**Gabriella Stefania Scippa** is Associate Professor of Botany (BIO/03) since February 2005, and conducts her teaching activities at the Department of Bioscience and Territory of the University of Molise.
Degree in Biology from the University of Milano, she was awarded a PhD in "Defense of the Agro-food production" at the Department of Animal, Plant and Environment Science, of University Molise. Part of the PhD project was carried out under the supervision of professor Elizabeth Bray, at the Department of Botany and Plant Sciences, of University of California, Riverside.

She is the scientific director of the Consortium of Garden Flora Apennine Capracotta, department delegate for Erasmus programs and coordinator of the International Ph.D. "Management and conservation issues in a changing landscape", in consortium with the University of Rome La Sapienza, Tuscia, Zadar (Croatia), Sarajevo (Bosnia-Erzagovina), Cordoba (Argentina).

Coordinator of the International Degree in "Science and Technology for the Environment and Territory", with the University of Split (Croatia) and the University of Targoviste (Romania) funded by the MURST (AA 2000). Head of international cooperation project "Involvement of forest management in slope stability", the Forest Commission of Edinburgh (UK), funded by the British-Council-CRUI. National Delegate and member of the Management Committee of COST Action E38 titled "Woody Root Processes".
Professor Scippa has conducted research at the Department of Biological Science of Exeter (UK), the Department of Botany and Plant Sciences, University of California, Riverside (USA), and the Department of Botany, University of Athens (Ohio, USA). She actively collaborates with the Laboratoire de Biologie des Ligneux et des Grandes Cultures (LBLGC - EA 1207), "University of Orleans (France).

***MAIN SCIENTIFIC RESEARCH ACTIVITIES***

Research activities are focused on: a) the biology and molecular aspects of plant interactions with the environment, b) seed biology.

**Biology and molecular basis of plant interactions with the environment**. This research line aims to understand mechanisms involved in the interactions between plants and environment and is focused on several plant species (cultivated and wild) of the Mediterranean environment subjected

to abiotic stress conditions such as water stress, mechanical stress and heavy metals. The approach used for these studies is multidisciplinary, and conducted on model systems that exhibit resistance to stress conditions (i.e. seeds, mosses), on isolated cells growing in liquid culture and on whole plants.

The mechanisms of response to water stress conditions are studied in several plant systems (seeds, mosses, potato cells in liquid culture, roots and leaves, transgenic tomato plants) and at different levels of analysis (morphological, anatomical, physiological, biomolecular). In particular, investigation are focused on "molecular factors" such as dehydrins, and nuclear proteins (QP54, Histone variants, Topoisomerases) involved in nuclear component protection or in the regulation of gene expression, in response water stress conditions.

The researches carried out at international laboratories and research facilities, of the Department of Biological Science of Exeter (UK), Botany and Plant Sciences, University of California, Riverside (USA) and Botany, University of Athens (Ohio, USA), have greatly contributed to address these studies.

Research activities related with plant response to mechanical stress are deeply linked to the studies of the biology of root systems with particular focus on mechanism regulating the morphology, the architecture and the lateral root development in different environmental conditions. Despite the key role played by roots in anchoring the plant body to the substrate, due to the intrinsic difficulties in the analysis and extraction of root material in field, studies related to the root response to mechanical stress are very small and little knowledge have been so far reported.

Researches activities involve the analysis of the mechanical stress response of woody root in the field and in green-house conditions. The woody root of native plants (i.e. *Spartium juncem* L , *Fraxinus ornus* L., *Quercus cerris* L.) and model species (*Populus* spp) is analyzed by integrating different level of morphological, anatomical, physiological, biomechanical and molecular analysis through the use of broad-spectrum approaches (cDNA AFLP, RT-PCR, proteomics and metabolomics). Transcriptomic and proteomic approaches coupled to biostatistical analysis are used to identify candidate genes regulating woody roots mechanical stress response, lateral root formation and cambium activity. The complex interplay among the major plant hormones (i.e. indole acetic acid, gibberellins, ABA and ethylene ) is also investigated by measuring their level in each different bent region during time, and by analyzing important transporters (PINs) and regulators (DELLA proteins, KipRP, SCARECROW).

