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„A. FĂTU" BOTANICAL GARDEN IASSY – THE GREENHOUSE –

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Summary: In Iassy, „A. Fătu" Botanical garden's Greenhouse complex (20 buildings with a total area of 3800 sq.m) hosts a remarcable fund of exotic plants (2700 taxa), native especially in subtropical, tropical and ecuatorial areas, on every continent.
This paper presents some of the plant collections grown in this space. It comes out that, by number, diversity and value (scientific/decorative) of the taxa, many collections – azaleas and camelias, carnivorous plant, palm trees, bromelias, orchids, cicads, crotons, ficuses – have a unicum value in the country.

Key words: exotic plants, greenhouse, collections

It can be said that since 1970 the notion of „nature's preservation" had become more and more pressing. Since then, more actions were undertaken in order to know and preserve „ex situ" the spontaneous flora; concomitantly logistic were structured, specific for the administration of these plants.

Thus, among the prioritary objectives of the world's botanical gardens are: „ex situ" conservation activities, concerning species that have become rare; scientific activities (observations of spontaneous vegetal species and correlating this knoledge in renaturalization activities); educational activities (in making known the biodivarsity and the need to protect it; to mould the respect towards nature; to efficiently intervene about all public categories).

Constituted in a scientific network, the AGBR (The Association of the Botanical Gardens in Romania) is commited in aligning the country's botanical gardens to the european standards regarding the mission, structure and management of these institutions. Included in this association, the Botanical Garden of Iassy constitues a valuable „nursery" of specialists and ensures their envolvement in enforcing the strategies of biodiversity's conservation.

„A. Fătu" Botanical Garden from Iassy, has an important role in enforcing the world and european strategies concerning biodiversity conservation.

The Botanical Garden's involvement in this action is done „ex situ" – a traditional activity, by gathering collections of rare, endemic or endagered species, creating a seed bank etc. – and „in situ" by participating to regional and national projects of habitat protection. At the same time the Botanical garden is developping as a environment educational center in order to bo capable to inform about the vegetable legacy and the posibilities to protect it. Thus, the need to orientate the scientific research, the information or education towards biodiversity conservation prooves to be an prioritary objective.

For a botanical garden is a duty towards the public to increase it's knoledge about the living world, to try and answer rigorously the questions about plant diversity, ecology, lasting administration of natural resurces and other topical interests.

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As a representative unit on a national scale, „A. Fătu" Botanical Garden from Iassy, has – since it's foundation – as a prioritary objective „ex situ" conservation activities concerning species that have become rare, endagered or are endemic to Romania and other geographical locations.These could serve in future repopulation of new biotopes, that would have to be created; the obtained experience, concerning the behaviour „in captivity" of these species, would be an important trump in these attempts. In this activity, the Botanical gardens have, with no doubt, the most efficient means; they also have the necessary scientific knoledge and experience to cultivate a wide range of exotic and native taxa.

The Greenhouse Departament constitues a valuable and permanent exhibit for different categories of vizitors because of the abundance of the exposed vegetal material, the types of informing and presentation. Besides the magnificent decore offered, the Greenhouses reprezent true schools of tropical botanics by the diversity of the cultivated species; also, here can be found many spontaneous species – obtained by international seed exchange. All these exotic plants are classified, described and participate at the place's esthetics depending on the representated climate.

Principal objective, of scientific, didactic and recreational interest (of our institution), the Greenhouses Departament (20 greenhouses blocks – 3800 m^2) lodges a remarcable stock of exotic plants (300 taxas) native especially in subtropical, tropical and ecuatorial areas, on every continent; the plant distribution respect well established criterias (phytogeographical, taxonomical, utilitarian) offering a wide range of informations.

Without exhosting a theme that is so vast, we present the general problems of the Greenhouses Departament, making an inventory of the exotic plants collection, cultivated in this space.

