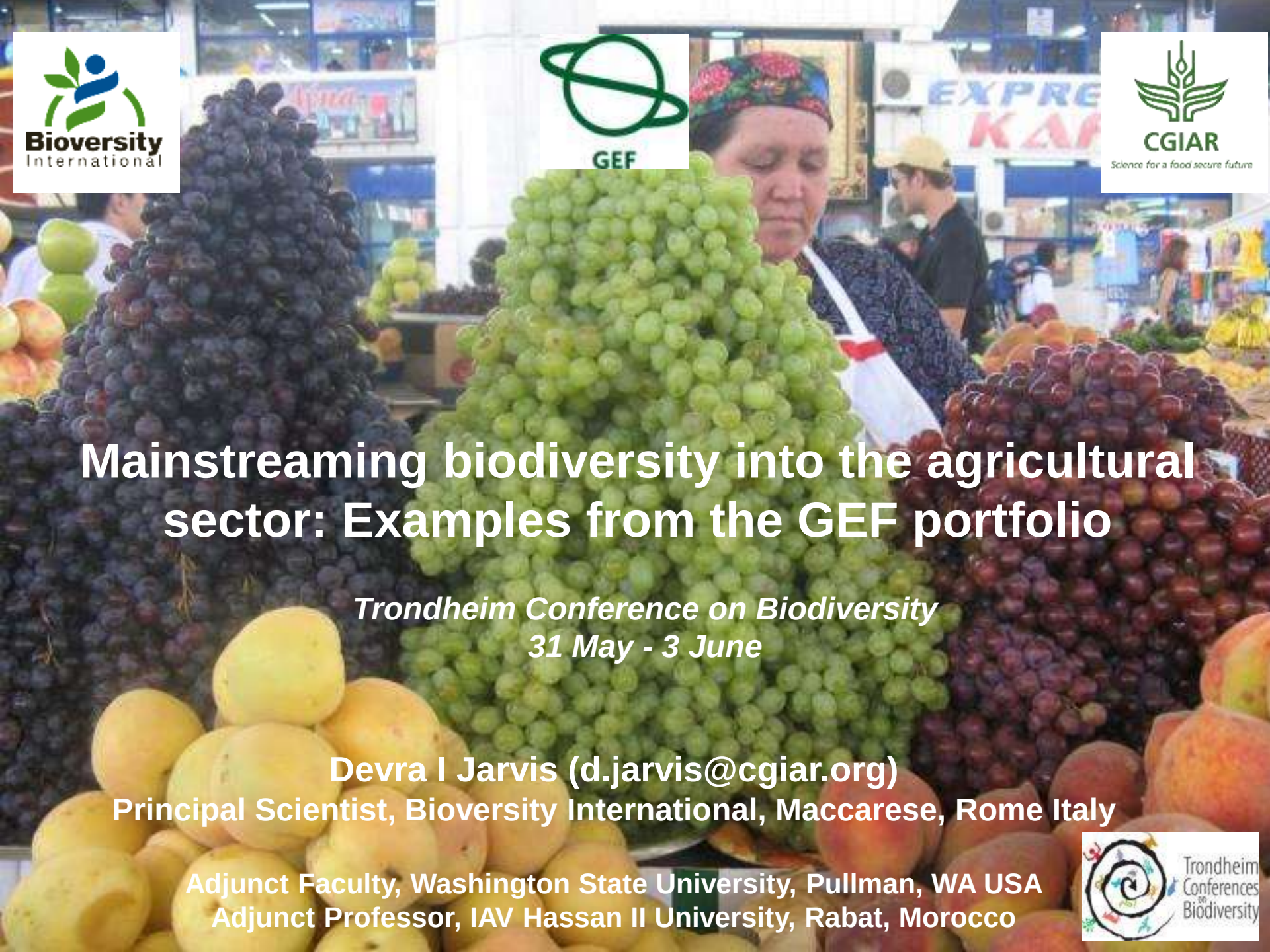

Mainstreaming biodiversity into the agricultural sector: Examples from the GEF portfolio

