Some notes on PGRFA...
Riccardo Bocci – r.bocci@casignano.it

My background...

Common hypothesis: DIVERSITY

Situation Europe of « non conventional varieties »
Observation and testing diversified crop populations
On farm research
Seed regulation recommendations

Strategies for performance and quality
Working on key-concepts
Participatory research
Policy recommendations on seed, research and food system

4 species
7 species
15 species
SOLIBAM
Strategies for Organic and Low-input Integrated Breeding and Management

Policy recommendations for legal aspects of seed certification and protection of Plant Breeders’ Rights and Farmers’ Rights

The SOLIBAM project is supported by the European Commission through the Seventh Framework Programme for Research and Technological Development under the Grant Agreement n° 245058.

Policy recommendations to sustain diversity strategies within food systems

The negotiations web

- FAO - ITPGRFA
- WIPO
- European Union
- WTO

- PGR conservation
- IPRs
- GIs
- seed laws
- Convention on Biological Diversity
Seeds, the way to modernize agriculture

- Catalogue
- UPOV

Collect → Conserve → Use → Breeding

Diversity

Ex-situ
The linear approach...

Stage 4. The agricultural sector is well advanced. The national seed policy is re-examined, special attention is given to developing and strengthening commercial seed production and marketing, a seed law is in force, and links are established with related and supporting institutions and groups.

Stage 3. Agricultural research and development are well established and productive. High-yielding varieties of basic food crops are rapidly replacing traditional varieties in the most productive areas of the country. Production inputs are widely used, although not at the most efficient levels. Many components of a seed program exist, and the supply of seed ranges from fair to adequate. Seed quality may be poor, distribution remains relatively inefficient, and farmers use much less seed than is available for distribution. Some private seed enterprises are being formed.

Stage 2. Agricultural research and development are under way. Improved varieties of basic food crops are being developed and are beginning to replace traditional varieties. Use of production inputs, such as fertilizer is limited but improving. The limited quantities of seed available are a constraint on improvements in crop production.

Stage 1. Agricultural research and development are ineffective, limited, or just getting under way. Most varieties of basic food crops are traditional, as are production practices. Nearly all farmers save their own seed, but a plant breeding department may be distributing small quantities of improved varieties of some crops.
Conservation - Agriculture

Agrobiodiversity trend

- wild ancestors
- landraces
- cultivars

diversity
domestication dispersal modernization

Time
Commercial agriculture, the state of the art

But...

Less crops
Less varieties
Plant breeding paradox

“Thus, paradoxically, plant breeding has been undermining the very genetic basis on which it rests, leading to an overall phenomenon of de-diversification or genetic erosion. Plant breeders have become aware of this situation and have attempted to rectify it by broadening the genetic basis of their cultivar gene pool. However, it remains that the genetic diversity represented in the elite gene pools is only a small fraction of that present in the entire gene pool of crop plants. Hence, there is an enduring concern about the disappearance of genetic diversity over the long term.” (Gepts, 2006)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Company</th>
<th>Seed Sales, 2011 US$ millions</th>
<th>% Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Monsanto</td>
<td>8,953</td>
<td>26.0</td>
</tr>
<tr>
<td>2.</td>
<td>DuPont Pioneer (USA)</td>
<td>6,261</td>
<td>18.2</td>
</tr>
<tr>
<td>3.</td>
<td>Syngenta (Switzerland)</td>
<td>3,185</td>
<td>9.2</td>
</tr>
<tr>
<td>4.</td>
<td>Ylenorin (France) (Groupe Limagrain)</td>
<td>1,670</td>
<td>4.8</td>
</tr>
<tr>
<td>5.</td>
<td>WinField (USA) (Land O Lakes)</td>
<td>1,346 (est)</td>
<td>3.9</td>
</tr>
<tr>
<td>6.</td>
<td>KWS (Germany)</td>
<td>1,226</td>
<td>3.6</td>
</tr>
<tr>
<td>7.</td>
<td>Bayer CropScience (Germany)</td>
<td>1,140</td>
<td>3.3</td>
</tr>
<tr>
<td>8.</td>
<td>Dow AgroSciences (USA)</td>
<td>1,074</td>
<td>3.1</td>
</tr>
<tr>
<td>9.</td>
<td>Sakata (Japan)</td>
<td>548</td>
<td>1.6</td>
</tr>
<tr>
<td>10.</td>
<td>Takii &amp; Company (Japan)</td>
<td>548</td>
<td>1.6</td>
</tr>
<tr>
<td>Total Top 10</td>
<td></td>
<td>25,951</td>
<td>75.3</td>
</tr>
</tbody>
</table>

Source: ETC Group, Phillips McDougall

Corporate bottleneck?
Collect → Conserve → Use → Breeding for uniformity

What impact on diversity on farmers' fields?

