental conditions, and abunadance and types of natural enemies. The distance from the first settling point of aphids was another factor affecting the distribution and population density of wingless aphids (Hanafi et al., 1989). The population of wingless aphids is shown in Figure 4 on the basis of location and site.

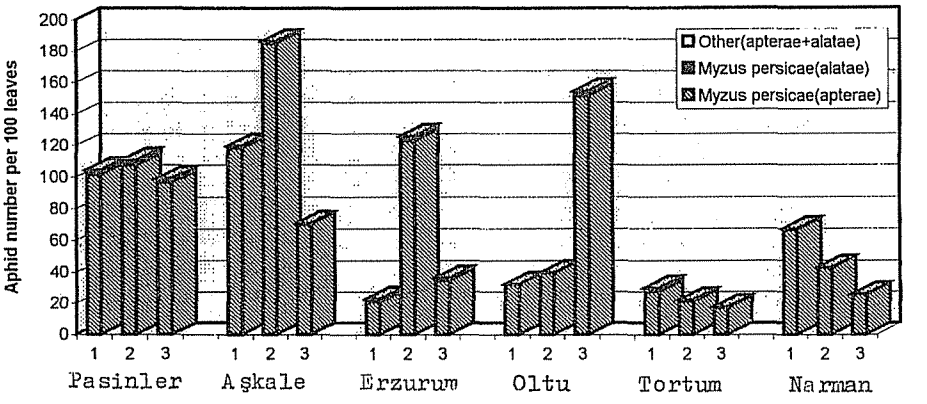


Figure 4. The average number of aphid counted on 100 leaves in one year (means of 3 years).

Owing to survey years and locations, the first appearance date of apterous aphids on the leaves also varied. In some lower sites of Tortum and Oltu Counties, apterous ***M. persicae*** individuals were first seen on the leaves in the last week of June. In the other locations ***M. persicae*** appeared during approximately the same period, from the first week of July to the first week of August.

The distribution of apterous aphid populations throughout the season was similar to that of alate aphid population. However, depending on the location, wingless aphid populations reached peak points 1-2 week earlier than winged aphid populations. Although there was a big difference in the population size between the locations, the trend of population changes were quite similar among the regions. The seasonal change of wingless aphid populations is presented in Figure 5. In comparison to alate aphid populations, the variation in apterous aphid population was even greater between the survey years. Also the graddual increase in the alate aphid populations from 1990 to 1992 was not observed in apterous populations. Environmental factors may certainly affect aphid behavior and, hence, population size. But it is evident that the aphid/leaf count method did not give consistent figures in a short period, such as 3 years. The observations in the neighboring potato fields of the survey sites showed that aphid populations may significantly vary even in very short distance. Thus, the aphid/leaf count method did not appear as a reliable method to monitor aphid populations and for determining when to take necessary control measures.

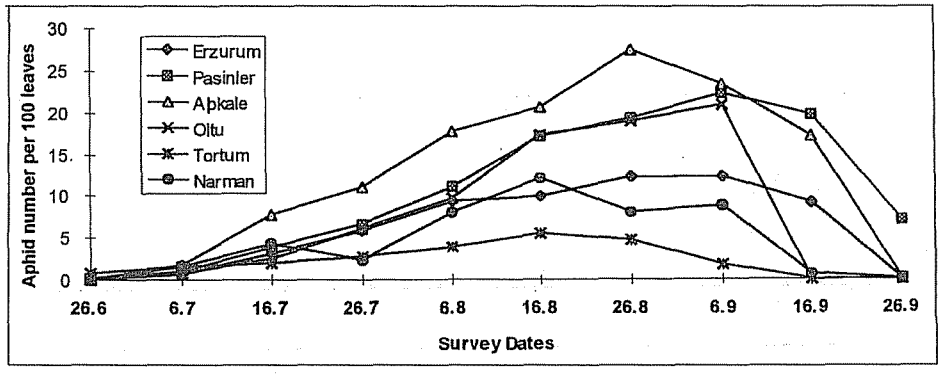


Figure 5. Seasonal change of apterous ***Myzus persicae*** in locations (means of 1990-91-92).

