



SAPIENZA  
UNIVERSITÀ DI ROMA



# SUMMER SCHOOL

# GROW AGROBIODIVERSITY IN A CHANGING CLIMATE

**18 - 26 September 2019**

FAO Headquarters  
Rome, Italy

With the technical support of the  
**Food and Agriculture Organization of the United Nations**

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# SUMMER SCHOOL

## Agrobiodiversity in a Changing Climate

One of the world's greatest challenges is to secure access for all to adequate supplies of food that is healthy, safe, and of high quality, and to do so in an environmentally sustainable manner. In order for this to improve, the sustainable management of natural capital must be at the forefront in food production systems. Resilient environments, sustainable production practices and the protection of agrobiodiversity can serve as avenues to improve dietary diversity and quality and, in turn, generate income for sustainable small holder farmers, and aid in the restoration and preservation of ecosystem. Even more, the loss or lack of adaptive capacity in modern and commercial agriculture is a cause for concern expected impacts of climate change.

Taking into account agrobiodiversity in food systems means bringing together various sectors of science, agriculture and economy to propose new strategies of food production that can be implemented in a changing environment and proposing diversified crops and practices as a resource and increased variety as a strength in agro-ecosystems. In addition to agricultural and genetic aspects, the agrobiodiversity discussion focuses on economic and social issues such as identifying markets for biological products, developing adequate value chains and marketing strategies, and preserving local crops.

The impact of investments in the agricultural sector depends significantly on the kind of interventions carried out and the type of food system that is promoted. It is essential to enable community-driven food systems that provide the best possible outcomes for producers and consumers. In this model, consumers and producers are connected through short, transparent, direct value chains, with an impact on the income of citizens. Producers are incentivized to develop or conserve quality based production models which are then rewarded with a price premium by consumers. Conversely, consumers are able to access culturally adequate, safe, nutritious food at affordable prices.

### OBJECTIVES

The course will focus on the importance of biodiversity in agriculture, with particular attention to its role in enhancing resilience and adaptability of cropping and farming systems to climate change.

The lectures will illustrate principles and practices for gathering agro-biodiversity data through either participatory diagnostic and empirical approaches, and for their utilization to develop management approaches that improve resilience and adaptability.

The course will also analyse the economic value of agricultural biodiversity in food systems as an incentive to conservation. The most critical management aspects along the agricultural value chain will be investigated, ranging from production to marketing and consumption.

A set of tools and methodologies for improving market access of neglected and underutilized foods and the role of gastronomic heritage as a driver for rural development will be presented.

The aim of the course is to equip the participants with the necessary tools, knowledge and understanding to enhance productivity and improve marketing strategies in sustainable and resilient agricultural systems.

The training will include joint lectures by speakers from various national and international organizations and a field trips to nearby farm, which will provide hands-on experience on relevant practices.

### INFORMATION



#### VENUE

ETHIOPIA ROOM (C285)  
FAO Headquarters, Via delle Terme di  
Caracalla, Rome, Italy



#### LANGUAGE

The official language is English



#### SCIENTIFIC DIRECTORS

Fabio Attorre – Department of  
Environmental Biology, Sapienza University  
of Rome

Devra Jarvis – Bioversity International/  
Platform for Agrobiodiversity Research  
(PAR)



#### COURSE MANAGER

Silvio Cianciullo, FAO - Mountain  
Partnership Secretariat



#### DATE & TIME

18 - 26 September 2019  
From 9:00 a.m. to 6:00 p.m. everyday



#### FEES & CREDITS

Admission fees 400 euros (including lunch  
and coffee breaks)

The course is worth six university credits  
according to the European Credit Transfer  
System (ECTS)



#### COORDINATOR

Giorgio Grussu, FAO - Mountain  
Partnership Secretariat



#### CONTACT

For more information you can write at  
[caf\\_croptgeneticdiversity@uniroma1.it](mailto:caf_croptgeneticdiversity@uniroma1.it)

### Wednesday, 18 September

08:45 **Welcome and introductions**

09:00 **Crop genetic diversity, domestication and traditional varieties (Chapters 1,2,3) - T. Hodgkin/ D.**

*Jarvis/ M. Turdieva (Bioversity)*

Introduction to traditional varieties (pag 1 - 11)

