



SAPIENZA  
UNIVERSITÀ DI ROMA

Alliance



# SUMMER SCHOOL

# GROW

## AGROBIODIVERSITY IN A CHANGING CLIMATE

15 - 25 September 2020

Online course

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

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GROW

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 aide 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 hands-on experience on relevant practices.



## ONLINE COURSE

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Virtual lessons on Microsoft Teams,  
4 hours per day, breaks every 45mins



## DATE & TIME

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15 - 25 September 2020  
From 14:00 to 18:00 (Rome time)



## LANGUAGE

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The official language is English



## FEES & CREDITS

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Admission fees 200 euro.  
The course is worth six university credits  
according to the European Credit Transfer  
System (ECTS)



## SCIENTIFIC DIRECTORS

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

Devra Jarvis – Platform for Agrobiodiversity  
Research (PAR)



## COORDINATOR

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Giorgio Grussu, FAO - Mountain  
Partnership Secretariat  
[Giorgio.Grussu@fao.org](mailto:Giorgio.Grussu@fao.org)



## COURSE MANAGER

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Valeria Barchiesi, FAO - Mountain  
Partnership Secretariat  
[Valeria.Barchiesi@fao.org](mailto:Valeria.Barchiesi@fao.org)



## CONTACT

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

# AGENDA

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# Module 1: Management of Agrobiodiversity

DAY 1

## Tuesday, 15 September

14:00 Welcome, introductions, presentation of participants

15:00 Crop genetic diversity, domestication and traditional varieties (Chapters 1,2,3) - T. Hodgkin/ D.I. Jarvis (PAR)

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)

15:30 The origins and centres of diversity for perennial crops (the case of Apple) - M. Turdieva (Alliance)

16:00 Diversity and its evolution in crop populations (Chapter 4) - K. Naino Jika/ P. De Santis (Alliance)

The nature of diversity (pag 64 -66)

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

Population genetic structure (pag 71 - 77)

Evolution in crop varieties and populations (pag 78 - 84)

Reproductive biology (pag 84 - 89)

Crop varieties in production systems (pag 91 - 92)

17:00 Measuring diversity in crops (Chapter 5) - P. Colangelo (CNR-IRET)

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

17:45 Introduction to practicum - P. De Santis (Alliance)

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

## Wednesday, 16 September

**14:00** Measuring diversity in crops (Chapter 5) - *P. De Santis (Alliance)/ D.I. Jarvis (PAR)*

Gathering data using participatory approaches (pag 108 - 118)

Designing and investigation (pag 119 - 123)

Calculating on farm diversity indices: Richness, Evenness, Divergence

**15:00** Abiotic components of agricultural ecosystem (Chapter 6/7) - *M. Reverberi (Sapienza)/*

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

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)

**16:00** Spatial Analysis of Plant Diversity and Distribution in a Changing Climate - *F. Attorre (Sapienza)*

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

Ecosystem diversity and function (pag 150 - 153)

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

**17:00** Diversity in, and adaptation to, adverse environments on-farm (Chapter 6/7) - *N. Bergamini/ P. De Santis (Alliance)/ P. Colangelo (CNRIRET)*

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

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

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





## Thursday, 17 September

- 14:00** Who are the managers of diversity? Characterizing the social, cultural and economic environments (Chapter 8) - *R. Nanyka (Alliance)*
- Farmers' roles and the management of crop diversity (pag 191 - 199)
  - Social relationships and the distribution of diversity (pag 199 - 200)
  - 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)
- 15:00** Measuring the values of on-farm diversity (Chapter 9) - *D. Gauchan (PAR)*
- Public and private values of diversity (pag 212 - 214)
  - Varietal choice and diversity maintenance (pag 215 - 220)
  - Econometric models and value chain actors (pag 220 - 226)
  - Measuring non-market values of diversity (pag 226 - 231)
- 15:45** Assessment and testing of guidelines for economic development of community managed institutions - *Eleonora De Falcis (Alliance)*
- 16:15** Policy and genetic diversity on-farm (Chapter 3,10) - *I.L. Noreiga (Alliance)*
- 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)
- 17:00** 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)

