ACADEMIA DE ŞTIINŢE AGRICOLE ŞI SILVICE "GHEORGHE IONESCU-ŞIŞEŞTI"
INSTITUTUL NAŢIONAL DE CERCETARE-DEZVOLTARE PENTRU BIOTEHNOLOGII
ÎN HORTICULTURĂ ŞTEFĂNEŞTI ARGEŞ
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THEMATIC PLAN FOR THE PERIOD 2021 - 2027
INCDBH ŞTEFĂNEŞTI-ARGEŞ

I. Genetics and Plant Breeding

TOPICS	PARTICIPATING RESEARCHERS	OBJECTIVES/ RESULTS
1.1 Characterization and evaluation of genetic diversity of horticultural material from germplasm collections		
1.1.1. Characterization and identification of material from germplasm collections of horticultural species	Dumitru Anamaria Nedelea Gina Manolescu Andreea Ciobotea Cristina Dinu Daniel	Use of standardized and up-to-date methods for the complete characterization of the accessions from the owned collections. ➢ description of varieties in germplasm collections with standardized descriptors; ➢ completing the registers of the germplasm collections with the records of the owned varieties.
1.1.2. Study of genetic uniformity and variability	Dumitru Anamaria Nedelea Gina	Evaluation of the genetic uniformity of plant material obtained through *in vivo* and *in vitro* propagation, as well as of genetic diversity as a result of breeding techniques.

in horticultural species	Manolescu Andreea	➢ testing DNA extraction methods and applying RAPD and SSR marker methods to horticultural species to prove genetic uniformity or polymorphism in the studied species.
1.1.3 Comparative analysis of genetic diversity in donor and regenerated plants from *in vitro* anther culture in the *Solanaceae* family species	Manolescu Andreea Dumitru Anamaria Nedelea Gina	Evaluation of genetic diversity and identification of genotypes through *in vitro* culture techniques and molecular analyses. ➢ Obtaining of haploid and double-haploid plants from anther culture; ➢ Creation a database with phenotypic and genotypic information by using specific molecular markers (RAPD, SSR) for *in vitro* obtained plants, with increased tolerance to biotic and abiotic factors.
1.1.4 Use of specific molecular biology techniques to assess the resistance to biotic and abiotic stress factors	Manolescu Andreea Dumitru Anamaria Ciobotea Cristina	Application of techniques based on SSR microsatellite markers, in order to determine and evaluate the resistance to biotic and abiotic factors, of different F1 genotypes, clonal elites under study and varieties obtained at INCDBH.
1.2 Conventional breeding methods		
1.2.1 Use of viticultural germplasm resources in order to obtain new grapevine genotypes with a high degree of adaptability in the climate change context	Ciobotea Cristina Nedelea Gina Dinu Daniel Dumitru Anamaria Manolescu Andreea	Breeding the assortment of grapevine varieties with superior biological potential. ➢ Identification of genotypes of the genus *Vitis vinifera ssp. sativa*, with superior biological potential, in order to use them in the National Breeding Program; ➢ Obtaining genotypes with increased tolerance to biotic and abiotic factors - F1, F2 generations.
1.2.2. Study of ampelographic and ampelometric characters of some intraspecific hybrids for table grapes	Ciobotea Cristina Nedelea Gina Dinu Daniel Dumitru Anamaria Nicola Claudia	➢ Their ampelographic characterization compared to the parental forms according to the standardized methodology at the OIV international level; Selection of the most valuable hybrid elites, obtained from various combinations, in order to approve and patent new genotypes with seeds/seedless with superior agrobiological and technological potential.

1.2.3. Diversification of the horticultural genetic resource base, including from spontaneous flora	Ciobotea Cristina Nedelea Gina Dumitru Anamaria Dinu Daniel Manolescu Andreea Nicola Claudia	Introducing new species with sanogenic potential into the assortment. ➢ Collecting the biological material and establishment of species lots; ➢ Identification of useful bioactive compounds; ➢ Identification and introduction into the germplasm collection of local genotypes of the *Vitis vinifera ssp. sativa* genus and *Vitis vinifera ssp. sylvestris* genus in order to diversify the genetic resource base; ➢ Ampelographic and eno-carpological characterization of accessions for the identification of essential bioactive compounds; ➢ Study of the agrobiological and technological particularities of some old autochthonous genotypes in order to use them as genetic material in the National Breeding Program.
1.2.4. Improving the biological value of quality autochthonous varieties by applying clonal and intraclonal selection	Ciobotea Cristina Bănuță Mădălina Sumedrea Dorin Dinu Daniel Onache Anca Tănase Andrei	➢ Completing the viticultural germplasm pool by obtaining clonal selections with high economic value, certification the most valuable clonal elites from Romanian autochthonous and foreign varieties, in order to optimally use the ecopedoclimatic conditions specific to the various viticultural areas in Romania and to obtain superior quality viticultural products.
1.2.5 Obtaining new genotypes in species of the *Solanaceae* family with adaptability to biotic and abiotic stress	Alina Florea Sumedrea Dorin Nicola Claudia	Enrichment of the vegetable gene pool by obtaining biological creations of solano-fruitful vegetables. ➢ New hybrids and varieties with high agro-biological potential and tolerance to abiotic and biotic stress factors.