Carnivorous plants (insectivorous):

These plants have captured the attention of many biologists since the late XVIII – th century (Roth, 1782), the literature about their type of feeding, gradually growing richer. In 1875, Ch. Darwin describes a series of carnivorous plants highlighting the leaf's structure, the tentacle and foliar lobe's movement, the structure of the secretory glands, making a series of experiments concerning the carnivorous plant's feeding process. They represent an interesting biological group, having some unespected adaptative metamorphosis, regarding exclusivly the leaf, determened by their mixed nourishment. The number of known carnivorous plants species is estimated around 535, most of them belonging to the dycotyledonous. These are autotrophyc plants, living – generally – on mediums that are poor in nutritive substances therefore they have to complete their nitrogenous nourishment of mineral origin, with the organic one resulted by decomposing the substances found in the structure of the animal organisms, especially insects. They have distinct biological adaptation and special features, resulted mostly after the metamorphosis of the leaves in order to atract, capture and digest small animals.

The carnivorous plants from the Botanical garden's collection (12 taxa) exhibit adequate modalities to the mentioned purpose.

Species from the *Drosera* genra (*D. communis, D. aliciae, D. capensis, D. spathulata*) retain the pray with glandular hairs (glandulary tentacles), that are mobile and sticky.

Pinguicula (*P. nemorensis, P. esseriana*) and *Dionaea muscipula* (fly trap, Venus trap; scattered in peaty swamps in South Carolina) have traps resulted from leaf modification.

Species from the *Saracenia* genra (*S. flava, S. purpurea*,; from the North America's peat bogs), *Cephallotus follicularis* (australian species), the tropical epiphyte

Nepenthes (*N. x mixta*) have leaves transformed in urns (cornets, „pails") in wich insects enter and are digested.

Also, *Utricularia vulgaris* (bladder wort), indigenous aquatic plant, has small traps.

Through the abundance and diversity of the taxas included, this collection is reprezentative for our greenhouses; it constitued the subject of scientific papers, licence thesis, mass-media presentations, thematic exhibitions.

Azaleas and Camellias

Among numerous exotic plants collections, the azaleas and camellias collection is especially apreciated. Sheltered in the fifth greenhouse, it constituted itself – along the years – a real „reserve" of unique plants (35 azaleas cultivars and 15 camellias cultivars). These are valuable decorative plants, especially at flowering time (through the flower number and morphological and colour variety) and form a representative collection, the largest of this type in the country. For more than 20 years, at flowering time (january – march) an exhibition is organized. The azalea's shrubs (presented in pots or tubs) are medium sized (maximum hight is 2 m) and have persistent leaves; the flowers generally have a large variety of forms: they are simple or involte, single or grouped, the corola can have wavy or fingeled margins and a rich and variable chromatics – bright red (*Ambrosiana, Adventsglocke, Europa, Flacără*), brick-coloured (*Robert van Oost*), purplish-blue shades (*Enzett Kisse, Hexe, Kiss – Bier, Concinnum*), purplish-blue with waved white margins (*De Waale's Favorite*), pink (*Vaervaeneana rosea*), pink streaked with white (*Eri*), pure white (*Pax,Petrick Alba*).

The 12 cultivars of *Camellia japonica* (shruby or tree appearance, coriaceous, shiny, persistent leaves,) are noticed at flowering time because of the large flowers, simple or invlote, heaving waxy petals, variable coloured (white, red, pink, streaked or pure).

The bromelias collection

The plants from the **Bromeliaceae** family that are sheltered in our greenhouses constitues an abundant collection (100 taxa). It includes both terestrial species – pine-apple (*Ananas comosus*) cultivated in tropical areas, well-known for it's fruit's taste, sweet and flavoured (the fruit is compound, globular, the inflorescence's axis participating at it's formation) – and epiphitic species (most of them). These plants originate in the amazonian basin. In these plants, special adaptations allow the fast absorbtion of the water from the atmosphere (rain, dew): scaly hairs, with complex morphology, located on the leaves or steam. Also called „urn plants", the species of *Aechmea, Billbergia, Guzmania, Noregelia, Nidularium* and *Vriesea* genera are grassy plants, usually stemless; they have leathery, stiff leaves, often with pricky tips or margins, forming a rosette or some kind of cornet, in the middle of wich the inflorescence grows. The spanish moss (*Tillandsia usneoides* – rootless plant, with long thread-like stems) is suspended by it's base and pour down in a impressive, gray cascade (aprox. 1 m in lenght); other species (*Tillandsia cyanea*) are noticed through their flatened inflorescences.