Metabolomic analysis is used to define the metabolites fingerprint in woody root subject to mechanical stress and to assess if and which primary and secondary metabolites are involved in the spatial and temporal asymmetric response of poplar woody root to bending stress. In particular, the

attention is paid to the compounds belonging to the class of phenols (coumarin, flavonoids), alkaloids and glycosides and their structural characterization by 1D and 2D NMR.
The expression of miRNAs predicted to target developmental- and stress/defense-related genes is also investigated by using a RealTime PCR analysis.

**Conservation and protection of plant biodiversity**. The research concerning the biology of the seed, takes the start with the study of some aspects of the physiology of germination, such as activation of cell proliferation and the factors involved in G0-G1 transition. Thereafter, to meet the increasingly urgent demands to "limit" the current process of genetic erosion, the activities of this line of research on the biology of the seed, have been extended to the "conservation biology". In fact, research activities directed to the recovery, characterization and conservation of native species germplasm are currently in progress with focus on plants of interest in agro-food and wild species threatened with extinction. In particular, it has been realized a full characterization by means of morphological, physiological and molecular, of two major ecotypes of native lentil. This characterization has shown that the two native ecotypes differ genetically and morphologically from the common commercial varieties (including that of Castelluccio di Norcia with PGI label). Moreover, thanks to an innovative approach as proteomics, and metabolomics the "markers" that distinguish native ecotypes from commercial varieties have identified.
Besides the studies on these authocton legumes research in the laboratory, field and nursery regarding the biology of seeds of medicinal species (*Gentiana lutea* L., *Juniperis communis* L., *Taxus baccata* L., *Ruscus aculeatus* L. and ), and / or species of environmental interest (*Medicago marina*), with the ultimate goal of understanding the strategies and mechanisms that control dormancy, identify the best conditions for long-term preservation, and those that favor germination and ex situ propagation.

***GRANTS***

**MIUR-PRIN 1998** Signal transduction of water stress and accumulation of proteins with protective functions in the nucleus: use of transgenic plants as a case study;

**FAIR1 CT95-0497 1999** "A European Approach for Assessing potential regrowth of woody plants: parameters for plant vitality and dormancy of planting stock "(EU).

**POP Molise 1999** entitled "Studies on the dynamics of the slope in relation to soil conservation, and interaction with vegetation blankets (EU).

**Financing of the University "Young researchers" 2001**. "Analysis of genetic factors involved root in response to different conditions of slope. " University of Molise

**CNR 2001**. Root-soil interactions: analysis of plant response to conditions of slope through the study of architecture, anatomy and genetics involved.

**Contract No. QLK5-CT-2001-00289 EU 2001**. Eco-engineering and Conservation of Slopes for Long-term Protection from Erosion,Landslides and Storms.

**PRIN 2005**. Using genomics and proteomics to study the development of lateral roots in woody plants
subjected to conditions of environmental stress.

**Dip.STAT, University of Molise-collaboration with the Department SCAM, University of Insubria 2005.** Climate change, carbon cycle and the turnover of fine roots in ecosystems forest: case studies in Molise and Lombardy.

**Regional Agency for Agricultural Development Molise 2005.**Studies for the conservation and improvement of some Molise authocton lentil ecotypes.

**Regional Agency for Agricultural Development Molise 2006**. Characterization and conservation of medicinal plants native Molise Apennines.

**Molise Region 2006.** Design and initial actions for the enhancement of regional nursery.

**PRIN 2008.**The role of microRNAs in regulating the response of roots to mechanical stress and the development of lateral roots .

**Municipality, Province of Isernia and the Chamber of Commerce 2010.**Preliminary studies for the recover and characterization of indigenous germplasm of onion "Isernia" .