Trondheim Conference on Biodiversity
31 May - 3 June

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Global

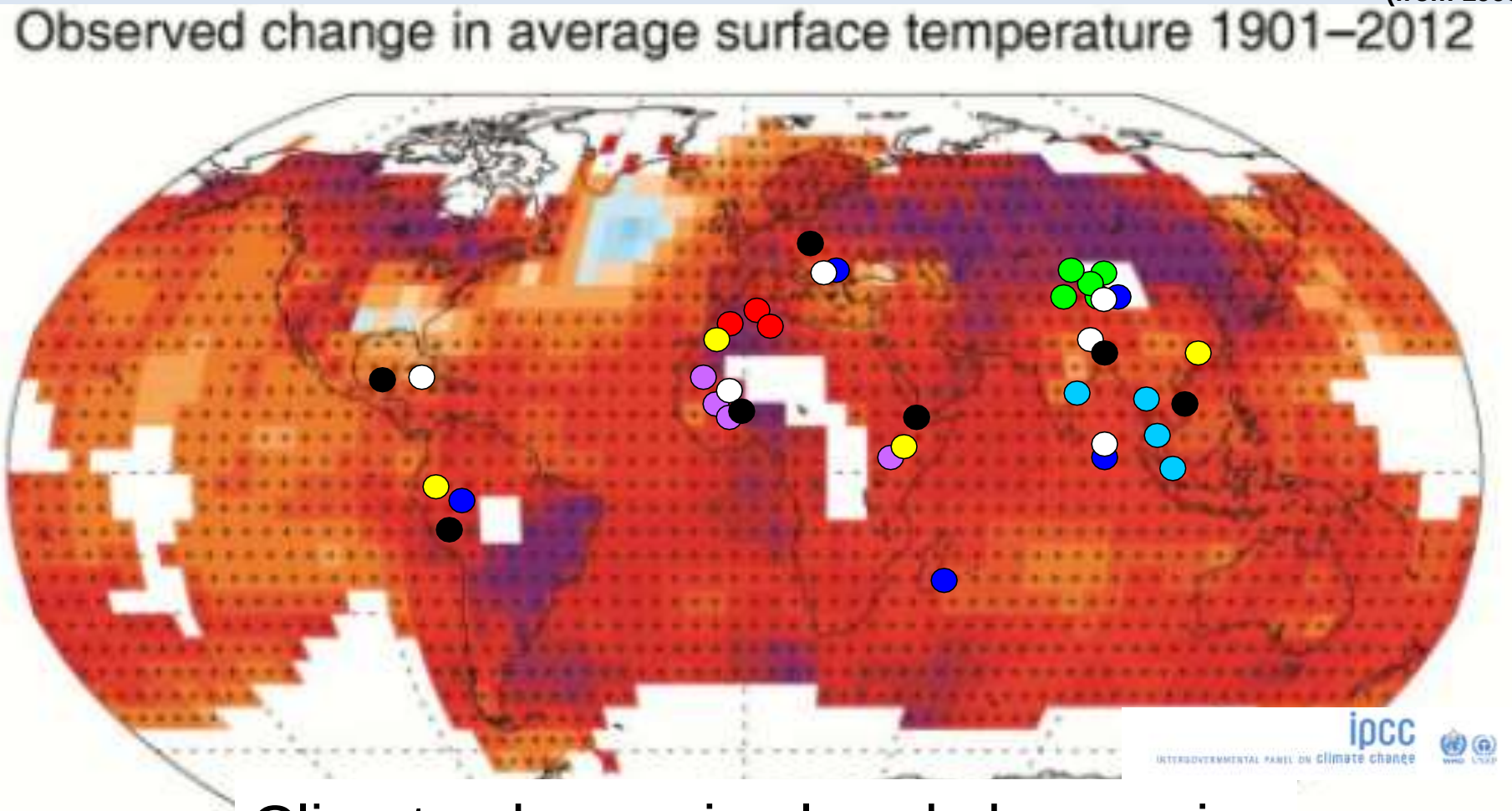
- Crop Wild Relatives
- Pest and Disease

Regional

- Community based mgt. SSA
- Fruit trees Central Asia
- Fruit trees in APO
- Date palm in North Africa

Single County

- Cuba
- Nepal
- Sri Lanka
- Niger
- Armenia
- Uzbekistan
- Before (from 1995)



Climate change is already happening

IPCC 2016

Why deliberately mainstream intra-specific crop diversity into agricultural production systems?