Spectaculary plants, many bromelias are cultivated for their unique flowers/inflorescences, other for their persistent leaves, intensely coloured.

Orchids collection

The orchids have now access almost everywhere in the world, from Groenland to Sahara, from the seashore to the mountain tip. They are adapted to the different mediums and climats. The **Orchidaceae** family is one of the richest in the plant's world; from the 30000 existing species, most of them originate in the warmer regions of the world – the tropical regions of Africa and Asia.

In our greenhouses are found more than 50 species and hybrids; among the terestrail species we posses*: Calanthe vestita, Vanda sp., Paphiopedilum sp.* and cultivars (*P. barbatum, P. insigne*) with large, solitary flowers, on the flower stem, *Cymbidium* cultivars (the boat orchid) are often used as cut flowers.

Most of the orchids are epiphytic (they developp on other plants, used as support, without being parasited; the mineral substances are taken from the so-called „suspended soil", resulted from decomposition of leaves and organic matters that acumulated between roots or on thicker branches of the host-plant): *Lycaste aromatica* (from Mexic, Nicaragua; grows in tropical forests, 2000 m altitude), *Coelogyne cristata* (from Hymalaya, 1600-2000 m altitude), *Laelia pumila, Stanhopea insignis, S. hernandezii*.

Orchid's aerial roots – having root cover – are special adaptations for fast absorbtion of water during rains; many orchids also deposit the water in foliar bulbs (the inferior internode of the tuberascented aerial stem): *Coelogine cristata, Dendrochilum cobbiaeum* etc.

The most impressive part in an orchid is the flower, atractive especially by size, colour and scent. At flowering time, the orchids from our collection are an atraction point. Like the bromelias, the orchids are rare, exacting plants, that can be cultivated only in special conditions; they are impressive because of their decorative apearance, diversity and way of life.

Tropical plants collection

These plants are remarcable both by flowers and leaves.

The exotic **Araceae** collection (aprox. 70 taxas): decorative by flowers (*Anthurium* – flamingo flower, and it's 10 cultivars represent an attractive point; it's inflorescence is very attractive by it's form and bright color: pink – '*Guatemala'*, white – '*Lena'*, red – '*Grig'*; species and cultivars of *Spathiphyllum, Zantedeschia*), attractive by shape and leaves coloration (species from the following genera: *Anthurium, Amorphophallus, Dieffenbachia, Aglaonema, Caladium, Syngonium*) or by habitus *(Philodendron, Monstera* and *Xanthosoma* species).

The **Marantaceae** family representatives collection, includes taxas from *Calathea, Ctenanthe, Maranta, Stromantha* and *Thalia* generas. They form an important group among the hot greenhouse plants. These are grassy plants, perennial, that stand out both by habitus and foliage decorativism, attributes that ensures them certain privileges in cultivation activities.

From the **Calathea** genera – spread in the tropical America – we mention: *Calathea makoyana* the leaf's upper side is olive-green, marked with redish/green oval spots, along the midrib; the underside has the same pattern but on red) decorative species by it's color pattern and association. *C. bachemiana, C. lancifolia, C. lietzei* are species remarked both by leaf's background color (olive-green, silver-green or metallic-green) and shape, color and arrangement of the spots. *C. ornata* has a cultivar – '*Roseo-lineata*' (with pink stripes).

From the **Marantha** genera, *M. leuconeura* ('*Karchoveana'* and '*Fascinator'* cultivars) and *M. bicolor* species are remarked by their large leaves, colored in different shades and velvety appearance. These are exacting plants, demanding special conditions (high temperature, shady places and high air humidity) that recommend them for greenhouse cultivation. The Botanical garden collection, gathered along the years, includes 20 taxas, and constituted a subject for some known scientific papers; it is also habitual presence in flower exhibitions.

