

PRESSURE VARIABILITY OF APHIDS – VECTORS OF POTATO VIRUSES IN POLAND

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Abstract. Monitoring of aphids – vector of potato diseases virus – continued in Poland for 30 years in 5 localities, indicated some changes in pressure exerted by these insects. The biggest differences were observed for *Macrosiphum euphorbiae* (Thom.) and subsequently for *Aphis frangulae* Kalt. and *Aulacorthum solani* Kalt. Reduction in population of these aphids has been observed according to elapsing time in all five localities. In case of *Myzus persicae* (Sulz.) or *Aphis nasturtii* Kalt., these changes involved decrease or increase of the pressure, depending on the locality.

Key words: aphids, potato

I. INTRODUCTION

Knowledge of epidemiology of virus diseases is essential for seed potato production. Main vectors of viruses are aphids. Several aphid species may colonize of potato plants under Poland climatic conditions. The most numerous are: *Myzus persicae* (Sulz.), *Aphis nasturtii* Kalt., *Aphis frangulae* Kalt. Much less numerous are *Macrosiphum euphorbiae* (Thom.) and *Aulacorthum solani* (Kalt.) (Kostiw 1987). Tracing of aphids pressure allows for assignment the proper time of their control on seed potato plantations, time of haulm destruction and forecasting the spread of potato viruses. Multiyear observations make the possibility to register and analyse proceeding changes in that respect (Kostiw 1994; Gabriel et al. 1991).

II. MATERIAL AND METHODS

Observations were carried out in 5 localities over various regions of Poland (Fig. 1), beginning May till August in years 1969-1998. Aphids were trapped in yellow water traps placed inside of potato plantation on fallow 20 x 20 m. Insects were collected every day or every two days depending on locality and 5 mentioned above aphid species were described. Dates were transformed according to formula $\lg(n+1)$, where n denotes mean number of aphids collected from 2 traps. In order to analyse the results, all period of the observation has been divided into 3 decades that involved years: 1969-1978; 1979-1988; 1989-1998. The occurrence of the particular aphid species in decades has been compared. Total aphid number of a given species collected in whole period 1969-1998 was taken as 100%. This number was basis for calculation of percental share of aphids in particular decades.



Fig. 1. Localities of yellow water traps in different regions of Poland

III. RESULTS AND DISCUSSION

Results are presented on Fig. 2. The most pronounced changes were noticed in the case of *A. frangulae* that involved gradual decrease of their population along elapsing time. The occurrence in I decade (years 1969-1978) in localities: Bonin, Szyldak, Zamarte, Jadwisin and Stare Olesno was 54%, 62%, 48%, 44% and 55% respectively. Much less share has been noticed in II decade (1979-1988). There was 28% in Bonin and Szyldak, and 26%, 37% and 35%, respectively in Zamarte, Jadwisin and Stare Olesno. Far less share was observed in decade III (1989-1998): 18% in Bonin and Jadwisin, 9% in Szyldak and 10% in Stare Olesno. However in Zamarte, the same level of *A. frangulae* (26%) has been maintained over the period of II and III decade. Similar tendency has been found in the case of *M. euphorbiae*. Share of aphids in succeeding decades (1969-1978, 1979-1988 and 1989-1998) was respectively: 85%, 0% and 15% in Szyldak; 70%, 16% and 14% in Bonin and 67%, 27% and 6% in Stare Olesno. Changes in *A. solani* population display not the same profile. The highest number was observed in Stare Olesno and Zamarte (59% and 52%,