According to the three years' mean, apterous aphid population exceeded the critical level (20 aphids/100 cmpound leaves) in Pasinler, Aşkale and Oltu Counties. The number of aphids per 100 leaves at the peak level had changed from 5.5 to 68 in survey sites. In Narman and Tortum Counties the population never exceeded the critical level in any sites and years. In Erzurum Central County, however apterous aphids exceeded the critical level in the one survey site. On the other hand, no correlation was found between population dynamics of alate and apterous aphids in all locations with respect to years. The alate aphid population did not increase and decrease with the increasing and decreasing apterous population during the same year. Although several researchers indicated that the role of wingless green peach aphid populations in the spread of potato virus diseases was not important, since the apterous ***M. persicae*** population is very large and is a potential source for the alate from, relevant vector control measures are necessary for the elimination of virus infection.

Özet

Erzurum İlinde patates bitkisindeki afid (Homoptera: Aphididae) türleri ve bunların populasyonlarının mevsim içerisindeki seyrinin belirlenmesi

Bu çalışma Erzurum'da patates bitkisindeki afid türlerini ve bu türlerin mevsim içerisindeki populasyon değişimlerini belirlemek amacıyla üç yıl süreyle yürütülmüştür. Kanatlı ve kanatsız afid populasyonlarını belirlemek için su dolu sarı tuzak ve yaprakta afid sayım metodu birlikte kullanılmıştır. Survey peryodu boyunca, sarı tuzak yöntemi ile yakalanan afidlerden, toplam olarak 34 afid türü teşhis edilmiştir. Bu 34 afid türünden 14'ünün patates virus hastalıklarının vektörü olduğu şimdiye kadar rapor edilmiştir ***Aphis fabae*** ve ***Myzus persicae*** toplam afid populasyonunun % 47'sini sırasıyla, % 24.2 ve 22.7'lik değerlerle oluşturmuşlardır. Bu iki afid türüne oranla diğer afidlerin populasyonları oldukça düşük düzeyde kalmıştır. 14 kanatlı afid türünün populasyon içerisindeki oranları, hemen hemen bütün lokasyonlarda % 1'in altında seyretmiş ve mevsim içerisinde düzenli bir dağılım göstermiştir. Yüksek rakımlı ovalarda yeşil şeftali afidinin ortalama olarak ilk uçuşa, 17 Temmuz'da,düşük rakımlı vadilerde ise 7 Temmuz'da başladığı tesbit edilmiştir. Diğer yandan, tuzakta 5 yeşil şeftali afidinin yakalandığı tarihler, ortalama olarak yüksek kesimlerde 21, vadilerde ise 31 Ağustos olarak belirlenmiştir.

Yaprakta afid sayımı ile elde edilen bulgular, sarı tuzak yönteminden oldukça farklılık göstermiştir. Yaprakta afid sayımı yöntemiyle sadece 4 afid türü belirlenmiştir. Bu yöntemde kanatsız afid populasyonu toplam populasyonun % 98.9'unu oluştururken kanatlı populasyon % 1.1 düzeyinde kalmıştır. Dikkati çeken diğer bir nokta ise, yaprakta sayımı yapılan toplam populasyonun % 98.5'ini ***M. persicae***'nin oluşturmasıdır. Diğer 3 afid türü (***Macrosiphum***

euphorbiae, Aulacorthum solani ve ***Aphis fabae***) ise populasyonun yanlızca % 1.5'ini meydana getirmiştir. Yeşil şeftali afidnin populasyonu,3 ilçede eşik değerini (20 afid/bitki) eylül ayının başlangıcında aşmıştır. Yapılan genel değerlendirmelerde, yaprakta sayım metodunun, yıllara ve lokasyonlara bağlı olarak çok değişken sonuçlar verdiği ve bu metodla elde edilecek bilgilere dayanılarak afid populasyon değişimlerinin doğru olarak saptamanın pek mümkün olmayacağı kanaatine varılmıştır.

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