The origins of agriculture and crops (pag 13 - 28)

Centres of crop diversity and centres of origin (pag 28 - 33)

Nature, biodiversity and genetic resources (pag 35 - 40)

10:00 **Diversity and its evolution in crop populations (Chapter 4)**

The nature of diversity (pag 64 -66)

Crops, varieties, and populations (pag 67 -70)

Population genetic structure (pag 71 - 77)

11:00 **Coffee break**

11:15 **Evolution in crop varieties and populations (pag 78 - 84)**

Reproductive biology (pag 84 - 89)

Crop varieties in production systems (pag 91 - 92)

13:00 **Lunch break**

14:00 **Measuring diversity in crops (Chapter 5) D. Jarvis/ P. Colangelo (CNR-IRET)**

Exploring extent and distribution of diversity - Agronomic, Biochemical, Molecular (pag 92 - 107)

15:00 **Coffee break**

15:15 **Gathering data using participatory approaches (pag 108 - 118)**

Designing and investigation (pag 119 - 123)

16:00 **Practicum - Calculating on farm diversity indices: Richness, Evenness, Divergence**

17:00 **Presentations of participants**

The lectures of the first module will be based on the text book [Crop Genetic Diversity in the Field and on the Farm - Principles and applications in Research Practices](#) (see page numbers)

# Module 1: Management of Agrobiodiversity

DAY 2

## Thursday, 19 September

**09:00** Abiotic components of agricultural ecosystem (Chapter 6) - M. Reverberi/ F. Attorre (Sapienza)/ N.

Bergamini (Bioversity)

Abiotic and biotic components of agroecosystems (pag 126 - 137)

Farmer characterization and classification of abiotic and biotic components (pag 137 -145)

Reducing the dimensionality of complex data sets (pag 146 - 149)

Ecosystem diversity and function (pag 150 - 153)

**11:00** *Coffee break*

**11:15** Diversity in, and adaptation to, adverse environments on-farm (Chapter 6) - P. Colangelo (CNR-IRET)/ D. Jarvis/ N. Bergamini (Bioversity)

Evolution of crop varieties in stress prone environments (pag 154-157)

Abiotic stress and crop genetic diversity (pag 157 - 163)

Biotic stress and crop genetic diversity (pag 163 - 169)

Farmer management of crop genetic diversity to cope with environmental stress (pag 169 - 172)

Identifying where diversity is used to cope with environmental stress (pag 172 - 180)

Genetic diversity, damage, and genetic vulnerability (pag 181 - 190)

**13:00** *Lunch break*

**14:00** Who are the managers of diversity? Characterizing the social, cultural and economic environments (Chapter 8) - R. Nanyka/ N. Bergamini (Bioversity)

Farmers' roles and the management of crop diversity (pag 191 - 199)

Social relationships and the distribution of diversity (pag 199 - 200)

**15:00** *Coffee break*

**15:15** Social capital, collective action and property rights (pag 202 -203)

Tool and methods for documenting and relating farmer characteristics to crop genetic diversity

(pag 203 - 211)

**16:00** Practicum – Who are the managers of diversity?

**17:00** Presentations of participants

# Module 1: Management of Agrobiodiversity

DAY 3

## Friday, 20 September

**09:00** Measuring the values of on-farm diversity (Chapter 9) - D. Gauchan (Bioversity)

Public and private values of diversity (pag 212 - 214)

Varietal choice and diversity maintenance (pag 215 - 220)

**11:00** *Coffee break*

**11:15** Econometric models and value chain actors (pag 220 - 226)

Measuring non-market values of diversity (pag 226 - 231)

**13:00** *Lunch break*

**14:00** Policy and genetic diversity on-farm (Chapter 3,10) - I.L. Noreiga (Bioversity)

The development and evolution of national programs on plant genetic resources (pag 41 - 44)

The origins of an international commitments to plant genetic resources conservation (pag 45 - 46)

Policy debates on conservation- ABS (pag 46 - 57)

**15:00** *Coffee break*

**15:15** The use of genetic resources for plant breeding (pag 56 - 62)

Policies and legal frameworks that have a negative impact on farmers' capacities to use diversity on-farm (pag 232 - 242)

Policy processes: Overview on concepts and methods (pag 242 - 249)

