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CONSIDERATIONS REGARDING THE VASCULAR FLORA OF SOME FRUIT ORCHARDS IN DOLJ COUNTY, ROMANIA

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ABSTRACT

Through the environmental requirement imposed by inter-rows, the eco-scheme contributes to the CAP objective of biodiversity conservation, as well as increasing the soil's carbon sequestration capacity and improving the quality of the soil structure, the main natural resource in agricultural activity. The present work aimed to analyze the vascular flora from some fruit orchards in Dolj County, Romania following a taxonomic study, starting from the need to establish a vegetal soil cover with spontaneous plants, both specific to the region and environmentally friendly. Following the observations made, it was found that the floristic composition of the grassy cover in the orchards in Dolj County is variable depending on the age of the orchard and the works that were carried out between and on the rows of trees. In orchards where human intervention is low, there is a good representation of taxa belonging to the Fabaceae family (eg Trifolium repens, T. pratense, Medicago arabica, M. sativa). On the other hand, isolated species are present in well-maintained orchards, especially from the category of weeds that can be difficult to fight (e.g. Sorghum halepense, Xanthium italicum, Conyza canadensis, etc.). Observations will be continued to consider the effect of wild plants on the environment and to establish an area-specific varietal soil cover for keeping the row spaces grass-covered.

INTRODUCTION

Plants from the spontaneous flora of our country have always been the main source of obtaining cultivated species. Data related to the consumption of fruits in specimens from the spontaneous flora can be found since antiquity, in Asia Minor. The evidence is the remains discovered in the lake dwellings of those times (according to O. Heer., from Ghena et al. 2010). The continuous development of the culture technology of fruit species is topical. Satisfying the needs of the continuously growing population results in the intensification of horticultural areas cultivated with species that correspond qualitatively and quantitatively to the requirements of the current market. Although orchards are constantly being modernized, an aspect of environmental importance is often neglected. The whole attention of the farmer is focused most often on satisfying the needs of the customers and does not take into account the impact on the environment. Good practices applied in the eco-friendly management of orchards are desirable for a contribution to the protection and conservation of existing biodiversity in the cultivation area. Gurin et al. (2021) report an improvement in fruit tree root growth by applying a 7:3 mixture of red clover (*Trifolium pratense*) and timothy (*Phleum pratense*) and an improvement in soil potassium by intercropping of legumes-cereals, in a ratio of 3:7, in

an apple orchard. Xiaozhu et al. (2016) confirm that keeping the soil grass covered can be a practice that contributes to increasing the level of phosphorus thus contributing to the quality of an apple orchard. On the other hand, Li et al. (2022) after determining six different soil maintenance methods, concluded that the use of straw mulch significantly contributes to maintaining a constant soil moisture. The surface between the rows is kept grassed to better protect the soil against compaction and erosion. It is important to know the species present, in order to establish future strategies for the conservation of useful flora and fauna with a role in pollination. Climate change constitutes also a severe threat to the health of spontaneous and crop plants, associated with changes in pathogens life cycles, increased incidence, pathogenicity, genetically recombination and aggressiveness traits, impacting both productivity and quality and resulting in food insecurity (Bonciu et al. 2022, Cotuna et al. 2022 a, b, Dima et al. 2023 a, b, Matei et al. 2022). García and Miñarro (2014) mention in this regard the importance of the vegetal cover on the attracted pollinating insects and the role they have on the orchard ecosystem. Simoes et al. (2014) also confirm the importance of the plant substrate in the conservation of soil resources. Intercropping is an important soil management practice for increasing orchard productivity and land use efficiency because it has beneficial effects on soil microbial communities and soil properties (Li et al. 2022). Considering the importance of spontaneous plants present in fruit orchards, botanical research has been carried out over the years in the Oltenia Plain. We find data in several works that refer to the flora or vegetation of a certain region (Buia & Popescu-Mihăilă 1952, Buia & Păun 1960, Buia et al. 1961, Cîrţu 1971, Păun et al. 1971, Păun & Popescu 1975, Păun et al. 1975, Popescu 1992, 1996, Popescu et al. 2003, Şerbănescu 1958), without giving greater importance to the areas occupied by fruit orchards.

The present work aimed to analyze the vascular flora from some fruit orchards in Dolj County, Romania, and to carry out a taxonomic study, starting from the need to establish a vegetal soil cover with spontaneous plants, specific to the region and friendly to the environment.

MATERIAL AND METHODS

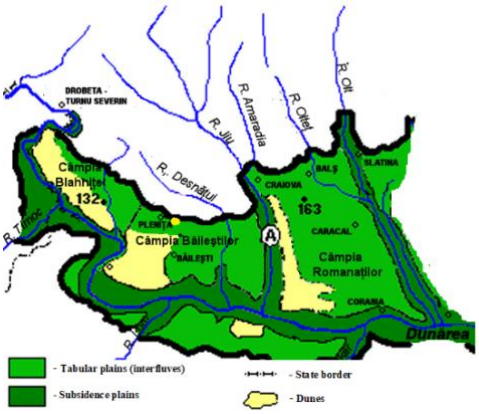

Figure 1. Map with the location of the area researched in the Oltenia Plain (internet processing)

The research was carried out during the spring-autumn period, from April to September 2023. The researched area is located in the northern part of the Băilești Plain, a component part of the Romanian Plain (figure 1). The study was carried out in apple, plum, and cherry orchards located in Orodel commune, Dolj county (44°13'N 23°16'E). The soil on which these orchards grow is typically preluvosol. From a climatic point of view, the area is characterized by an average annual temperature of 10.9°C, with a minimum monthly average of -0.9°C in January, and the highest in July, of 23.1°C.