Crotons collection

Under this name – crotons (*Codiaeum variegatum var. pictum*) - are included a large number of cultivars, used as indoor plants; they originate in Asia and Malayesia.

Crotons are small shrubs (70 cm high), having persistent leaves, with different sizes and shapes. They are decorative both by their habitus and – especially – leaves polychromy (red, purple, pink, orange, yellow), with different combinations (stripes, spots, dots) varying with age. All the cultivars are heat loving (20^0-22^0 C) and exacting towards the air and soil humidity.

Among the 25 cultivars from our collections, we mention: *Gold finger*, *Phillippe,Gedulding, Mrs. Iceton, Excellent, Aureo-punctatum (Pictum), Goldstar, Petra, Gold Moon, Norma, Corckscrew etc.*It is the most abundant cultivar collection in the country, known and apreciated by specialists. It is also habitual in plant exhibitions.

The *Acalypha* (**Euphorbiaceae**) cultivars and species collection: *A. hispida* owns it's attractivness to the distinct appearance and the inflorescence's purplish – red coloring.

The leaves of some cultivars (‚*Godseffiana', ‚Miltoniana'* and ‚*Musaica'*) of *A. wilkesiana* species, have characteristic markings.

Fern collection

Includes both exotic and indigenous taxa (aprox. 55) belonging to the **Polypodiatae** and **Lycopodiatae** classes; these are grassy, perennial plants, decorative by leaves (= fronds); some have creeping (*Sellaginella* turfing species) or vertical stems (stiff stem, up to 50 cm high and a terminal leaves rosette – *Blechnum brasiliense*), underground rhizome (*Pteris, Davallia, Polypodium*) or aerial (tree-ferns – *Cyathea*).

The ferns from the Botanical garden collection have leaves with a large variety of shapes: from simple, with undivided margins (*Asplenium nidus*) to those that are very complexe, many times divided (*Nephrolepis exaltata*).

Pteris cretica (with it's numerous cultivars), *Blechnum occidentale*, *Adiantum capillus-veneris* – are valuable decorative plants, especially by their fronds (with variable shape and size).

Collection of plants from Musaceae family

The taxa from this family atract atention by special qualities: banana tree (species and cultivars of *Musa* genera) exhibit an elegant tuft of leaves at the end of their slender stem; paradise-bird flower (*Strelitzia reginae*) is unequaled in it's beauty and inflorescence persistance; species of *Musa, Strelitzia* and *Heliconia* stand out by habitus and unusual inflorescences.

Palm tree collection

Arecaceae family is very numerous, wide spread but limited to tropical and subtropical areas. The palm trees collection (aprox. 55 taxa) includes known species – *Phoenix dactylifera, Chamaerops humilis, Hornea forsteriana, Sabal blakburnia, Trachicarpus fortunei, Washingtonia filifera* – but also many rarities (species from the genera: *Archontophoenix, Arecastrum, Brahea, Butia, Caryota, Chamaedorea, Chrysalidocarpus, Latania, Dictyosperma, Syagrus*). Highly decorative, the palm trees are imposing among the exotic plants because of their elegant leaves and particular habitus.

Collection of plants decorative by leaves's colouring and shape (includes species and cultivars from *Begonia, Dracaena, Cordyline, Pilea* and *Peperomia* genera); these have been presented in scientific paper, flower exhibitions, mass-media.

Collection of species and cultivars of Ficus genera

Abundantly represented in the Greenhouse Complex (24 species, 13 cultivars), the ficuses collection (**Moraceae** family) has an important place in the scientific research of

our colective. Native to the tropical and subtropical region, the *Ficus* genera has a significant representative in plant's world. All the species have milky sap (latex) and are large trees or shrubs, from wich some are climbing. The leaves have variable size, are leathery (coriaceous), undivided or lobed, decorative. The flowers are inclosed in the receptacle; the fruits (sicones) are characteristic, sometime edible (*Ficus carica*). The aerial adventitious roots, produced along the stems of many species, are also visually interesting.