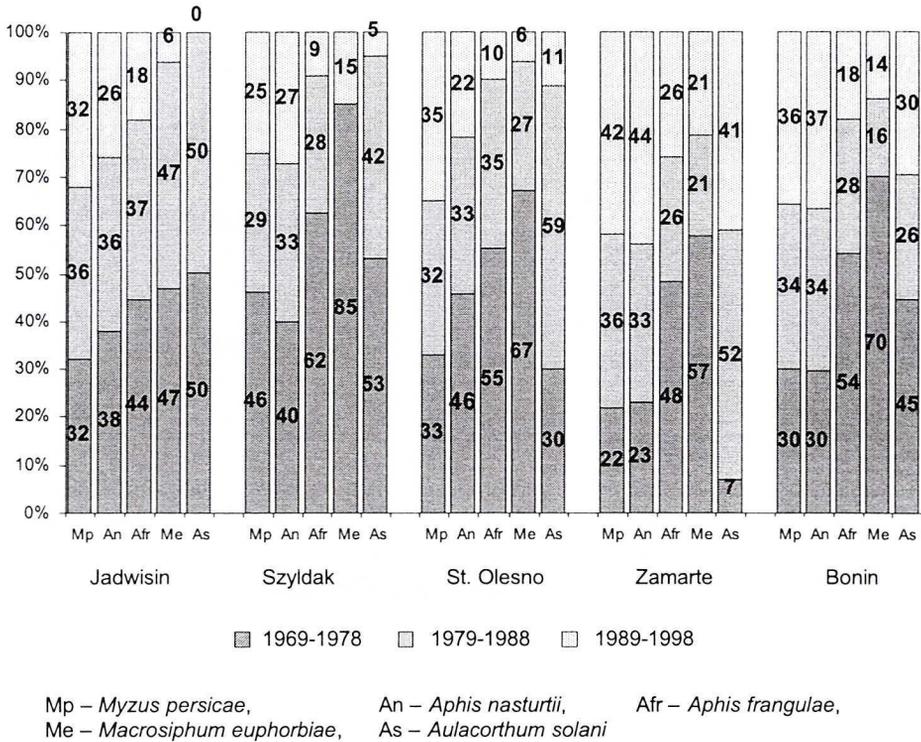


Fig. 2. Comparison of 5 aphid species occurrence in 3 decades of the period 1969-1998 in 5 localities (%)

respectively) in period 1979-1988. In remaining localities (Jadwisin, Szyldak and Bonin) the share was similar like in the case of *A. frangulae* and *M. euphorbiae*. Participation was reduced from 50% level in 1969-1978 to zero level in 1989-1998 in Jadwisin and from 53% to 5% in Szyldak and from 45% to 30% in Bonin. Decreasing amount of *A. nasturtii* was stated in 3 localities: Jadwisin, Szyldak and Stare Olesno. In three subsequent decades the share was following: 38%, 36% and 26% in Jadwisin; 40%, 33% and 27% in Szyldak; 46%, 33% and 22% in Stare Olesno. Reverse trend has been observed in Zamarte. Aphid population enhanced from 23% in 1969-1978 and 33% in 1979-1988 to 44% in the last decade (1989-1998). Similar, however not such distinct trend was observed in Bonin (respectively: 30%, 34% and 37% share).

In respect to *M. persicae*, increase in the number of aphids was stated in 2 localities (Zamarte and Bonin), although in Zamarte it was more substantial (22% in 1969-1978 and 42% in 1989-1998), than in Bonin (30% and 36%). On the other hand, no changes were noticed in Jadwisin and Stare Olesno, and similar level of population has been observed over 30-years period. Decrease in population occurred in Szyldak in time of elapsing years, especially in years 1979-1988 (29%) and 1989-1998 (25%) in comparison to 46% in 1969-1978.

Elucidation of those fluctuation is not simple. Probably, lowered pressure of aphids may be partially related to descending acreage of potatoes in Poland (by 55% in years 1962-1998).

Therefore the number of host plants is also diminished. This interpretation don't harmonize to results from Zamarte because in this locality only *A. frangulae* and *M. euphorbiae* aphid pressure was decreased in contrary to *M. persicae*, *A. nasturtii* and *A. solani* (increase in number). At the same period an acreage of potato growth became greater by several times in the region of this locality (A. Pawlak – personal communication). Another factor that may affect is application of insecticides in potato protection. The observations indicated that insecticides used for control of colorado beetle, are active towards aphids like *A. nasturtii* and *A. frangulae*. Contrary to *M. persicae*. Many strains of this aphid acquired resistance to active components of the insecticides and became selected. Moreover, *M. persicae* belongs to polyphagous group and may multiply on wide spectrum of plant species.

IV. CONCLUSIONS

1. Decrease in population of *A. frangulae*, *M. euphorbiae* and *A. solani* indicates on descending role of this aphids in epidemiology of virus diseases of potatoes in Poland.
2. The threat caused by *A. nasturtii* and *M. persicae* seems to be diverse (increased or decreased numerous of aphids depending on the region).

V. LITERATURE

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ZMIENNOŚĆ PRESJI MSZYC – WEKTORÓW WIRUSÓW ZIEMNIAKA W POLSCE

STRESZCZENIE

W latach 1969-1998 w 5 miejscowościach w różnych rejonach Polski prowadzono obserwacje (odłowy do żółtych szalek) mszyc, wektorów wirusów ziemniaka. Stwierdzono zmienność presji tych owadów. Największe różnice zanotowano u *Aphis frangulae* Kalt. Na przykład w Szydaku udział procentowy osobników tej mszyce w latach 1969-1978 wyniósł 62 procent, a w latach 1979-1988 i 1989-1998 odpowiednio 28 i 9 procent. Zbliżone dane zanotowano również w innych miejscowościach.

W miarę podobny trend wystąpił u mszyc *Macrosiphum euphorbiae* (Thom.) i *Aulacorthum solani* Kalt. Zmniejszenie liczebności świadczy o malejącym znaczeniu wymienionych gatunków mszyc jako wektorów wirusów.

W odniesieniu do *Myzus persicae* (Sulz.) i *Aphis nasturtii* Kalt. stwierdzono wzrost lub spadek liczebności w miarę upływu lat w zależności od miejscowości.