II. Oenology and grape-derived products

2.1 Chemical and sensory analysis of wines	

2.1.1. Modern winemaking technologies adapted to the oenological potential of grape varieties	Onache Anca Tănăsescu Constantin Bontea Stan Tănase Andrei	Characterization of the technological potential of cultivated grapevine varieties and establishing solutions to improve the efficiency in order to increase oenological competitiveness on international level. ➢ Improved winemaking technology.
2.1.2. Isolation, characterization, identification and preservation of yeast strains useful for the winemaking process, specific to the Ștefănești vineyard	Onache Anca Manolescu Andreea Tănase Andrei Bontea Stan Sumedrea Dorin	Isolation and characterization of native yeasts from the viticultural ecosystems of Ștefănești vineyards, using microbiological and molecular methods. ➢ Study of the variability of indigenous yeasts useful in the winemaking process, through specific molecular biology methods (SSR markers); ➢ Collection of local yeast strains for use in directed fermentations and production of distinctive wines, characteristic of the Ștefănești terroir; ➢ Improving the aromatic profile and complexity of wines through the controlled use of selected strains in the winemaking process; ➢ Improved winemaking technology by exploring the yeasts biodiversity in Ștefănești grapevine growing area.
2.2 Study of the elementary profile of wines and alcoholic beverages to identify fraudulent practices		
2.2.1. Study of grape ripening dynamics	Onache Anca Tănase Andrei Marin Valentin Bontea Stan	Implementation of CAP restrictions for the wine sector ➢ Database for monitoring the must enrichment practices; traceability of elemental and polyphenolic compounds.
2.2.2. Multiparameter study on advanced analytical techniques for the verification and classification of wines and alcoholic beverages within the methodological rules imposed by law	Onache Anca Tănase Andrei	Investigation of the elemental profile of the wines in order to differentiate them according to the geographical origin. ➢ Analytical methods in order to achieve the most complex compositional profile of wines, with a special emphasis on advanced analytical techniques and statistical tools.
2.2.3. Study of polyphenolic compounds in canes, grapes, wine and waste resulting from	Onache Anca Nicola Claudia	Identification and quantification of polyphenolic compounds in plant matter (canes), grapes, must, wine and waste resulting from the winemaking process. ➢ Polyphenolic compounds extraction methods.

the winemaking process in order to use them as markers of authenticity and typicity		
2.2.4. Research on the behavior of some grapevine genotypes for obtaining quality wines in Ştefăneşti vineyard, under current climatic conditions	Tanase Andrei Onache Anca Sumedrea Dorin Marin Valentin	Identification of grapevine genotypes for wine grapes that ensure economic and constant production in terms of quantity and quality, under Stefăneşti grapevine growing area conditions. ➢ Database with pre- and postharvest quantitative and qualitative indicators of grapevine genotypes for wine grapes; ➢ Good practice guide for the use of approved genotypes at the Stefăneşti viticultural center.
2.3 Superior valorization of winemaking by-products and obtaining bioproducts		
2.3.1. Extraction and quantification of bioactive compounds from winemaking by-products in order to obtain bioproducts	Onache Anca Tanase Andrei Sumedrea Dorin	Use of winemaking by-products, in the form of functional ingredients, for food products fortification, in order to increase the nutritional quality and antioxidant capacity. ➢ Extraction methods of bioactive compounds; ➢ Improved technology for processing winemaking by-products, in order to obtain functional ingredients with high nutraceutical value; ➢ Wine product (wine and must) improved by enrichment with polyphenol extracts.