1. Unpredictable fluctuations in temperature, rainfall, frost, pest, disease,

2. Productivity in low input environments, extreme temperatures and water, degraded soils

3. Growing consumer demand for diverse and natural food-based products

4. Interested of communities to retain control over their crop resource

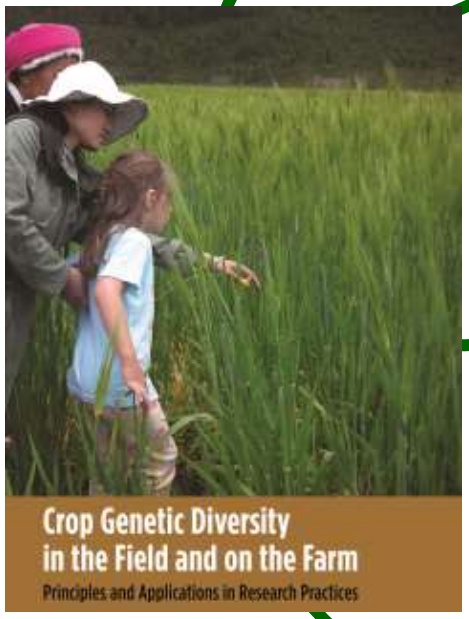
An Heuristic Framework:
Determining where local crop genetic diversity can help achieve SDGs

I. Does diversity exists in the production system?

- *Exists but not in sufficient quantities*

II. Diversity exists but is it accessible ?

- *Lack of funds*
- *Social constraints, policy constraints*



III. Diversity is accessible, but is it valued and used -- does it perform ?

- *Not perceived as competitive, not evaluated*
- *Poor performance or cultural acceptability*
- *Management not optimal, policies inhibit use*

4. Diversity exists, is accessible, is valued but do farmers benefit from it use?

- *Insufficient market or non market benefits from use*
- *Weak local institutes and farmer/community leadership*