# Module 1: Management of Agrobiodiversity

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DAY 4

## Friday, 18 September

- 14:00 Genetic diversity and selection pressures at different social, spatial, and temporal scales (Chapter 11) - R. Nankya (Alliance Uganda)/ M. Turdieva (Alliance Uzbekistan)**
- 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)
- 15:00 Patterns of seed supply: The "Seed Systems" (pag 267 - 274) - D.I. Jarvis (PAR)/ P Colangelo (CNR-IRET)**
- Social, spatial and temporal dimensions of traditional varieties (pag 275 - 282)
- 16:00 Strategies for collaboration and intervention (Chapter 12) - P. De Santis (Alliance)**
- 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)
- 17:00 Traditional varieties and agricultural productivity (Chapter 13) - D.I. Jarvis (PAR)/ P. De Santis (Alliance)**
- Socioeconomic, policy, environmental, biological and genetic dimensions (pag 313 - 320)
  - Assessment with DATAR (Diversity Assessment Tool for Agrobiodiversity and Resilience)
  - The future value of traditional varieties (pag 320 - 323)
  - Approaches to maintenance of traditional varieties (pag 323 325)

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## Saturday and Sunday, 19-20 September

Days off



# Module 2: Agrobiodiversity on the Ground

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DAY 5

## Monday, 21 September

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

The CSA Approach

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

**15:00** - 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

**16:00** Tools and Methods for Evidence-based Decision Making in CSA: Examples & Exercise - *R. Vuolo/*

*H. Kanamaru (FAO CBC)/ Isaac Guzman (FAO ESA)*

- Introduction: Modelling System for Agricultural Impacts of Climate Change (MOSAICC)
- Introduction: Ex-Ante Carbon Assessment Tool (EX-ACT)

**17:00** Hands-on exercises in breakout groups (based on participant's preference):

MOSAICC - EX-ACT

# Module 2: Agrobiodiversity on the Ground

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DAY 6

## Tuesday, 22 September

**14:00** Agroecology - *A. Bicksler (FAO AGPM)*

The principles of Agroecology

**15:00** Agroecology as a science, practice, and social movement

**16:00** Agroecology for resilience and climate change adaptation

**17:00** Group Exercises and Discussions

# Module 3: Agrobiodiversity values as market drivers

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DAY 7

## Wednesday, 23 September

**14:00** Slow Food - *F. Mattei (Slowfood)*

Agrobiodiversity as driver for rural development and the preservation of healthy ecosystems, Externalities, ecosystem services and common goods

**15:00** Promoting market access and generating sustainable demand paradigms

Education and awareness raising

**16:00** NaturaSi - *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

**17:00** How to build long lasting relationships of trust between producers, retailers and consumers

Marketing and distribution strategies for small mountain producers

Organic farming: new approaches and research

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DAY 8

## Thursday, 24 September

**14:00** Fundamental principles and definitions: Organic agriculture - *Roberto Ugas (IFOAM)*

Organic agriculture and its relation and contribution to other sustainable agriculture initiatives

**15:00** Organic 3.0: Towards truly sustainable food and farming systems to achieve the

Agenda 2030 - *Patricia Flores (IFOAM)*

**16:00** An overview of organic guarantee systems - *Cornelia Kirchner (IFOAM)*

**17:00** Focus on PGS: a locally appropriate and smallholder-friendly option for quality assurance

# Module 3: Agrobiodiversity values as market drivers

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DAY 9

## Friday, 25 September

14:00 Innovation Contest - Participants' presentations

15:00 Innovation Contest - Participants' presentations

16:00 Innovation Contest - Q&A

17:00 Closing Remarks - G. Grussu (FAO MP)/ F. Attorre (Sapienza)/ C. Murer (NaturaSi)/(Alliance)/(IFOAM)  
Award Ceremony



# Lecturers

## Devra Jarvis



Devra I Jarvis is Principal Scientist at the Alliance of 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).