III. Diseases and pests management in horticultural plantations

3.1 Control of viruses, viral and viral-like diseases		
3.1.1. Streamlining the methods for grapevine virus-free regeneration in order to increase the quality of the grapevine genetic resource	Guţă Cătălina Buciumeanu Elena Ciripan Lorena	Validation of virus elimination methods in grapevine developed at INCDBH Ștefănești ➢ Evaluation of the economic efficiency of virus elimination methods. Development of new virus elimination methods of grapevine specific viruses (cryotherapy, chemotherapy). ➢ Virus elimination methods.
3.1.2. Morpho-anatomical-physiological changes in grapevines induced by viral infection and the application of virus elimination methods	Guţă Cătălina Buciumeanu Elena Vizitiu Diana Sărdărescu Ionela Ciripan Lorena	The influence of viral infection on grapevine development processes and the interaction between grapevine, viruses and the environment, as the basis of the plant physiological response to biotic and abiotic stress. ➢ Control of viral diseases through analysis of infection symptoms correlated with laboratory diagnosis ➢ Adaptation capacity of grapevine to stress factors

		Maintaining the varietal identity of regenerated grapevine through various virus elimination methods. ➢ Safe application of virus elimination methods
3.1.3 Management of viral diseases in horticultural species	Guță Cătălina Buciumeanu Elena Ciripan Lorena Vizitiu Diana Sărdărescu Ionela Romilă Andi	Incidence of viral diseases in horticultural species. ➢ Study of viral diseases in horticultural species. Limiting the viral diseases spread in horticultural species by monitoring host plants and virus vectors. ➢ Measures to prevent the spread of viral diseases in horticultural species. Identification of new viruses with wide spread in vineyard plantations. ➢ Study on incidence, impact, elimination and spread prevention. Increasing the diagnostic reliability of grapevine viral diseases ➢ Innovative solution to streamline the diagnostic process of viral diseases in vineyard Evaluation of the phytosanitary status of commercial vineyard, a starting point in clonal selection programs; ➢ Virological status.
3.2 Precision technologies with applications in horticulture		
3.2.1. Researches on mitigation the impact of climate change and other stress factors on vineyard	Florea Alina Sumedrea Dorin Nicola Claudia Vizitiu Diana	Irrigation and fertilization management based on a multisensory and multispectral approach for the rapid diagnosis of water and nutritional stress in soil and plant, in valuable autochthonous varieties. ➢ Controlling soil fertility status through soil-plant-fertilizer agrochemical analysis; ➢ Improved grapevine cultivation technology using precision agriculture based on optimization of fertilization and irrigation.
3.2.2 Pathogens and pests management using precision agriculture	Vizitiu Diana, Buciumeanu Elena Guță Cătălina Sărdărescu Ionela Romilă Andi	Control of pathogens and pests in horticultural plantations using GIS systems decision support. ➢ Warning and control program; ➢ Technological sequences. Improving plant growth and fruiting processes under current horticultural biocenosis conditions. ➢ Modernized technologies to increase the adaptability of horticultural plants to environmental factors.
3.3 Isolation, identification, characterization and control of pathogens and pests in horticultural species		

3.3.1. Bioecological and symptomatological study, and measures to prevent and control the attack of pathogens and pests in horticultural plantations	Vizitiu Diana Sărdărescu Ionela Buciumeanu Elena Guță Cătălina Romilă Andi Marin Valentin Negru Daniel	Diagnosis of harmful organisms in horticultural plantations. ➢ Studies on the biology and ecology of pathogens, insects and mites. Testing the *in vivo* and *in vitro* effectiveness of pest control treatments ➢ The study of the relationships and interactions between pests, pathogens (bacteria, fungi, viruses, protozoa, etc.) and their environment. ➢ Forecasting the dynamics of the populations of the main harmful organisms, warning of their appearance in horticultural plantations, establishing measures, methods and means of integrated control and the optimal time for interventions.
3.3.2. The impact of climate change on the evolution of biodiversity in horticultural plantations	Vizitiu Diana Buciumeanu Elena Guță Cătălina Sărdărescu Ionela Romilă Andi	Biodiversity analysis and characterization in horticultural plantations. ➢ Databases; Identification, evaluation and management of weed species that can affect the health and productivity of horticultural crops. ➢ Technological sequences; ➢ Databases. Arthropod monitoring and application of standardized and state-of-the-art methods for their exhaustive characterization. ➢ Study on morphology, biological cycle of insects and identification of host plants; ➢ Study of the compositional structure of insects (classification and taxonomic diversity, morphological composition, internal anatomy, chemical composition).
3.3.3 The use of organic products and active compounds of natural origin on pathogens, pests and horticultural plants	Vizitiu Diana Sărdărescu Ionela Romilă Andi Marin Valentin	Evaluation of the effects of organic products and active compounds of natural origin on pathogens, pests and horticultural plants. ➢ Ecological technological sequences for diseases and pests control affecting horticultural crops.

IV. Improving the assortment and cultivation technologies of vegetable species

4.1. Introduction of new vegetable species into culture	Florea Alina Sumedrea Dorin Nicola Claudia	Study on the cultivation of new vegetable species. ➢ Technological sheets for each species. ➢ Promotion in culture of new species/genotypes with productive potential and high nutraceutical value.

