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BREEDING OF SUMMER SQUASH (*Cucurbita pepo* L.) DEVELOPMENT OF F1 HYBRIDS TOLERANT TO VIRUS DISEASES

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Abstract

In the context of the research project "Exploitation of Created Hybrid Squash with Tolerance to Diseases for Organic Production," a pilot cultivation of the created hybrids was carried out in various regions of Greece aiming to evaluating their tolerance to the main diseases of squashes, which are viruses. Tolerance to viruses, via new set of hybrid squashes constitutes an alternative route to non-treatable but manageable diseases of squashes, expecting higher and qualitative competitive yields under both conventional and organic cultivation schemes.

Performance Evaluation

Pilot outdoor cultivations of squash hybrids were established in Missolonghi and Ilia-Achaia areas by the Department of Agriculture of the University of Patras, with the support of Lappa's Western Greece Agricultural Cooperative of Organic Farmers. In July 2023, 19 new hybrids and 2 commercials hybrids (RIGAS F1 and SONORA F1) established at each experimental area. A full randomized experimental design with 3 replicates per hybrid was applied.

Standard commercial organic zucchini cultivation methods were applied. The yield of zucchini F1 hybrids and their tolerance to viruses, were evaluated. The yield of F1 hybrids were measured with harvests carried out every 2-3 days from late August to late September, while observations and measurements of virus infestations began in mid-August and continued until October. The hybrid yields differed significantly at both sites ((Fig. 1).

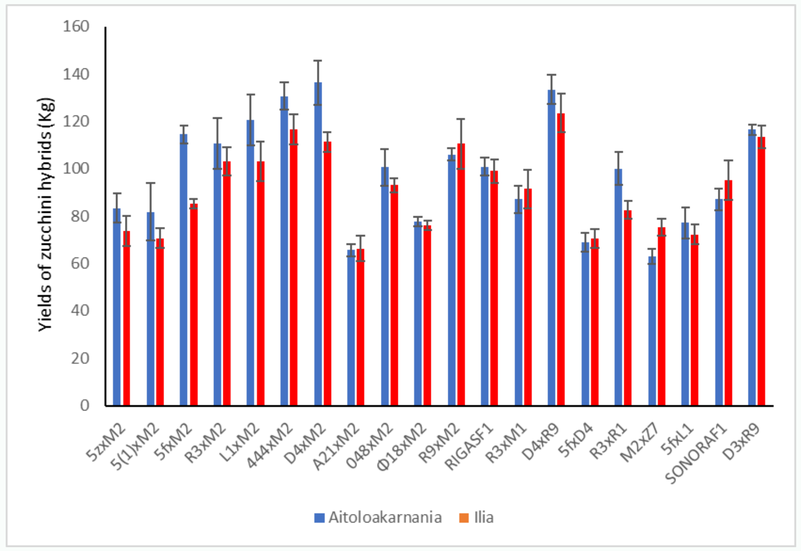

Fig.1: Yields of squash hybrids

Hybrids R_3xM_2, L_1xM_2,$444xM_2$, D_4xM_2,R_9xM_2, RIGASF1, D_4xR_9 and D_3xR_9 achieved high yields (103 to 136 kg) in both experimental areas, while the $5fxM_2$ hybrid performed well only in Aetoloakarnania area (114.90 kg). On the contrary, hybrids $A_{21}xM_2$, $\Phi 18\chi M_2$, $5fxD_4$ and M_2xZ_7 recorded the lowest yields in both experimental areas (Aetoloakarnania and Ilia-Achaia), while Intermediate fruit production was observed in the rest of tested hybrids ($5zxM_2$, $5(_1)xM_2$, $048xM_2$, R_3xM_1, R_3xR_1, $5fxL_1$ and SONORA F1.

