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"Crossing borders:
a world of nematode diversity and impact to discover"

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Nematode biodiversity as a soil health indicator in agroforestry ecosystems.

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Analyses of the nematode community structure can serve as useful indicators of the agricultural soil health and as indicators of the agroecosystem sustainability. Agroforestry, a combination of woody species and crops, is being offered as one of the solutions for improving soil health and its biodiversity. This combination reduces the negative impacts of climate on agricultural production and creates a new microclimate within the plantations. In this study, the biodiversity of nematodes was compared under 3 different agroecosystems: 1) agricultural crop (C), 2) walnut orchard (W), and 3) consociation of agricultural crop and walnut orchard (C+W); at two sites in Croatia, Dakovo and Ivankovo. The agricultural crop was wheat in 2017/2018, followed by rape seed (green fertilization) in 2018, and buckwheat in 2019. Samples were taken on 11 occasions during that period, in 4 repetitions. The numbers of genera differ statistically significantly under the different treatments in favor of consociation in both sites. At the Đakovo site, statistically lower numbers of genera were found in C treatment (14.77) than in C+W (17.66) and W (16.61). At the Ivankovo site, there was also a statistically lower number of genera in treatment C (14.48) than in C+W (16.91) and W (16.30). Statistically significant differences were found in the percentage of all trophic groups except the predators in the Dakovo site. The highest percentage of bacterivores was found in treatment C (63.3) compared to C+W (51.67) and W (37.15). A higher percentage of fungivores was found in treatment W (29.77) than C (21.41) and C+W (21.11). The percentage of plant parasitic nematodes was higher in treatment W (29.28) than C+W (20.11) and C (10.53). The percentage of omnivores was the highest in treatment C+W (6.23) and W (6.16) compared to C (3.81). Statistically significant differences were found in a percentage of bacterivores and plant parasitic nematodes in the Ivankovo site. The highest percentage of bacterivores in Ivankovo were found in treatment W (51.89) compared to C+W (44.83) and C (34.43). The percentage of plant parasitic nematodes was higher in treatment C (30.6) than C+W (19.41) and W (15.19). Regardless the differences in percentages of trophic groups in the study sites, the results suggest that consociation of woody species and agricultural crops increases soil biodiversity and thus improves soil health, which is a basic prerequisite for successful agricultural production.

Keywords: Nematode biodiversity - Agroforestry ecosystems - Soil health - Nematode genera - Trophic groups.