Agroecology and ecological intensification: key approaches for OFF research at CRA

Stefano BISOFFI
... the third largest Public Res. Organization in Italy ...

Permanent staff

... the largest devoted entirely to agricultural research
... we operate through four Departments ...

Plant and Crop Science

... with R&D structures distributed all over Italy
... we operate through four Departments ...

Livestock ... with R&D structures distributed all over Italy

Science & Animal Products
... we operate through four Departments ...

Agro-Industrial Productions and Processing

... with R&D structures distributed all over Italy
Agronomy, Forests and Environment

... we operate through four Departments ...

... with R&D structures distributed all over Italy
... advanced laboratories and equipment ...
... 5000 ha of experimental farms ...
Main research lines in OFF

- Preservation of biodiversity (local cv, landraces, microorganisms, link w. local food specialties, ...)
- Breeding and selection of cultivars suited to OF (resistance, adaptability, stability, ...) with a participatory approach
- Support to the creation of an OF-oriented seed industry
Main research lines in OFF

- ‘Soft’ techniques for seed coating
- Plant-derived chemical products for crop protection
- Alternatives to copper
Main research lines in OFF

- Relationship between animal welfare, animal health and food safety/quality (pig, poultry, dairy cows, farmed fish, …)
- Effluents: reduction of GHG emissions, anaerobic digestion, use of digestate
- Compost from residues
Main research lines in OFF

- Soil biota and the rhizosphere: bacterial communities, mycorrhizae
- Plant-plant interactions at the root level: complementarities, layers
- Weed management: cover crops, mulching, crop residues
- Green-manuring
- Rotations, sequencing, intercropping, agroforestry
- Factors affecting re-planting success in fruit orchards
Main research lines in OFF

- Agroecosystem management in greenhouse plant productions
A look forward: the big challenges

2050:
- +30% population
- +70% production
- Same land available

9.2 billion in 2050

Produce more with less
- Genetics
- Soil fertility management
- Resource efficiency
- Exploit natural interactions

Resilience
- Risk management
- Diversification
  - In time
  - In space (3D)
- Biodiversity

Focus on the territories
- Typical products
- Specialty vs commodity
- Cultural/social factors

Sustainability
- Ecological intensification
- Rural development (Rural Renaissance)
- Food, Diets, Lifestyles, Health
A look forward in Agroecology
Agroecology vs conventional agriculture

Maximize single crop productivity

Land productivity
Energy efficiency
Labour productivity
Farmers’ income
ROI - Inputs efficiency
Resilience (risk management)
Long term soil functionality
Environmental services
More than just complexity ...

From:
A. Wezel, S. Bellon, T. Doré, C. Francis, D. Vallod and C. David
Agroecology as a science, a movement and a practice. A review
Agroecology and Sustainability
Participatory approach

Problem identification

«Agricultural research and development begins and ends with the farmer»

(Rhodes and Booth, 1982)

Solution acceptance
A few comments

- Sustainability from concept to science; from narrative to metrics (‘Sustainability Readiness Level’)
- Science to provide convincing evidence to support desirable transitions (agroecology, ecological intensification, sustainable food systems, ...)
- ‘Is agricultural research too serious a matter to be left to agricultural scientists?’ (G. Clemenceau, mod.)
- Social awareness/responsibility of researchers, of research funding and performing Institutions
- New competencies needed: integrators, brokers (‘silos breakers’), transdisciplinarity built into academic careers
- Break the boundaries; innovation occurs at the borders between knowledge fields (e.g. genomics, precision agriculture, robotics, nutrition)
- **Think bold!**
Think bold … (e.g. perennial grains)

Root systems of annual and perennial wheats

Root systems of annual and perennial wheats
The way forward

- A ‘secular’ non-dogmatic approach
- Biological and social rather than ‘normative’ approach
- Tacit knowledge validation and valorization
- Social innovation (cooperation, market organization)
- Re-think the AKIS (EIP-Agri, OG, Thematic Networks, RDP) and the Innovation Support Services
- Knowledge is probably the only resource that grows with use
Complex agroecosystems are beautiful

(Chianti Hills, Tuscany)

Thanks!