Crit. Revs. Plant Sci., 2011

I. Diversity exists: Significant traditional variety diversity continues to be managed by small holder farmers

maize, beans, chili, squash

durum wheat, faba bean, barley

maize, beans,

rice, barley, finger millet, taro, sponge gourd, pigeon pea

Morocco

Hungary

Nepal

Mexico

34 to 65 rice per community, Nepal

Globally applicable indicators: richness, evenness, divergence

4-5 sorghum varieties per farm *Burkina faso*

Peru

Burkina Faso

Ehtiopia

Vietnam

maize, chili, casava, cotton, peanuts

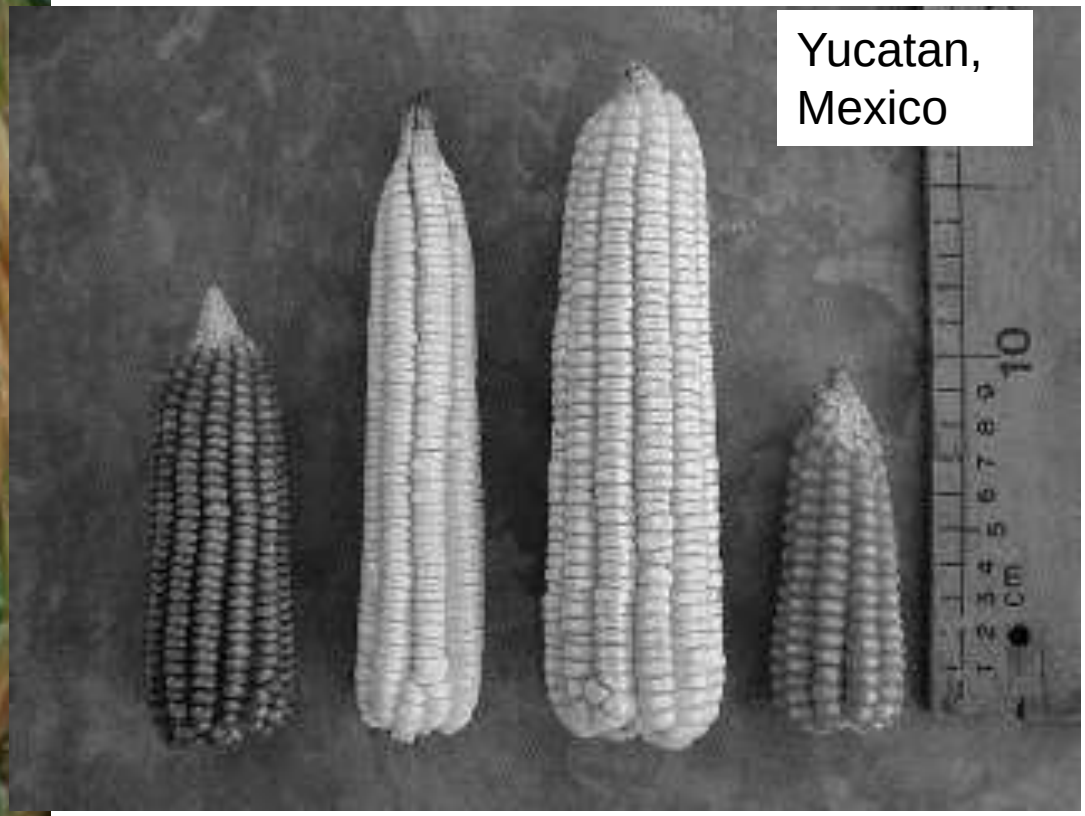
sorghum, cowpea, millet, okra

sorghum, durum wheat

rice, taro

Jarvis et al., 2008 PNAS

I. Functional diversity exists: Varietal diversity in the farmer's field for unpredictable rainfall and poor soils?

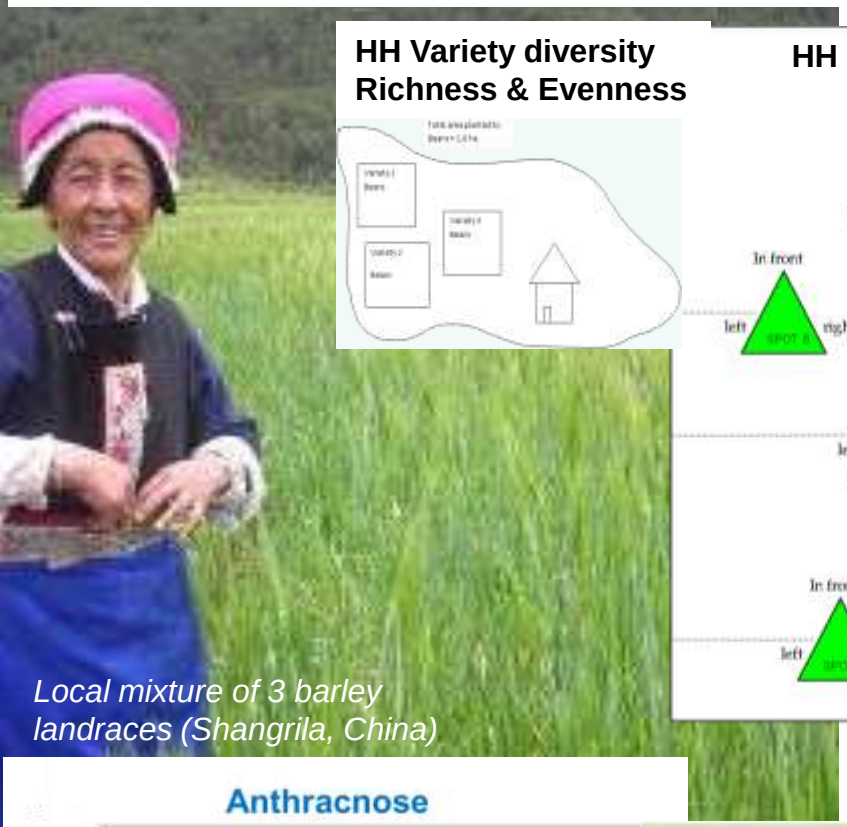


Na'tel: *from planting to maturity in 7 weeks –* ***drought avoidance***

X-nuuk nal: *four months – long maturing* ***drought resistant***

Tuxill et al., 2008

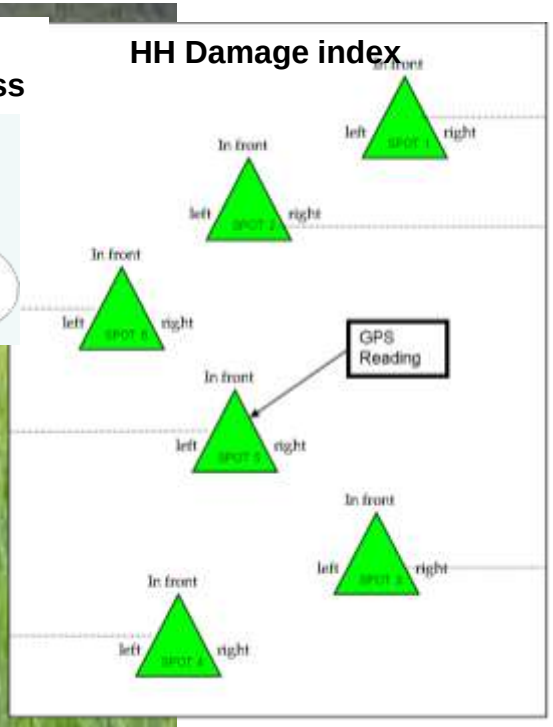
I. Functional diversity exists: Is varietal diversity in the farmer's field improving production and resilience?