Developing policies that support farmers' role as generators, managers, and conservers of crop diversity (pag 249 - 254)

**17:00** Presentations of participants

## Module 1: Management of Agrobiodiversity

DAY 4

### Saturday, 21 September

**09:00 Genetic diversity and selection pressures at different social, spatial, and temporal scales (Chapter 11) -**

*D. Jarvis/ P Colangelo/ M. Turdieva (Bioversity)*

The crop cycle (pag 225 - 258)

Use of harvested materials and diversity of traditional varieties (pag 259 - 263)

Selection during crop production and seed management (pag 263 - 264)

Patterns of seed supply: The "Seed Systems" (pag 267 - 274)

Social, spatial and temporal dimensions of traditional varieties (pag 275 - 282)

**11:00 Coffee break**

**11:15 Strategies for collaboration and intervention (Chapter 12) - P. De Santis (Bioversity)**

Institutional and partner diversity (pag 283 - 285)

Building trust and equitable collaboration (pag 286 - 290)

Actions that incorporate genetic, ecological, social and economic concerns in support of on-farm management of crop genetic diversity (pag 291 - 303)

Farmers benefit from the use and conservation of materials (pag 303 - 311)

**12:30 Traditional varieties and agricultural productivity (Chapter 13) - D. Jarvis (Bioversity)**

Socioeconomic, policy, environmental, biological and genetic dimensions (pag 313 - 320)

The future value of traditional varieties (pag 320 - 323)

Approaches to maintenance of traditional varieties (pag 323 325)

**13:00 Lunch break**

**14:00 Rome Botanical Garden visit – hands on experience on biodiversity - F. Attorre (Sapienza)/ D. Jarvis (Bioversity)**

Methodology for the formation of a germplasm bank for local crop varieties

Creation of an herbarium and storage of specimen samples

Visit of the vineyard Vigneto Italia, home of 155 autoctonos grapes varieties

DAY 5

### Sunday, 22 September

Day off

## Module 2: Agrobiodiversity on the Ground

DAY 6

### Monday, 23 September

**9:00 Agroecology - A. Bicksler (FAO AGPM)**

The principles of Agroecology

Agroecology as a Science, Practice, and Social Movement

**11:00 Coffee break**

**11:15 Agroecology for Resilience and Climate Change Adaptation**

**13:00 Lunch break**

**14:00 Climate-Smart Agriculture (CSA) - F. Matteoli/J. Schnetzer (FAO CBC)**

The CSA Approach

- Challenges and opportunities for agriculture in the face of climate change

- CSA concept and 5 step-process to CSA implementation

- Practices and production systems for CSA

Tools and Methods for Evidence-based Decision Making in CSA: Brief introduction

**15:30 Coffee break**

**15:45 Tools and Methods for Evidence-based Decision Making in CSA: Examples & Exercise - R. Vuolo (FAO CBC)/L-S. Schiettecatte (FAO ESA)**

- Modelling System for Agricultural Impacts of Climate Change (MOSAICC)

- Ex-Ante Carbon Assessment Tool (EXACT)

**16:45 Mountain partnership: mountain products' value chains - G. Grussu (FAO MP)**

The Mountain Products initiative



## Module 3: Agrobiodiversity values as market drivers

DAY 7

### Tuesday, 24 September

- 09:00 **Slow Food** - F. Mattei (Slowfood)  
Agrobiodiversity as driver for rural development and the preservation of healthy ecosystems,  
Externalities, ecosystem services and common goods
- 11:00 **Coffee break**
- 11:15 **Promoting market access and generating sustainable demand paradigms**  
Education and awareness raising
- 13:00 **Lunch break**
- 14:00 **NaturaSi** - F. Brescacin/ C. Murer (NaturaSi)  
Organic products in Italy and in the world: growing market, more responsible consumers  
Effective and equitable farming techniques and distribution processes with low environmental impact  
Economic and social wellbeing of producers and their communities
- 15:30 **Coffee break**
- 15:45 **How to build long lasting relationships of trust between producers, retailers and consumers**
- 17:00 **Open discussion**  
Marketing and distribution strategies for small mountain producers  
Organic farming: new approaches and research

## Module 3: Agrobiodiversity values as market drivers

DAY 8

### Wednesday, 25 September

- 10:00 **Field trip to Vallepietra Village**  
Visit to the Slow Food presidium of Vallepietra, where a small consortium of farmers is starting  
to revive a traditional legume from the Simbrivio Valley, the "Ciavattone" bean.