Succulents collection

Is one of the most abundent collections (grouped in 2 greenhouse compartiments); it includes species from families like **Cactaceae, Aizoaceae, Crassulaceae, Euphorbiaceae, Agavaceae, Asteraceae, Asclepiadaceae** etc.

The cactuses are the best known group from the suculent plant category. They are native to America, from where they were spreaded in Europa and Africa. Mexic is considered to be the richest area in cactuses. These are plants well adapted to the conditions of the dry desert, having some vegetative organs modifications. Characteristic for them is the transformation of their leaves in thorns/spines; the green stem takes over the chlorophylian assimilation function; a reduced transpiration alowes them to resist extended periods of drought. They are cultivated as ornamental because of their variety of shapes and the beauty and tenderness. Some species (from generas like *Lobivia, Astrophytum, Rebutia, Gymnocalicium, Echinocereus, Echinopsis, Mammillaria*) stand out by their shape geometry, the disposition and insertion of spines particularities, the coloring and tenderness of their flowers.

This collection includes (also) species and cultivars from genera like: *Agave, Crassula, Ceropegia, Euphorbia, Alöe, Kalanchoe, Gasteria, Hawortia, Lithops, Sansevieria, Senecio, Stapelia* (aprox. 1200 taxa) etc.

Useful plants collection: includes tropical and subtropical plants (aprox. 120 taxa) having different uses: food, medicine, aromatic and othher uses (resiniferous, colouring, textile, pretious wood etc.).

Gymnospermous collection: includes representatives from families like: *Cycadaceae, Pinaceae, Cupressaceae* and *Taxodiaceae*. Primitive forms of present phanerogams (important for knowing the evolution of seed-plants), the representatives of *Cycas, Ceratozamia, Zamia, Encephalartos, Stangeria* genera, constitutes an exceptional collection (by habitus, age etc.). Having a disjunctive spreading in the southern emisphere, the families *Araucariaceae* and *Podocarpaceae* include valuable representatives (the *Araucaria* and *Podocarpus* genera).

In our collection many of the cultivated gymnospermous stand out by their habitus and foliage variety; they have also constituted the subject of some scientific papers, degree papers, mass-media presentations and exhibitions.

Citrics collection

The cultivated species belong to three genera: *Fortunella, Poncirus* and *Citrus*. The *Citrus* genera is the best represented; in our collection can be found many cultivars of *Citrus limon* (lemon tree), *C. sinensis* (orange tree), *C. reticulata* (mandarin tree), *C. paradisii* (grape tree), *C. maxima* (pumelo tree) etc. These plants are native to the tropical and subtropical areas of Asia, their cultivation being an old tradition. The taxa cultivated in the collection have multiple qualities.

The collection of plants with peculiar esthetic qualities

This collection includes: exotic plants with controlled growth (lianas, climbing and voluble plants controled in order to cover variable shapes – cercles, columns, twisted roots etc.); grafted cactuses, that stand out by shape and colour (of the graft and the stock);

coniferous and decidous taxa can be trimmed and controlled to take different shapes (topiary); wooden exotic plants with knited or trimmed stems/branches.

Numerous other exotic plants collections, cultivated in the Iassy Botanical garden's Greenhouses, include valuable taxa, representative for specific phytogeographic areas, inclusively plants with esthetic/decorative qualities: mediteranean plants; plants from Australia and New Zeeland; plants from the northern and southern regions of Asia.

Along the years we considered necessery a scientific aproach of the incomplete cleared up aspects regarding the taxonomy, growing conditions (including finding out optimal culture parameters, like the category and quality of the soil), to experiment new multiplication proceedings, observing biological/esthetic/utilitary qualities of some taxa having scientific/ornamental importance (including rare/endangered taxa). The research that we have made materialized in a large number of scientific papers, licence paper, master's degree.

Many of the exotic plants collections, existing in the greenhouses of Iassy's Botanical Garden – by the number and value of the cultivated taxa – have a value of unica in Romania: azaleas and camellias, carnivorous plants, palm trees, lianas and epiphites, succulents etc. Our envolvement in making and mentaining these collections has contributed to a national acknowledgement of this activity.