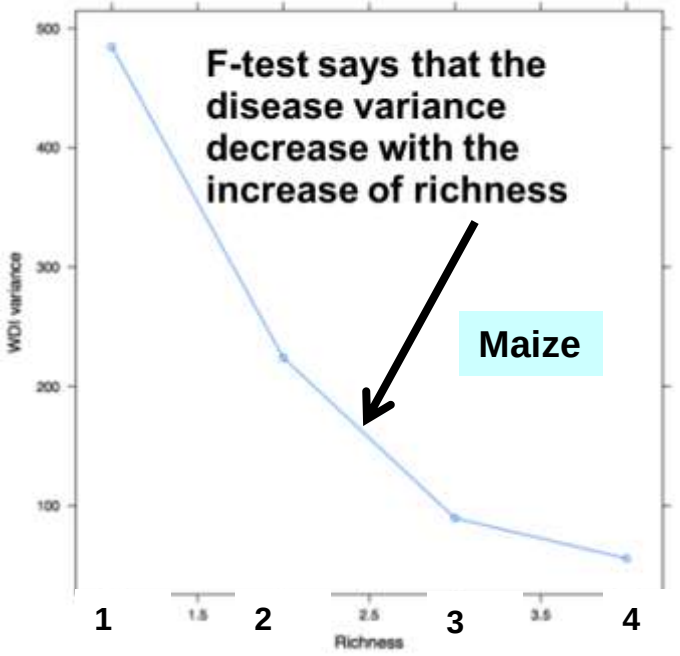
Local mixture of 3 barley landraces (Shangrila, China)

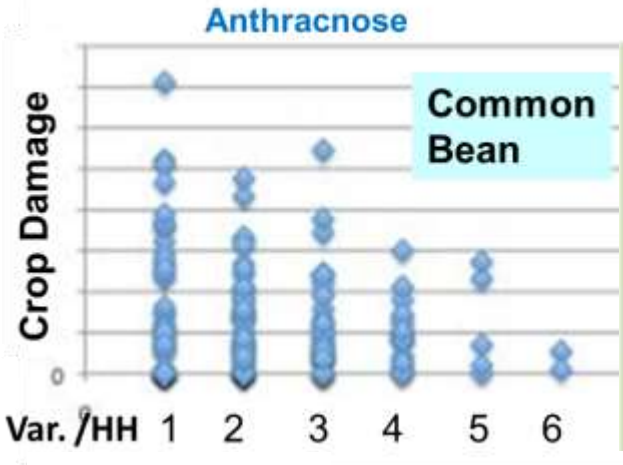
HH Variety diversity
Richness & Evenness