## Module 3: Agrobiodiversity values as market drivers

DAY 9

### Thursday, 26 September

- 09:00 **IFOAM** - L. Lutikholt (IFOAM)  
Fundamental principles and definitions: Organic Agriculture  
Organic Agriculture and its relation and contribution to other Sustainable Agriculture initiatives
- 11:00 **Coffee break**
- 11:15 **Organic 3.0: Towards truly sustainable food and farming systems**  
The Organic Movement and its Support Systems - Organic and SDGs
- 13:00 **Lunch break**
- 14:00 **PGS (IFOAM)**  
An overview/summary of current organic guarantee systems  
Locally appropriate and smallholder-friendly alternatives - and overview
- 15:30 **Coffee break**
- 15:45 **Participatory Guarantee Systems - principles and practice**
- 17:00 **Open discussion**
- 17:30 **Closing Remarks** - D. Jarvis (Bioversity)/G. Grussu (FAO MP)/F. Attorre (Sapienza)





# Lecturers

## Devra Jarvis



Devra I Jarvis is Principal Scientist at Bioversity International, Rome Italy, Adjunct Faculty at Washington

State University, Adjunct Professor at the Institut Agronomique et Veterinaire Hassan II, Morocco, and Coordinator of the Platform For Agrobiodiversity Research (PAR). Her work focuses on developing empirical evidence to assess and support the use of local crop genetic diversity to improve the production and resilience of small-holder farmers. She is the primary author of the textbook used as the scientific basis of this course.

## Toby Hodgkin



Research Advisor for the Platform for Agrobiodiversity Research and an Honorary Research Fellow

of Bioversity International. After working as geneticist/plant breeder or vegetable crops he joined the International Board for Plant Genetic Resources to work on the maintenance and use of plant crop genetic diversity. He has worked on in situ conservation of crops and their wild relatives since 1990, publishing extensively on different aspects of conservation and use.

## Muhabbat Turdieva



Coordinator of the regional project 'In situ/on farm conservation and use of agrobiodiversity

(horticultural crops and wild fruit species) in Central Asia', focused on sustainable use of local diversity of temperate fruit trees and their wild relatives in the center of their origin. Previously has worked as Bioversity Forest Genetic Resources Scientist for Asia, Pacific and Oceania providing support to Central Asian and Transcaucasian Network on Plant Genetic Resources (CATCN-PGR).

## Nadia Bergamini



Ecologist, works for Bioversity International in the Productive and Resilient Farms, Forests and Landscapes

Initiative. With 8 years' experience as an information officer in the UN Food and Agricultural Organization and nine years applied research, project management and extension experience in India, Nepal, China, the Philippines, Tunisia, Bolivia and Cuba. Areas of expertise, participatory and field research into sustainable production landscape management and socio-ecological resilience of agro-ecosystems

## Rose Nanyka



Conservation Biologist and a Fellow of the African Women in Agricultural Research and Development.

She works with Bioversity International in the Genetic Diversity, Productivity and Resilience Section, managing projects on using crop biodiversity for ecosystems production and resilience. She has eighteen years' experience with in multi-stakeholder processes involving NGOs, CBOs, and Government Institutions in sustainable natural resources management.

## Devendra Gauchan



Agricultural Economist with a PhD from the University of Birmingham, specializing in economics of

agricultural biodiversity conservation, currently is the National Project Manager at Bioversity International's Nepal office. He has worked in agricultural R&D sector in Nepal and abroad for over 20 years. Before joining Bioversity International, he was the Senior Scientist and Head of Socioeconomics & Agricultural Research Policy Division, at Nepal Agricultural Research Council (NARC).

## Paolo Colangelo



Paolo Colangelo is a researcher at the Research Institute on Terrestrial Ecosystems of the National

Research Council (CNR-IRET, Italy). His main research focus is on biodiversity, evolution and conservation combining molecular tools and ecological statistics. In the last decade he collaborated with Bioversity International in the study of relationship between agrobiodiversity and the resilience of agroecosystem to pest, disease and abiotic stress.