Centers of origin
Genetic uniformity and vulnerability (UG99)

Common challenge: bring back diversity to the fields...
Plant breeding in the past..

Farmers were also breeders

Many farmers in different places
They bred for specific environments
old/traditional varieties

huge diversity!

Plant breeding now..

Always less breeders selecting for wide adaptation

few varieties spread in different environments

uniformity!
SOLIBAM recommendations for policy makers

• Three concepts should be at the cornerstone of future agricultural and research policies:
  • Diversity
  • Participatory innovation
  • Locality/terroir

Diversity ➔ sustainability

Innovation ➔ Coping climate change

LOCALITY /TERROIR ➔ Participatory

LOCALITY /TERROIR ➔ Decentralised

LOCALITY /TERROIR ➔ Embedded in places
Farmers and breeders grow / breed a range of populations / heterogeneous « varieties »

Mixtures

Selection among crosses

Positive mass selection within varieties

Bi-parental Crosses

Natural selection & soft selection within varieties

Pure lines

Selection among varieties

Natural selection & soft mass selection within varieties

Random crosses

Natural selection & mass selection within populations

CCP / Mixtures of crosses

=> a range of management approaches has been developed including those based on social organisation

Changing paradigms...

From on farm conservation...

G*E interaction

..to community biodiversity management

G*E*S interaction

New policies and governance..
A new approach to the seed issue:
Seed Systems…

The importance of Informal seed systems

a. guaranteeing access to propagation material in developing countries is well acknowledged by many researches and papers (see for example FAO, 2009; Bishaw and Gastel, 2010; Lipper et al., 2010).

b. “many country reports indicated that informal seed systems remain a key element in the maintenance of crop diversity on farm and can account for up to 90% of seed movement” (FAO, 2009).

It is important to note that this share varies according to the crop and the model of agriculture considered within the same country (Lipper et al., 2010). The continuous presence of these seed supply systems after years of policies addressed to develop an efficient private seed sector it is the demonstration of the market failures.
Why informal seed systems?

Informal seed systems are particularly important in the case (i) farmers prefer varieties with specific adaptation to local conditions or tasting/cooking quality that cannot be obtained from the formal sector; (ii) formal seed systems are inefficient or expensive; (iii) an acceptable seed quality could be easily produced (Louwaars, 2007); (iv) it is difficult to having access to improved seed (Lipper et al., 2010).

“it is impossible to replace farmers’ seed systems completely and it would be unwise to try. Farmers’ seed systems provide an important component of food security, a vital haven for diversity and space for further evolution of PGR” (FAO, 2009).
Integrated seed systems

Ex situ  ────────────  On farm

Community seed bank

Problems...

- Policy and legal issues
- Marketing and commerce
- Obstacles to release heterogeneous materials

Major obstacles
The directive is an important step forward because it implicitly acknowledges that seed regulations since the 1960s have contributed to the genetic erosion of agricultural diversity and so must be amended somehow.
COMMISSION IMPLEMENTING DECISION
of 18 March 2014

THE EUROPEAN COMMISSION,
Having regard to the Treaty on the Functioning of the European Union,
Having regard to Council Directive 66/402/EEC of 14 June 1966 on the marketing of cereal seed (1), and in particular Article 13a thereof,
Whereas:
(1) Directive 66/402/EEC sets out specific requirements for the production and marketing of cereal seed. Those provisions prevent the marketing of seed not belonging to a variety.
(2) However, new research in the Union on plant reproductive material that does not fulfil the variety definition as regards uniformity, shows that there could be benefits of using this diverse material, in particular with regards to organic production or in low input agriculture for example to reduce the spread of diseases.
(3) To allow seed from those populations to be marketed, it would be necessary to amend points E, F and G of Article 2(1) of Directive 66/402/EEC by adding the possibility to market seed which does not fulfil the requirements concerning varietal aspects. In order to decide about such amendment to Directive 66/402/EEC, it is necessary to gather information on the marketing of seed from populations. In particular, it needs to be verified whether the identification of populations of particular species can be ensured, with guarantees similar to those resulting from the requirements concerning varietal aspects, on the basis of information on their breeding and production methods. Moreover, it should be assessed under this experiment whether the identity of the seed marketed as belonging to those populations and the information to the user can be ensured, with guarantees similar to those resulting from Article 3(1) and Article 10, based on traceability requirements and identification of the places of production.
(4) Given the characteristics of populations, the certification of seed from populations might imply a disproportionate burden for authorities and for operators. It is therefore appropriate to gather information on the possibility to provide for a system of controls of the production and marketing of seed of populations not requiring certification.
(5) In view of their significance for the market sector of cereals and available research results, the species subject to this experiment should be wheat, barley, oats and maize.
(6) In order to clarify the nature of populations in comparison to varieties, it is necessary to lay down a requirement on the number of varieties used in the crossings to breed a population.
(7) The responsible official bodies should monitor this experiment through official controls on the production and marketing of seed from populations and their quantities, the persons maintaining those populations and the performance of those populations in specific areas.
(8) Conditions should be established for the submission of applications and authorisation of a population pursuant to this Decision, submission of a reference sample, denomination of the population, and registration of persons producing and marketing those populations. It is important that those conditions are assessed to ensure identity and traceability during the production and marketing of such population, effective controls by the responsible official bodies and avoidance of the creation of a market parallel to the one established pursuant to Directive 66/402/EEC.