The Botanical Garden's Greenhouses, by the multitude of the exhibited collections, have a remarcable role in making the public senzitive in understanding the diversity of the plant's world and the need to protect it, in educating the respect for the nature and the important role of the plants in our life. The Botanical gardens have the role to put the plant in it's place, in the living systems and to make understood the importance of a good environment management.

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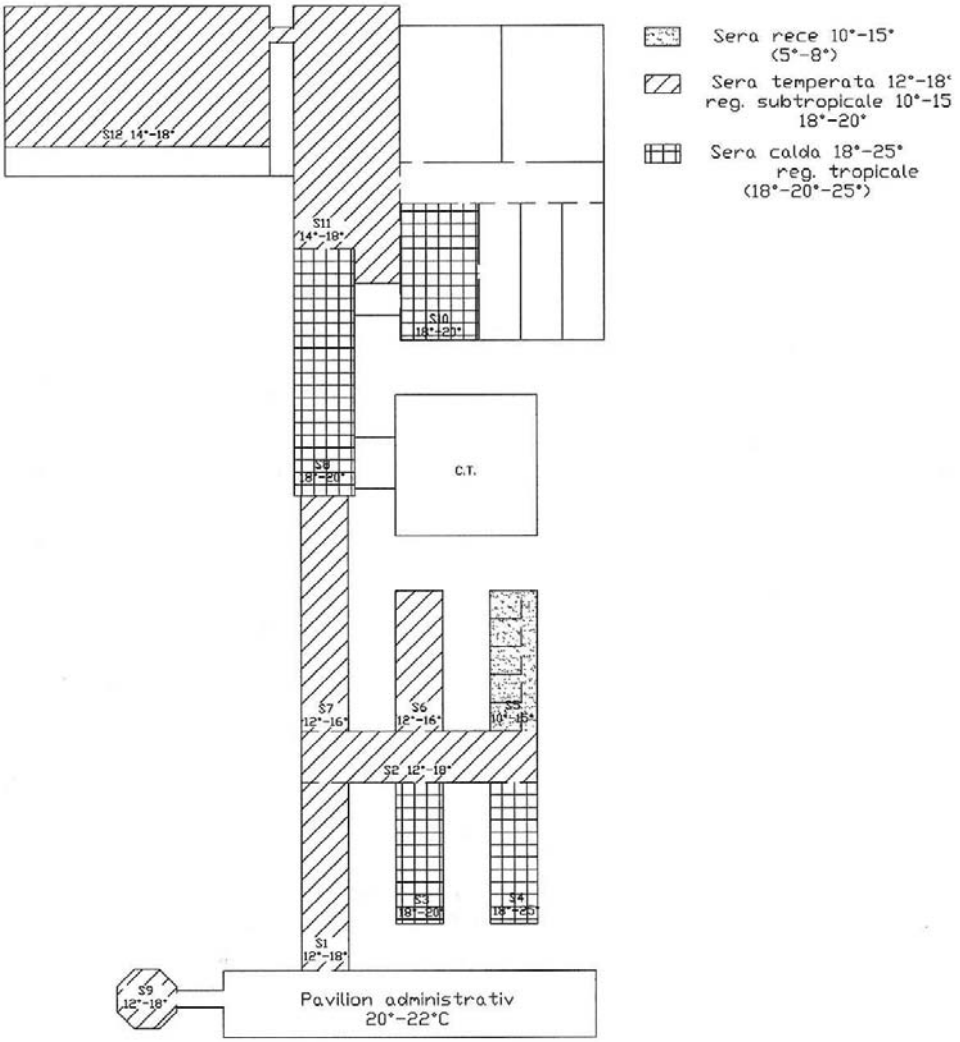
SCHIȚA COMPLEXULUI DE SERE



Lithops karasmontana var. *karasmontana*

Heimerliodendron brunonianum '*Variegata*'

Magnolia grandiflora

Fuchsia x *hybrida* '*Nymphe*'

Drosera spathulata Labill

Maxillaria tenuifolia