## 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.



### **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).

### **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



Over 15 years of experience in the fields of climate change, political science and participatory approaches in

international agencies such as FAO, the World Bank and government institutions. She has been a member of the Facilitation Unit of the Global Alliance for Climate Smart Agriculture since 2014. She is the Leader of the CSA Team in the Office of Climate Change, Biodiversity and Environment (OCB) at FAO. She has a degree in law, a master's degree in international cooperation and a PhD in science and management of climate change.

## Julian Schnetzer



Environment and Climate Specialist at FAO. He holds a BSc/MSc in geocology 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, works on the use of climate information

for agriculture, supporting the development and implementation of the MOdelling System for Agricultural Impacts of Climate Change (MOSAICC). Before joining FAO and in parallel with her present work she carries out research activities and consultancies on agrometeorology and atmospheric dispersion modelling for several institutions in France and Italy.

## Hideki Kanamaru



Hideki Kanamaru is Natural Resources Officer at the Regional Office for Asia and the Pacific for the

Food and Agriculture Organization of the United Nations in Bangkok, Thailand. He holds a PhD in Geography from Boston University, USA. After a research career at the Scripps Institution of Oceanography in San Diego, USA, he joined FAO in 2007. He works on climate services in the agriculture sector, climate downscaling, assessments of climate change impacts on food security, climate change adaptation, and disaster risk reduction.

## Isaac Guzman



Mexican national, he is a climate change policy analyst. He holds an Erasmus Mundus Master's degree in

Environmental Policy and Management from the Central European University, Hungary; and Lund University, Sweden. His master thesis was focused on urban food security and adaptation strategies. Prior to joining the Economic and Policy analysis of Climate Change (EPIC) team at FAO he was a project manager in Mexico City's Ministry of Environment.

## Abdel Kader Naino Jika



Population geneticist. He holds a PhD degree in biology obtained at Paris Sud University, a master's degree

in both Genetics (University Pierre et Marie Curie) and in the Philosophy of Science (University Paris 1-Pantheon Sorbonne). Before joining Bioversity as HRF, he worked as a postdoc in Population genetics both in the lab EGCE (French Center for Scientific Research) and the French national institute for agronomic research (GQE-Le Moulon laboratory).

### Eleonora De Falcis



Agricultural economist working as Junior Professional Officer at the Alliance, based in Rome, Italy.

She has experience in the areas of SME and agri-food competitiveness, including in international trade. Currently working on the economic sustainability of various agrobiodiversity projects related to on-farm agrobiodiversity conservation, mainly in Asia and Africa.

### 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.

### 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.

### Roberto Ugas



Peruvian agronomist with graduate studies in the Netherlands and Japan in the fields of

ecological agriculture, agrobiodiversity, and rural development. Professor at Universidad Nacional Agraria La Molina (Peru), researcher and lecturer on horticulture, agroecology, smallholders, plant genetic resources and food systems. Member of the Latin America continental supervisory board of Solidaridad, participates in the Latin American Scientific Society of Agroecology and in the International Society for Horticultural Sciences. He has been IFOAM - Organics International Vice-President and currently IFOAM ambassador.

### Patricia Flores



Senior Project Coordinator and coordinator for the Regional Office of IFOAM in Latin America. She

has a background in forestry and MSc in Resource Management (University of Edinburgh, UK), with post graduate studies in Agroecology (UC Berkeley, US). She has over 20 years of experience on Rural Sustainable Development and Agroecology. Currently she is the country Manager in Peru of the global project Nutrition in Mountain Agroecosystem, a trainer of IFOAM Academy and FAO consultant for several topics related to smallholders, agroecology and inclusive markets.

### Cornelia Kirchner



Organic Policy and Guarantee Senior Coordinator at IFOAM - Organics International,

with a M.A in Japanese Studies (University of Vienna). She has 8 years experience in supporting and monitoring Participatory Guarantee Systems (PGS) in various countries especially in East- and Southeast Asia and West Africa. Her expertise includes also advising governments and stakeholders on organic standard development, organic regulations and supporting policies.