HH Damage index

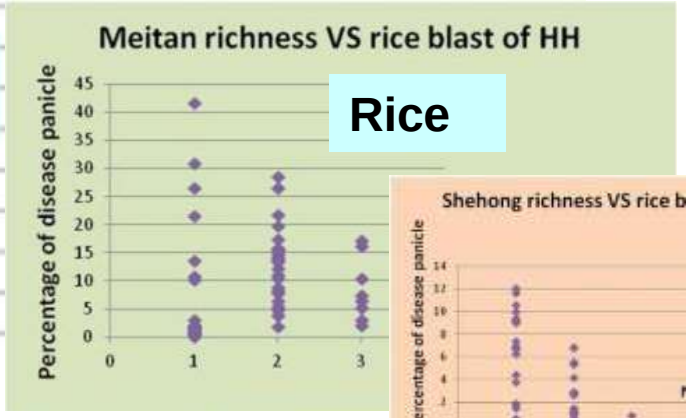


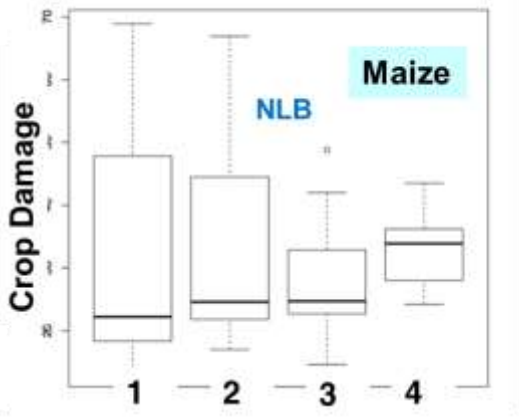
Lower probability of future damage





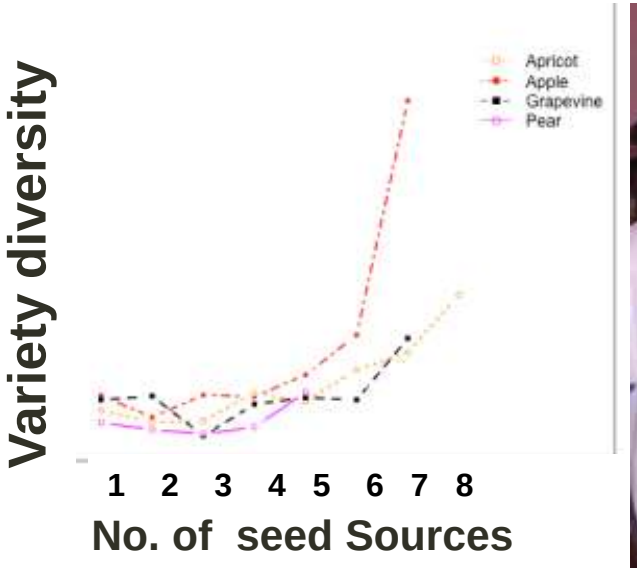
Mulumba et al., 2012





II. Diversity is accessible: good quality diverse planting materials assessable at the right time, in sufficient quantity

Higher diversity of seed supply sources -- more resilient seed systems

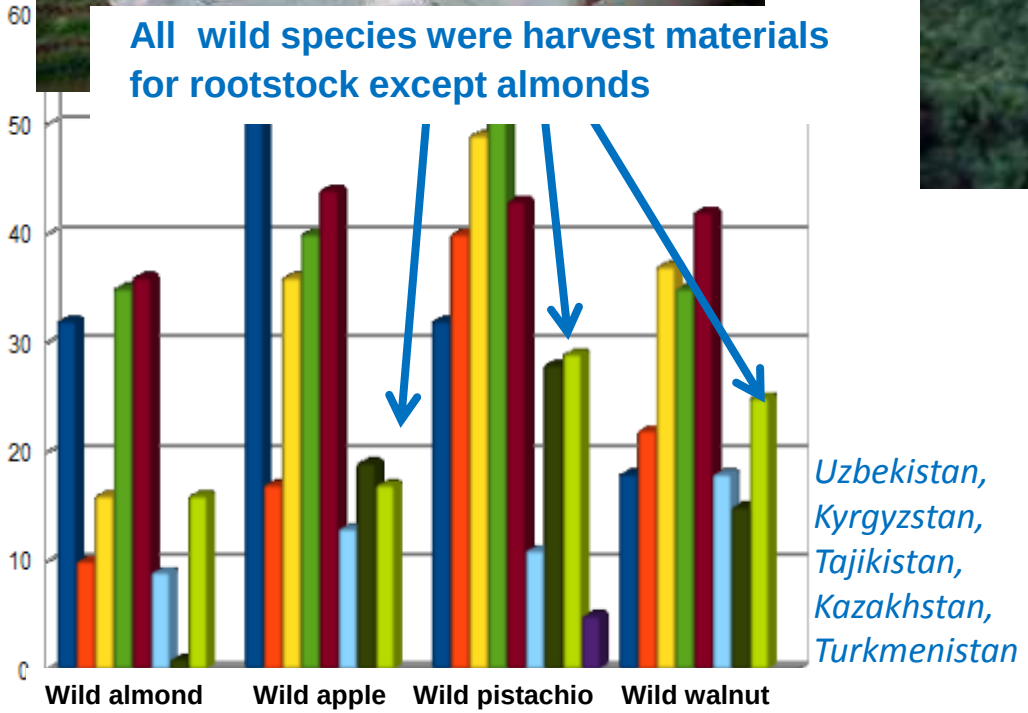


II. Diversity is accessible: Diverse sources of planting materials:

Bridging natural and managed landscapes

Photograph: Miguel Pinedo-Vasquez

UNEP GEF Cuba
MAB UNESCO



All wild species were harvest materials for rootstock except almonds

Uzbekistan, Kyrgyzstan, Tajikistan, Kazakhstan, Turkmenistan

III. Performance/Use:

Shifting from livestock to horticulture using local drought and frost resistant apple varieties (Farmer Norkushakov, Uzbekistan)