## Massimo Reverberi



Associate Professor of Plant Pathology at Sapienza University. He participated to several

European project on the control of the biosynthesis of some mycotoxins in different foodstuffs and on the application of the integrated control against fungi responsible for post-harvest spoilages. He was coordinator in several Research Unit of National Project, participate to 5 EU project funded under FP7 and one LIFE Project 2018-2023.

## Fabio Attorre



Associate Professor of Botany at Sapienza University. He is scientific coordinator

of several International Cooperation projects aimed at promoting the sustainable development of local communities and the conservation of biodiversity and natural resources. Areas of interventions included Mozambique, Swaziland, Zimbabwe, South Africa, Papua New Guinea, Albania, Yemen, Ecuador, Perù, Dominican Republic.

## Isabel López Noreiga



Policy specialist on the Policies for Crop and Tree Diversity management' research area at Bioversity

International. Her area of expertise is in biodiversity law and she has been involved in a number of research projects looking at the impacts of policies and legal frameworks on different actors' capacity to access, use, conserve and exchange natural resources, and particularly crop genetic resources.

## Paola De Santis



She works for Bioversity International in the Genetic Diversity, Productivity and Resilience

Section. She has been working on several national and international projects to improve productivity, enhance agro-ecosystems production and resilience and climate change adaptation by using crop genetic resources. Areas of expertise include development of partnerships at different levels, participatory approaches, and seed systems.

## Abram J. Bicksler



Agricultural Officer with the Food and Agriculture Organization of the United Nations (FAO)

based in Rome. He works with the Ecosystem Services and Agroecology Team within the Plant Production and Protection Division (AGP) on various initiatives related to the scaling-up of Agroecology, provision of ecosystem services, and is also the focal point for Pollinators within the division.

# Lecturers

**Federica Matteoli**



Project Manager at FAO, has strong expertise in coordination of projects on climate change, food security and

natural resources management at the global level and in developing countries. Federica has a PhD in Science and Management of Climate Change, a Degree in Law, a Master in International Services from the American University of Washington DC, and a Master in Project Management from Gestioni and Management in Rome.

**Julian Schnetzer**



Environment and Climate Specialist at FAO. He holds a BSc/MSc in geoecology from Potsdam

University (Germany). Before joining FAO, he worked with the Swiss Federal Agricultural Research Institute on life cycle assessments of crops. In 2012, he joined FAO as a Natural Resources Officer and since then worked on different topics including crop modelling, climate change and climate-smart agriculture.

**Raffaella Vuolo**



FAO, Climate and Environmental Division, has studied atmospheric physics at

University of Cagliari and Ecole Polytechnique of Paris and carried out research in various institutes in France and Italy, where her main work areas were climate and atmospheric transport modeling and agrometeorological field measurements. She now works on the use of weather and climate information for agriculture, supporting the development and implementation in developing countries of a climate impact assessment tool, MOSAICC.

**Emanuele Dughera**



Works for the Slow Food Foundation for Biodiversity as coordinator of the Africa and Middle East

Office. Is responsible for managing the office team and being the spokesperson of the group. Furthermore, manages Slow Food actions, grassroots projects, food and educational activities, in the Southern African countries as well as Portuguese speaking countries in the African continent.

**Fabio Brescacin**



President of EcorNaturaSi S.p.A. In 1979 he graduated in Agriculture from the University of Padua,

then he attended the Emerson College in England. Back in Italy he opened Ariele, one of the first organic food stores in Italy. In 1987 he was among the founders of Gea, a distribution company that then became EcorNaturasi S.p.A., now the leading distributor of organic and biodynamic products in Italy. He has been the president of the company since the beginning.

**Carlo Murer**



Specialized in Sustainable Tropical Forestry at Copenhagen University. Currently working as buyer

of organic raw material for EcorNaturaSi Spa, Italian company specialized on production and distribution of organic food products. He keeps the commercial relation with the 200 farms supplying raw materials (cereals, seeds and pulses) for the EcorNaturaSi's monitored production chains. He is implementing a Participatory Guarantee System PGS in Italy, among the farms working with EcorNaturaSi.