The rainfall regime is characterized by average annual precipitation of approx. 530 mm, the largest amount corresponding to the month of May with approx. 73 mm and the smallest amount corresponds to February with approx. 2.5 mm.

The identification of the plant material was carried out based on the specialized guidebooks in the country (Ciocârlan 2009, Sârbu et al. 2013). The nomenclature of the identified species is in accordance with the Plants of the World Online database (POWO 2023) and Sârbu et al. (2013). The identified species were arranged in alphabetical order.

RESULTS AND DISCUSSIONS

Dolj County is located in the southwestern part of Romania, being bounded to the south by the Danube River, to the east by Olt County, to the west by Mehedinți County, and to the north by Gorj and Vâlcea counties. According to INS data (the year 2014), within the South-West Oltenia Region, Vâlcea county had the largest share of fruit-growing areas (32.6%), compared to the entire area of the region, followed by Gorj (18.81%), Dolj (18.54%), Mehedinți (17.14%), Olt counties (12.88%). Dolj County belongs to the southern part of the Oltenia Plain, and to the northern part it falls on the level of the Getic Piedmont. The zonal vegetation of these places is classified in the silvo-steppe zone in the lower part and in the nemoral zone in the upper part. Following the research carried out on the grassy cover in apple, plum, and cherry orchards, it was found that the floristic composition includes valuable species that can be successfully used to improve the soil in nitrogen and other elements, that can be easily multiplied, and invasive alien species (eg *Abutilon theophrasti* Medik., *Ambrosia artemisiifolia* L., *Conyza canadensis* (L.) Cronquist, *Cuscuta campestris* Yunck., *Erigeron annuus* (L.) Desf. and *Sorghum halepense* (L.) Pers.), which require an immediate fight because it registers a great development both in the number of species and especially in the specimen (Table no. 1).

Table 1

The flora identified in the studied orchards

Species	Family	Cherry orchard	Apple orchard	Plum orchard
Abutilon theophrasti Medik.	Malvaceae	-	+	-
Amaranthus retroflexus L.	Amaranthaceae	-	+	+
Ambrosia artemisiifolia L.	Asteraceae	+	-	-
Artemisia vulgaris L.	Asteraceae	+	-	-
Atriplex patula L.	Chenopodiaceae	+	+	-
Bromus arvensis L.	Poaceae	-	+	+
Carduus acanthoides Hornem.	Asteraceae	+	-	+
Centaurea stenolepis A. Kern.	Asteraceae	+	-	+
Chondrilla juncea L.	Asteraceae	+	+	+
Cichorium intybus L.	Asteraceae	+	-	+
Cirsium arvense (L.) Scop.	Asteraceae	+	+	+
Convolvulus arvensis L.	Convolvulaceae	+	+	+
Conyza canadensis (L.) Cronquist	Asteraceae	+	+	+
Cuscuta campestris Yunck.	Cuscutaceae	-	+	-

Cynodon dactylon (L.) Pers.	Poaceae	+	+	+
Daucus carota L.	Apiaceae	+	+	-
Dichanthium ischaemum (L.) Roberty	Poaceae	+	-	+
Digitaria sanguinalis (L.) Scop.	Poaceae	-	+	-
Echium vulgare L.	Boraginaceae	+	-	+
Echinochloa crus-galli (L.) P.Beauv.	Poaceae	+	+	-
Elymus repens (L.) Gould	Poaceae	-	+	+
Erigeron annuus (L.) Desf.	Asteraceae	-	+	+
Euphorbia virgata Desf.	Euphorbiaceae	-	+	+
Gleditsia triacanthos L.	Caesalpiniaceae	-	+	-
Hibiscus trionum L.	Malvaceae	-	+	-
Lactuca serriola L.	Asteraceae	+	+	-
Lathyrus sphaericus Retz.	Fabaceae	-	+	+
Linaria vulgaris Mill.	Scrophulariaceae	+	+	+
Lolium perenne L.	Poaceae	+	+	+
Malva sylvestris L.	Malvaceae	-	+	+
Medicago arabica (L.) Huds.	Fabaceae	+	+	+
Medicago sativa L.	Fabaceae	-	+	+
Mentha longifolia (L.) L.	Lamiaceae	-	+	+
Plantago major L.	Plantaginaceae	+	+	-
Polygonum aviculare L.	Polygonaceae	+	+	-
Rubus caesius Thunb. ex Maxim.	Rosaceae	+	+	+
Rumex crispus L.	Polygonaceae	-	+	-
Sambucus nigra L.	Caprifoliaceae	-	+	+
Setaria pumila (Poir.) Roem. et Schult.	Poaceae	+	+	+
Solanum nigrum L.	Solanaceae	+	+	-
Sonchus arvensis L.	Asteraceae	+	+	-
Sorghum halepense (L.) Pers.	Poaceae	+	+	+
Trifolium pratense L.	Fabaceae	-	+	+
Trifolium repens L.	Fabaceae	+	+	
Xanthium italicum Moretti	Asteraceae	+	-	+