III. Performance/Use: Improvement – use of pro-poor traits , keeping a broad genetic base

Breeding goal set by farmers:

- **Improve taste of Mansara landrace rice and productivity**
- **Retain its adaptive traits of specific adaptation in marginal conditions**

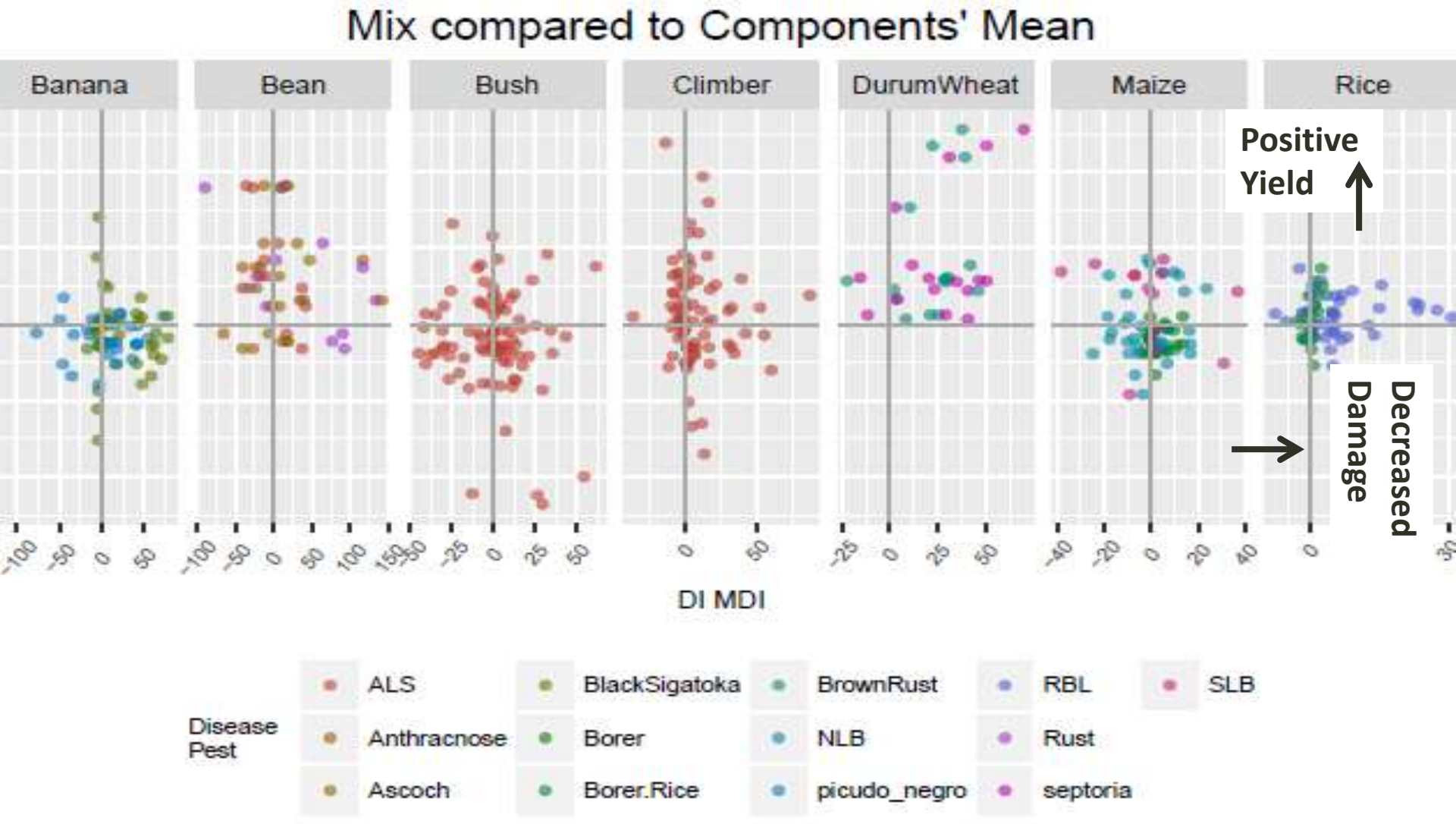
Mansara x Khumal-4 cross

Mansara

Participatory Plant Breeding - Nepal

III. Performance/Use: Reducing crop loss to pest/disease

Can mixtures give a benefit over component monocultures?