**Laure-Sophie Schiettecatte**



FAO, EX-Ante Carbon balance Tool (EX-ACT) team coordinator, started at FAO as technical expert for the

integration of blue carbon, aquaculture and fisheries into EX-ACT, holds a PhD in Marine Sciences from University of Liege. She is now coordinating the EX-ACT team activities, i.e. GHG appraisal of projects and policies, value chain analysis with on field mission, capacity building training, research and development of the EX-ACT suite of tools.

**Giorgio Grussu**



Project Coordinator for the Mountain Partnership Secretariat at the Food and Agriculture Organization of

the United Nations (FAO) since 2012, Giorgio holds a PhD in Environmental Biology, a Master Degree in Environmental Engineering, a Master Degree in Environmental Policy, and a Graduate Certificate in Geographic Information Systems (GIS). Before joining FAO he worked as an advisor on environmental issues with the Italian Development Cooperation, and as a project manager with IUCN, UN Environment and NGOs in Morocco, Angola, North Macedonia, Kosovo, and Bosnia & Herzegovina.

**Federico Mattei**



Works in the Project Development and International Relations Office of Slow Food's Foundation for

Biodiversity as a scientific and technical writer. Is responsible for developing project and seeking funding as well as technical or scientific revisions to reports, proposals and publications. Furthermore, leads several Slow Food projects on sustainable development, agriculture and sustainable tourism. Holds a Masters in Human Ecology and a Master in Food Security.

**Louise Luttkholt**



Executive Director of IFOAM – Organics International. Before, she founded and

directed HELVETAS Germany and functioned as a Senior Advisor on Sustainable Agriculture to HELVETAS Swiss Intercooperation, specialized in Nutrition Sensitive Agriculture. She has worked as Director of Strategy and Policy for Fairtrade International and has served on several high-level advisory positions within the fair trade movement. Since 1995 Louise has been active in the organic agriculture movement, including key positions leading strategy and policy for IFOAM – Organics International and BioNext.



GROW

# FIELD TRIP

Agrobiodiversity in a Changing Climate

## Vallepietra

Vallepietra is a small, medieval village of 268 inhabitants, located 100 km east of Rome. It lies in the heart of the Monti Simbruini Regional Park at 800 meters above sea level, in a valley that has a unique microclimate due to the presence of fresh water springs. The springs flow into a small river that runs down the valley and feeds the Simbrivio aqueduct, directly connected to Rome.

### The *ciavattone* bean

The abundant water and altitude have allowed a specific climbing variety of bean to adapt to the local climate conditions. The Vallepietra bean, also known as “ciavattone” has been growing there since the 16th century, during the period of Spanish domination. The cultivated bean fields are located on ancient terraces that start from the lowest part of the valley and reach up to the rocky slopes. Generations of farmers have worked to channel the spring water so as to reach the higher fields. The bean has a large, pearly-white seed and a very thin skin due to the chalky soil. Cultivation begins in April. No weed killers or chemical fertilizers are used, as they can pollute the springs. The beans are harvested in different phases, starting in September: the seeds for the following sowing are selected from the flowers that develop first, while the rest are sold. The beans are stored in jute bags along with a few bay leaves and kept in dry, cool cellars. The traditional recipes are simple: plain with extra-virgin olive oil and onions, in soups and salads, or with a sauce made with pig skin sausages.

### The traditional farming

When the bean was central to the local economy it was cultivated throughout the valley in small terraces. However, in the past few decades many of the terraces have been abandoned and overgrown with grass, and both bean cultivation and the village of Vallepietra have been gradually abandoned. This variety in particular has survived thanks to a few local families. A few years ago, a small consortium of farmers started to revive all traditional legumes from the Simbrivio Valley, while Slow Food has established a Presidium in Vallepietra to protect quality production from the risk of extinction and preserve the unique environment of the valley, as well as recover the traditional processing methods and safeguard its native breeds. The ciavattone bean is now being promoted in an attempt to bring new life back to the valley.

### Field trip logistics

Participants should meet at 09:00 at the main gate of FAO HQ on Wednesday 25 September. The bus trip to Vallepietra will take approximately two hours. The return is scheduled at 19:00, but could vary depending on traffic/contingencies. Please wear comfortable shoes and bring with you some water for the day and sun/rain protection. Lunch is included in the excursion.