It should be noted that during the summer period when viruses were on the rise, the most affected hybrids gave very low yields, although when virological infestations were at low levels, their yields were much higher. A typical example is the 5fxD4 F1 hybrid (Greek hybrid), which when viruses are at low levels is one of the most productive zucchini hybrids. On the contrary, the Greek F1 hybrid D4xR9, which is resistant to viruses, gave high yields during the summer season (Aitoloakarnania 133.37 and Ilia-Achaia 123.50 kg).

Assessment of hybrids tolerance to viruses

The evaluation of virological projections was performed using a scale from 0 (absence of symptoms) to 5 (very intense symptoms).

The hybrids R_9xM_2, $048xM_2$, D_4xR_9, R_3xM_2 and RIGAS F1 were the most tolerant to viruses and showed the fewest symptoms of virological projections (Figure 2). In contrast, hybrids $5fxD_4$, $5fxL_1$, D_4xM_2, $5fxM_2$ and 5_2xM_2 were among the most vulnerable to viral attacks and developed severe virological symptoms. Intermediate-intensity symptoms of viral infections occurred in the remaining ten hybrids.

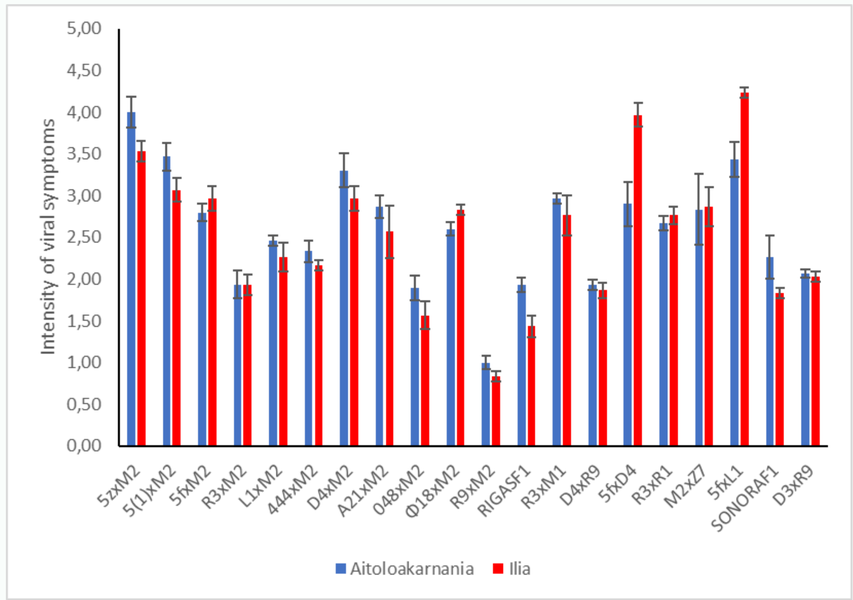

Fig.2: Intensity of viral symptoms in squash hybrids (0=absence of symptoms, 5=intense symptoms).

Intensity of viral infection symptoms on hybrid hosts was similar, with slight differences between experimentation areas. Rule exemption was recorded for hybrids $5(_1)xD_4$ and $5fxL_1$ which demonstrated higher levels of susceptibility to plant viruses when grown to Aetoloakarnania area.

Assessments of viral infections epidemics will be repeated in 2024 and 2025.

Assessments of viral infections in greenhouse crops

The Organic Farmers Association of Western Greece conducted greenhouse, pilot cultivation of squash hybrids in Aetoloakarnania (Kypseli Agrinio) from September to December in order to evaluate the hybrids for possible viral attacks. It has been found on an annual periodic basis when the development of a large population of aphids is favored (late summer – early autumn) there are serious viral attacks in early autumn greenhouse squash plantings. However, in the pilot crops that took place in September 2023, only isolated infestations of a few plants in various planting lines were observed, without being a significant problem. Early greenhouse plantings will be repeated in 2024.

Greenhouse, pilot squash hybrids in Aetoloakarnania.

Acknowledgments

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