4.2. Ecological technologies for diseases and pests control in vegetable crops in protected areas and field	Florea Alina Sumedrea Dorin Nicola Claudia	Evaluation of the effectiveness of organic products on pathogens and pests in vegetable crops. ➢ Database with indicators regarding the biological effectiveness of organic products ➢ Ecological technological sequences
4.3. Integrated technological sequences applied to vegetable species from the *Solanaceae* group, with favorable impact on the environment and rural development	Florea Alina Sumedrea Dorin Nicola Claudia Negru Daniel	Improvement of culture technologies in vegetable species grown in the field and protected spaces. ➢ Control of the state of soil fertility through agrochemical analysis of soil-plant-fertilizer, in vegetable crops; ➢ Fertigation technological sequences to increase productivity in vegetables from the *Solanaceae* group*;* ➢ Database with technical and economic indicators on the optimization of nutrition and drip irrigation; ➢ Determination of the vulnerability and behavior of new and expanded varieties in culture to the attack of the main diseases and specific pests; ➢ Improved technological sequence for integrated prevention and control of diseases and pests.

V. Biotechnologies applied in horticulture

5.1. Use of *in vitro* propagation biotechnological methods of horticultural species, in order to produce planting material with high biological value	Radomir Ana-Maria Stan Ramona	Development of efficient *in vitro* propagation technologies for horticultural species of economic importance. ➢ Improved *in vitro* propagation technologies for horticultural species (grapevine, ornamental plants, medicinal plants, plants with nutraceutical value).
5.2. Optimization of bioactive compounds extraction methods from medicinal plants	Nicola Claudia Radomir Ana-Maria Stan Ramona Onache Anca	➢ Methods for bioactive compounds extraction from medicinal plants
5.3 Maintaining the high biological value of the genotypes preserved in the germplasm	Guță Cătălina Radomir Ana-Maria Nedelea Gina	Virological testing of grapevine material (newly created varieties/clones; old varieties, removed from the cultivated assortment; traditional varieties, with a restricted area of

collection (initial propagation material MI-G0)	Buciumeanu Elena Dumitru Anamaria Ciripan Lorena Negru Daniel	cultivation; wild species related to cultivated ones) originating from viticultural collections in the country/abroad. ➢ Germplasm collection register; ➢ Virus elimination in identified infected genotypes, in order to maintain the virus-free phytosanitary status of the viticultural material stored in the germplasm collection; Improving the *in vitro* propagation technologies and maintenance of the viticultural material of MI-G0 biological category; ➢ plants regenerated by micropropagation Medium/long term conservation by *in vitro* culture/ cryopreservation of genotypes stored in germplasm collection. ➢ *In vitro* germplasm collection.

VI. Production of grapevine propagation material

6.1 Monitoring the phytosanitary status of *Base* plantations, supplying of canes for the grapevine propagation material production, according to the legislation in force.	Buciumeanu Elena Guță Cătălina Ciripan Lorena	Maintaining and increasing the biological values of the viticultural propagation material through the development of advanced methods for viral diseases diagnosis. ➢ Evaluation of the phytosanitary status of grapevine genetic material from mother plantations ➢ Control of viral diseases in order to promote in culture a propagation material free of regulated viruses. ➢ Virological status
6.2. Modernized technologies for the grapevine propagation material production	Dinu Daniel Florea Alina Bănuță Mădălina Nedelea Gina Vizitiu Diana Sărdărescu Ionela Negru Daniel Marin Valentin	Streamlining the specific parameters of grapevine nurseries in order to obtain quality viticultural planting material. Increasing the technological performance in the propagation material production for the new table grape varieties. ➢ Technological sequences regarding the agrotechnics of mother plantations supplying scion and rootstock canes; ➢ Improved technological sequences of the technological flow of grapevine propagation material production (use of rooting stimulants, choice of nutrient substrate, irrigation/fertilization programs, etc.); ➢ Integrated disease and pest management programs.

6.3 Behavior of *Vitis sp*. rootstocks to drought and their recovery mechanisms, in the context of climate change	Bănuţă Mădălina Dinu Daniel Florea Alina Sumedrea Dorin Nicola Claudia Negru Daniel	Introduction of rootstocks with high tolerance to water stress in breeding programs, in the context of climate change. ➢ Methods for determination of physiological, morphological, chemical/biochemical and ecological characteristics of rootstocks with tolerance to water stress; ➢ Database on the rootstocks behavior at different levels of water stress, by applying deficit irrigation.

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GENERAL DIRECTOR,

PhD. Dorin Ioan SUMEDREA

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PhD. Ionela-Cătălina GUȚĂ