The taxonomic analysis of the identified species in the studied fruit orchards highlights a better representation of the species belonging to the Asteraceae family. They have a better representation in orchards where a slight disturbance of the soil is observed. Where this is advanced, the leading place is occupied by the family Poaceae (Fig. 1). A significant percentage is occupied by families that have only one representative.

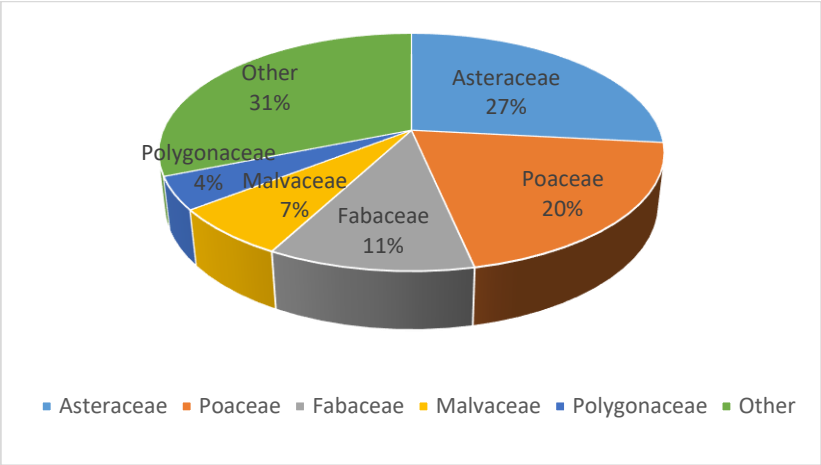

Fig. 1. Taxonomic analysis of the identified species (orig.)

Although the native weeds and partially the invasive alien ones are present in all three types of the studied orchards, they have a poor representation as individuals in the field, compared to the valuable leguminous and Poaceae species: *Medicago arabica*, *Trifolium repens*, *T. pratense*, *Lolium perennial*. On some species of vascular plants identified in the three types of fruit orchards, phytopathogenic agents from the category of mealybugs were also identified: *Erysiphe polygoni* DC. on *Polygonum aviculare* and *Rumex crispus*, *Erysiphe convolvuli* DC. ex St. Am. and *Erysiphe cicoracearum* DC. ex Merat. on *Sonchys arvensis*. Such studies are necessary because once an orchard is established, it becomes imperative to use the space between the rows to ensure productivity and better management of the orchard area. Special attention must be directed to the choice of the species to be used, respectively the species chosen not to compete with the fruit trees. Faulty management of the soil leads over time to the shortening of the life of the fruit trees, to the decrease in soil quality, nutrients, microbial activity, etc.

Inter-row spacing, using appropriate and synergistic species, improves fertility thus providing qualitatively and quantitatively better production, with effect on the obtained profit (Singh et al., 2016). Intercropping is an important soil management practice for increasing orchard productivity and land use efficiency because it has beneficial effects on soil microbial communities and soil properties (Li et al., 2022). Natural grass, clover, *Lolium*, *Vulpia myuros*, and alfalfa are commonly cultivated inter-row species in fruit orchards (Wang et al., 2014; Coller et al., 2019; Sun et al., 2022). Some research has shown that *V. myuros* species can suppress the growth of other weeds, improve the physicochemical properties of orchards, and provide nutrients for fruit trees (Brown & Rice, 2010). If the used species has a fibrous root system, it maintains the soil moisture level and stabilizes its structure (Ishii et al., 2007; Wang et al., 2011). In addition to altering orchard soil nutrient content, species used between fruit tree rows can also alter soil microbiota (Chen et al., 2014; Wang et al., 2020). In addition, intercropping helps regulate plant organic resource abundance and mediates C and N biogeochemical cycles, which substantially affect the soil's metabolic footprint (Bever, 2015).

CONCLUSIONS

In conclusion, the floristic composition of the soil grass cover in the studied cherry, apple, and plum orchards in Dolj County is variable depending on the age of the orchard and the work carried out between and on the rows of trees. The analysis of orchards where human intervention is low highlights a good representation of taxa belonging to the Fabaceae family (eg *Trifolium repens*, *T. pratense*, *Medicago arabica*, *M. sativa*). On the other hand, isolated species are present in well-maintained plantations, especially from the category of weeds that can hardly be controlled (e.g. *Sorghum halepense*, *Xanthium italicum*, *Conyza canadensis*, etc.). Research will continue to look at the effect that wild plants have on the environment. We believe that the creation of eco-schemes to protect the soil, fauna, and flora of these places and to support the fruit orchards, are more than necessary.

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