

THE NATURAL FLORA OF SZENT GYÖRGY HILL ADAPTED TO THE SPECIFIC CONDITIONS OF VINEYARDS

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The mesas of the Tapolca Basin are emblematic symbols of the Balaton Uplands landscape. Viticulture has long been present on the hills, including Szent György Hill, and the skirts of the mountain have been surrounded by vineyards for centuries. The vineyards rise out of the surrounding wetland and continue up to the hilltop which was once pasture and is now more a woodland. The land use is surprisingly stable, with the 1754 map of the First Military Survey showing a similar land use to the present on the sides of the hill. The reason for this may be that farming has been adapted to the environment. Vineyards were not established on the rocky outcrops and rock debris, where rocky swards and rocky woodlands were preserved. These areas are still rich in botanical values. In our country, the hardy cloak fern (*Notholaena marantae*) occurs only on St. György Hill, but the hill is also rich in other rare fern species. The early star-of-Bethlehem (*Gagea bohemica*), a native of our volcanic hills, with its tiny yellow flowers opening in early spring, also has a stable population in the rocky meadows on the hill's edge. From the end of March onwards, the basket of gold (*Aurinia saxatilis*) paints the tops of the basalt columns yellow. In the colder forests of the north side, the blue flowers of the common hepatica (*Hepatica nobilis*) emerge from the leaf litter in spring, while in summer the sturdy martagon lily (*Lilium martagon*) stands out with its spectacular inflorescence.

Small-plot farming in the vineyards was only interrupted in the socialist era, when efforts were made to merge the small plots. Fortunately, this intensive form of farming, which is extremely unfavourable from an ecological point of view, is less common today. Vineyards and vineyard parcels with fruit trees, rows of vegetables and even ornamental plants at the end of the rows are pleasant for the eye and for wildlife as well. Lawned and gently mown vineyards, with patches of grass left in place, also help to retain water and soil. The basalt walls between the vineyards provide occasional habitat for the rare and protected ferns. The long-standing importance of viticulture in the landscape is illustrated by the fact that ornamental plants (honesty – *Lunaria annua*), which were once planted around the cellars, or probably also former crops (Narbon vetch – *Vicia narbonensis*), which were sown between the rows, include species that are now protected.

It is in our common interest to preserve a land use that has functioned well over many centuries. The use of medicinal and aromatic plants, even under the vine rows, can be a valuable complement to the mosaic of landscape, which is adapted to the topography and takes account of ecological aspects as well.

Keywords: landuse, environment protection, biodiversity, mosaic farming



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CHARACTERISTICS OF GROWING MEDICINAL AND SPICY PLANTS IN VINEYARDS

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Among the wild and cultivated medicinal plants and herbs, we find many that are suitable for living together with grapes, and can also be used in the kitchen and to maintain well-being and health.

During the study of the literature related to the topic, I highlighted 14 species of medicinal plants and herbs that can be used to cover the grape rows, in addition to the fact that we can use them for the above-mentioned purposes and even for biological plant protection.

The species included in the list are all flowering plants, with the exception of horsetail. Several of them - basil, peppermint, thyme, lavender, lemongrass, and oregano - belong to the family of *Lamiaceae*, but there are also those with nesting flowers – marigolds (*Calendula*), *Echinacea* species, tarragon, *Tagetes patula*, common yarrow, tansy - which can be used in grape rows to cover. Perennial species are preferable because farmers don't have to take care of replanting them every year. It is also important that the plants planted under the vine can withstand shearing, shade, and drought.

Plants can also help keep certain pests away. Among the species mentioned above, suitable for this are e.g. velvet flower, marigold, lavender, peppermint and tansy.

Keywords: horticulture, drug science, cover crop, biological plant protection



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COLLABORATION IN VINEYARDS - WHAT CAN A GRAPE GROWER EXPECT IF HE/SHE DOESN'T FORM A MONOCULTURE

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Today's widely used viticulture practices require significant soil disturbance or the use of pesticides for weed control and extermination. As an inter-row alternative to these, many cover plant seed mixtures are now available, their use is spreading primarily in farms operating according to ecological, biodynamic or Agri-Environment Scheme (AKG) regulations. In addition to the presence of these inter-row cover plants, species that are chosen by the farmer for some known advantage (e.g. nitrogen collector, less competition for water than sedges) are introduced into the plantations, they also have a number of positive indirect effects from the point of grape growers. These include the improvement of the soil structure not only in the near-surface layers, the so-called rhizosphere (more and more active soil biological activity near the living plant root system) and allelopathic (suppressive ability by selecting root exudates= root secretions into the environment) effects.

The currently known cultivation form of grape growing in Hungary follows a monocultural model with a cordon training system. In the course of history, however, prior to mechanization aspects, grape growers created a number of alternative, high-cultivation, polyculture systems in their areas. Although these methods sometimes produced grapes less efficiently on a unit area, they enabled the management of other crops (e.g. trees, vegetables, herbs) or grazing animals more efficiently and thus more sustainably in every sense. As a step between mono- and polycultural grape growing, in-row covering with herbs was presented during the presentation as a covercrop solution.