1994
State sovereignty on biodiversity
Benefit Sharing
Prior informed consent

The International Treaty
on Plant Genetic Resources for Food and Agriculture

2004
A shared common pool including the PGRFA of the crops in list in Annex I

Art.5 on conservation of PGRFA
Art.6 on sustainable use of PGRFA
Art.9 on Farmers’ rights
Sustainable use

1. pursuing fair agricultural policies that promote, as appropriate, the development and maintenance of diverse farming systems that enhance the sustainable use of agricultural biological diversity and other natural resources;
2. strengthening research which enhances and conserves biological diversity by maximizing intra- and inter-specific variation for the benefit of farmers, especially those who generate and use their own varieties and apply ecological principles in maintaining soil fertility and in combating diseases, weeds and pests;
3. promoting, as appropriate, plant breeding efforts which, with the participation of farmers, particularly in developing countries, strengthen the capacity to develop varieties particularly adapted to social, economic and ecological conditions, including in marginal areas;
4. broadening the genetic base of crops and increasing the range of genetic diversity available to farmers;
5. promoting, as appropriate, the expanded use of local and locally adapted crops, varieties and underutilized species;
6. supporting, as appropriate, the wider use of diversity of varieties and species in on-farm management, conservation and sustainable use of crops and creating strong links to plant breeding and agricultural development in order to reduce crop vulnerability and genetic erosion, and promote increased world food production compatible with sustainable development; and
7. reviewing, and, as appropriate, adjusting breeding strategies and regulations concerning variety release and seed distribution.

Integrated seed systems

PGRFA Semi-commons

The International Treaty

Maintaining the flow of germplasm

Recognition

Reciprocity

Protection from misappropriations
A cultural process...

Lost in translation...

<table>
<thead>
<tr>
<th>Nation</th>
<th>Translation of “Landraces”</th>
<th>Meaning in English</th>
<th>Point of view expressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>Races primitives</td>
<td>Primitive, original races</td>
<td>Historical, social or biological</td>
</tr>
<tr>
<td>Germany</td>
<td>Landsorten</td>
<td>Landraces</td>
<td>Ecological</td>
</tr>
<tr>
<td>Italy</td>
<td>Eootipi</td>
<td>ecotypes</td>
<td>Biological</td>
</tr>
<tr>
<td>Spain</td>
<td>Variedades</td>
<td>varieties</td>
<td>Geographical</td>
</tr>
<tr>
<td>Romania</td>
<td>Varietati locale</td>
<td>Local variety</td>
<td>Geographical and social</td>
</tr>
<tr>
<td>Portugal</td>
<td>Variatades autóctones</td>
<td>Autocthonous varieties</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>Eolnes fajök</td>
<td>home variety</td>
<td>Sociological</td>
</tr>
</tbody>
</table>
Relations between formal and informal seed systems

- From the lack of trust to the mutual recognition:
- ‘Farmers can not develop such skills’
- ‘How can we do without controls and replicated trials?’
- ‘Will we loose our jobs?’
- ‘Researchers are not really interested in us’
- ‘Researchers only take our varieties to hand them to industry’
- A slow cultural process!!
Invent again agriculture..

The Ag. Research system

- CGIAR
- NARs
- Universities
- FAO

International research

gap filling at national level

Why farmers don’t adopt technology?

Why farmers don’t adopt technology?

Science

Public

Private

Local knowledge

Adoption
One size fits all…. It is not more realistic.

- R&D
- Variety release
- Seed multiplication
- Commercialization
- €
- IPRs (UPOV or Patent)
- distinctness
- uniformity
- stability

Science as cathedral

*Fig. 1: Un modèle délégué centralisé d'innovation : le cas du maïs hybride*
..from cathedral to bazaar...

..to the network..