467 observations (China, Ecuador, Morocco, Uganda)

IV. Benefit sharing: Guidelines: Access and sharing benefits in research projects

Model Agreements:

MTA on planting material of local varieties of fruit crops maintained in demonstration plots and nurseries

Prior Informed Consent (PIC)

Agreement on Information Access and Exchange

Nepal: national network of community seed banks NGO + Government

Central Asia: 58 nurseries producing 1,500,000 local variety saplings annually

http://centralasia.bioversity.asia/

IV. Benefit sharing: Market strategies for marketing diversity
Changing consumer norms

Celebrating Diversity

- Bouquet gift packages
- Agro-tourism

Product differentiation

- Product differentiation based on favorable crop attributes
- Geographic indication

Premiums for conservation efforts

Marketing mixed varieties

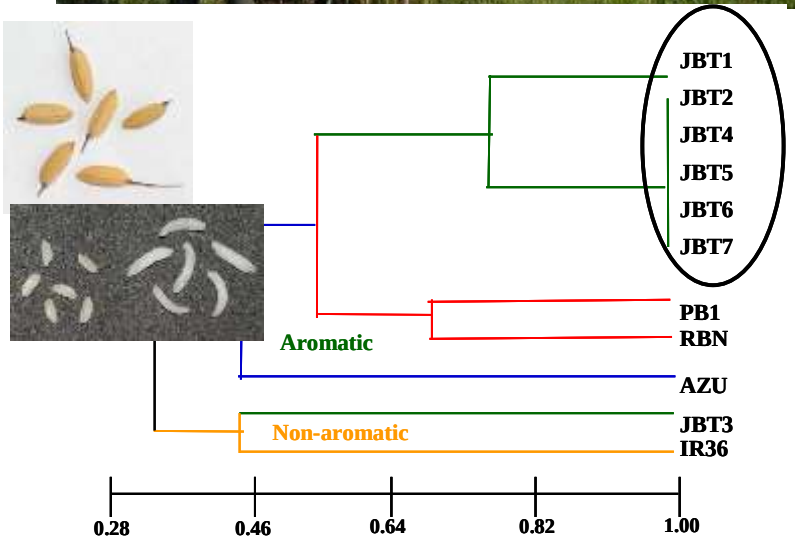
IV. Benefit: Legal and policy recognition of the contribution of local communities to enable benefit sharing

Alternatives and modification to seed certification systems

Loi n° 2008-73 du 2 décembre 2008, relative à la sauvegarde des palmiers ...

Photo: G .Plata

Certifying nematode free soils for potato seed in Bolivia



Nepal's first farmer bred registered released variety through the Nepalese seed system

IV. Benefit sharing: Collective action and community institutions

Vodouhe et al. 2011

Diversity Field Forum (DFF)

Men and women teams (25-30)

- **Assess, improve, multiply seed, informed on legistlation**

US farmers /farm interns heirloom varieties /low input

Attaining change in practices – Course materials for schools and universities that train agricultural and environmental extension workers

Scaling up process	Moving from Local to National to International Scales (>100 interventions)
Adaptation	**An innovation is scaled up by adapting it to other contexts** • *A machine for de-husking rice is adapted to tiny seed millets, reducing women labor* • *FAO Farmer Field Schools adapted to use genetic diversity (Diversity Field Forum)* • *IPM, climate change adaptation, soil-water mgt. includes crop varietal diversity* • *Participatory and conventional breeding use locally adapted materials*
Diffusion	**An existing innovation is scaled up by communicating it to more people** • *Diverse sets of varieties or varietal mixtures are taken up by more farmers* • *Extension colleagues have materials that include the use of varietal diversity* • *Community seed banks and biodiversity registries are linked to national gene banks* • *Private and public seed suppliers diversify their varietal portfolios*
Replication	**An existing innovation is scaled up to more people in different sites** • *Community seed banks: Central Asia fruit tree nurseries with high diversity* • *GIAHS site certification; Nematode free site certification* • *Restoration of degraded lines with locally adapted diversity*
Value addition	**An innovation is scaled up so that the same people, doing the same thing, can earn more** • *Markets for diversity; Geographical Identification certification; Agrotourism* • *Policies support benefit sharing for diversity custodians*
Temporal	**An innovation which is supposed to be introduced for a limited amount of time is scaled up for a longer time frame** • *Diversity fairs becomes an annual affair* • *A training course becomes an annual course*

Adapted from R. Alcadi, IFAD

Acknowledgements:
Participating farmers, local, national and international institutes, organisations and partners

Thank you

www.bioversityinternational.org