Keywords: in-row covercrop, polyculture, allelopathic effect, organic farming



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WILD AND CULTIVATED MEDICINAL PLANTS OF VINEYARDS IN THE BALATON REGION

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The practice of growing grapes in Hungary and abroad has, over time, given room for the appearance of other plants in the vineyards to varying levels. The 60-80 cm plant spacing used in the vineyards of the Great Hungarian Plain with sandy soil and bush trained vineyards enabled the establishment of few plants, while the grass cover of the hobby vines in Zala and the hollows of the washed soil provide a unique living space.

Species often found in vineyards: *Aristolochia vitifolia* (European birthwort), *Chenopodium album* (goosefoot), *Stellaria media* (chickweed) (its shallow roots hold the soil, and retains dew), *Amaranthus* (amaranths).

Annuals: *Polygonum aviculare* (common knotgrass), *Senecio vernalis*, (eastern groundsel) *Erigeron canadensis* (horseweed), *Portulaca oleracea* (common purslane).

Perennials: *Agropyron repens* (couch grass), *Trifolium repens* (white clover), *Equisetum arvense* (field horsetail).

Planted plants:

Phaseolus vulgaris (common bean), *Anethum graveolens* (dill). At the end of the rows: *Rosmarinus officinalis* (rosemary), *Salvia officinalis* (common sage), *Allium cepa* (onion), *Lavandula officinalis* (lavender), *Rosa sp.* (Rose) as an indicator of powdery mildew. Next to cellars: *Juglans regia* (walnut).

The copper and sulfur used in organic farming, can also be used in the cultivation of herbs, the following plant conditioners are used in the garden, among others: *Urtica dioica* (nettle), *Achillea millefolium* (yarrow), *Alli folium* (onion leaf), *Echium vulgare* (blueweed) wetting agent: *Gypsophila paniculata* (soap root), *Aesculus hippocastanum* (horse chestnut).

Keywords: biodiversity, medicinal plants, viticulture



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SPECIES- RICH INTERCROPPING EXPERIMENTS IN HUNGARIAN VINEYARDS

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In the past decades, mechanical tillage was the most commonly used soil cultivation method in Hungarian vineyards (often combined with herbicides). Fortunately, in the last few years, the application and development of alternative inter-row management technologies increased. The reason behind searching for alternatives is erosion, especially on hill-valley planted steep vineyard slopes, and deflation damages of uncovered soil surfaces. During our research started in 2012, we aimed to develop and test species-rich cover-crop mixtures. The experiment was designed as a participative on-farm trial series in many Hungarian wine regions. Three seed mixtures (Biocont-Ecovin, mixture of legumes, mixture of grasses and forbs) were compared. As Control, the spontaneous weed flora was recorded in the mechanically cultivated and mown rows next to the experiment. Besides the botanical aspects of the experiment, we also measured the soil moisture in different soil types. Our results show the most successfully established species that – used with optimal agrotechnology – can solve erosion damages, do not compete with the vines, and do not influence negatively the agro- and phytotechnical treatments: *Coronilla varia*, *Daucus carota*, *Lotus corniculatus*, *Medicago lupulina*, *Plantago lanceolata*, *Trifolium repens*. Moreover, thanks to the research after many years of the beginning the “Élő Sorköz” seed mixture developed, the results are relevant for practice, education, and extension services.

Keywords: grape, inter-row, erosion, cover crop



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CAN THE DIVERSE UNDERGROWTH PROTECT VINEYARDS FROM DAMAGES CAUSED BY ANIMALS?

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Our Institute started studies on diversification of vineyard inter-row cover vegetation in 2012. One of the main issues was the effect of the species-rich undergrowth on pollinators, and on predators and parasitoids of grapevine pests.

The root system of the grapevine can be chewed by chafer grubs (Melolonthinae) and voles (Arvicolinae) and can be sucked by nematodes (*Pratylenchus* spp., *Xyphinema* spp.) and the grape phylloxera (*Daktulosphaira vitifoliae*). Colonies of scale insects (Coccidae, Diaspididae) can be found on the surface of woody parts, and under the bark we can discover the mother and larval passages of bark beetles (Scolytinae), as well as the passages of longhorn beetle (Cerambycidae) larvae and jewel beetle (Buprestidae) larvae. Foliage and bunches can be threatened by mites (Tetranychidae, Eriophyoidea) and caterpillars (Lepidoptera) during the growing season, and ripe berries can be damaged by wasps (Vespidae), ladybugs (Coccinellidae: *Coccinella septempunctata*, *Harmonia axyridis*), fruit flies (*Drosophila* spp.), and the European starling (*Sturnus vulgaris*) as the harvest approaches.

How can properly designed undergrowth provide protection against the activities of these animals – which are harmful to us? It can provide alternative food for non-vine specialist herbivores and animals with a mixed diet, as well as provide alternative prey/host, hiding place/wintering place and balanced microclimate for predatory and parasitoid organisms that control grapevine pests.

The presentation showed the first steps and principles of planting and caring for the diverse grapevine undergrowth through case studies.



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