

Participatory Improvement of Cereals and Legumes in Eritrea



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Eritrea

Total area: 121,320 sq km
agricultural land: 61%
arable land: 4.78%
permanent crops: 0.03%

Population: 4.8 million
growth rate: 2.47%
0-14 years: 44%

80% of the population is
involved in farming and
herding



Crop production

- Cereals provide 70% of the national per capita calorie intake
- Pulses provide a major portion of the protein requirements
- Barley and wheat are major staples of the Highlands



Production constraints

- Highly variable and erratic rainfall
- Recurrent droughts
- Insect pests and diseases
- Soil erosion and declining soil fertility
- Lack of post-harvest storage facilities
- Insufficient draft animals and cultivation equipments



Eritrea and ICARDA

- Shortly after Independence (1993) a program of training and technical assistance started
- In 1997-2002 support from DANIDA within the National Seed Development Program
- In 1999 a participatory barley improvement program started supported by DANIDA

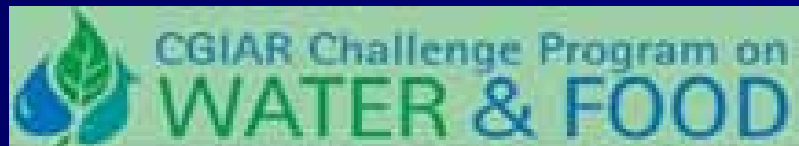




From 2004 participatory barley improvement is supported by the Government of Italy

Improving Water Productivity of Cereals and Food Legumes in the Atbara River Basin of Eritrea

Mereb-Gash and Tekeze-Setit Basins



Participating Institutions

- National Agricultural Research Institute (NARI)
- Hamelmalo College of Agriculture
- Systemwide Program for Participatory Research and Gender Analysis (PRGA Program), International Center for Tropical Agriculture (CIAT)



- Farmers' Communities in the Atbara Basin
- Zobas and Sub-Zobas
- NGOs

The Goal

To enhance food security and alleviate poverty in the Gash and Setit basins by increasing crop water productivity, using low-cost inputs, while minimizing risk and ensuring sustainability of production





Project area

Main Activities

- **Participatory breeding**
 - barley, wheat,
 - lentil, faba bean and chickpea
- *Hanfetse*
- Agronomy trials in barley and wheat
- Conservation Agriculture
- Seed production

Approach

- Participatory research and technology development
- Participatory on-farm technology testing
- Scaling out of the technology options to non-participating farmers

Farmers are involved in:

- Setting priorities
- Planning and implementing trials in their fields
- Evaluating the results
- Naming and producing seed of new varieties

Germplasm

- Local landraces
- Breeding lines from ICARDA (barley, lentil, chickpea, faba bean) and ICARDA/CIMMYT (wheat)



Selection process

2004 42 farmers
34 men
8 women

2005 88 farmers
67 men
21 women

2006 88 farmer
70 men
18 women



Farmers' and breeders' visual selection



Data collection and analysis

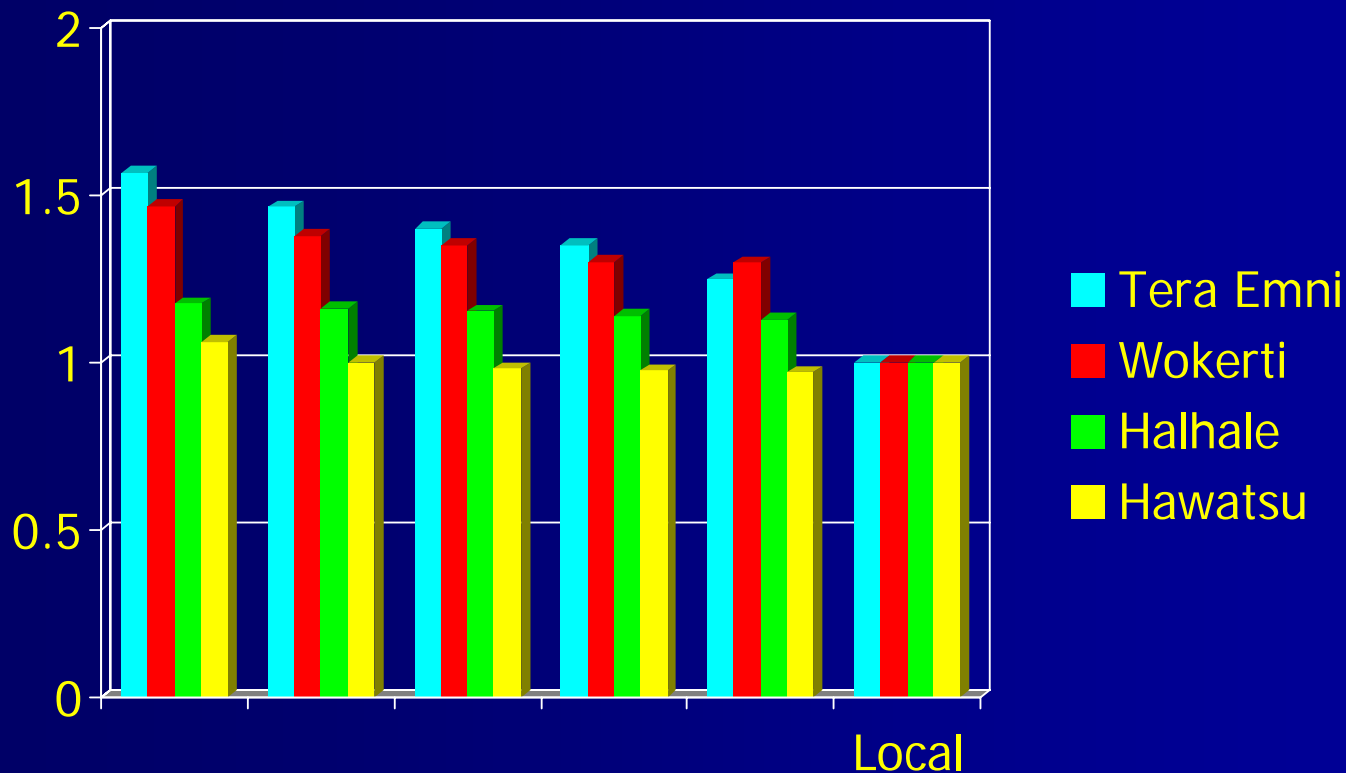


Data discussion with farmers and final selection



Relative yield (local check=1) of the top 5 yielding barley lines in four locations

Yield advantages from 6 to more than 57%



Shishai released for medium altitude areas
Rhawa released in Embaderho
Tekonda released in Adi Keyh

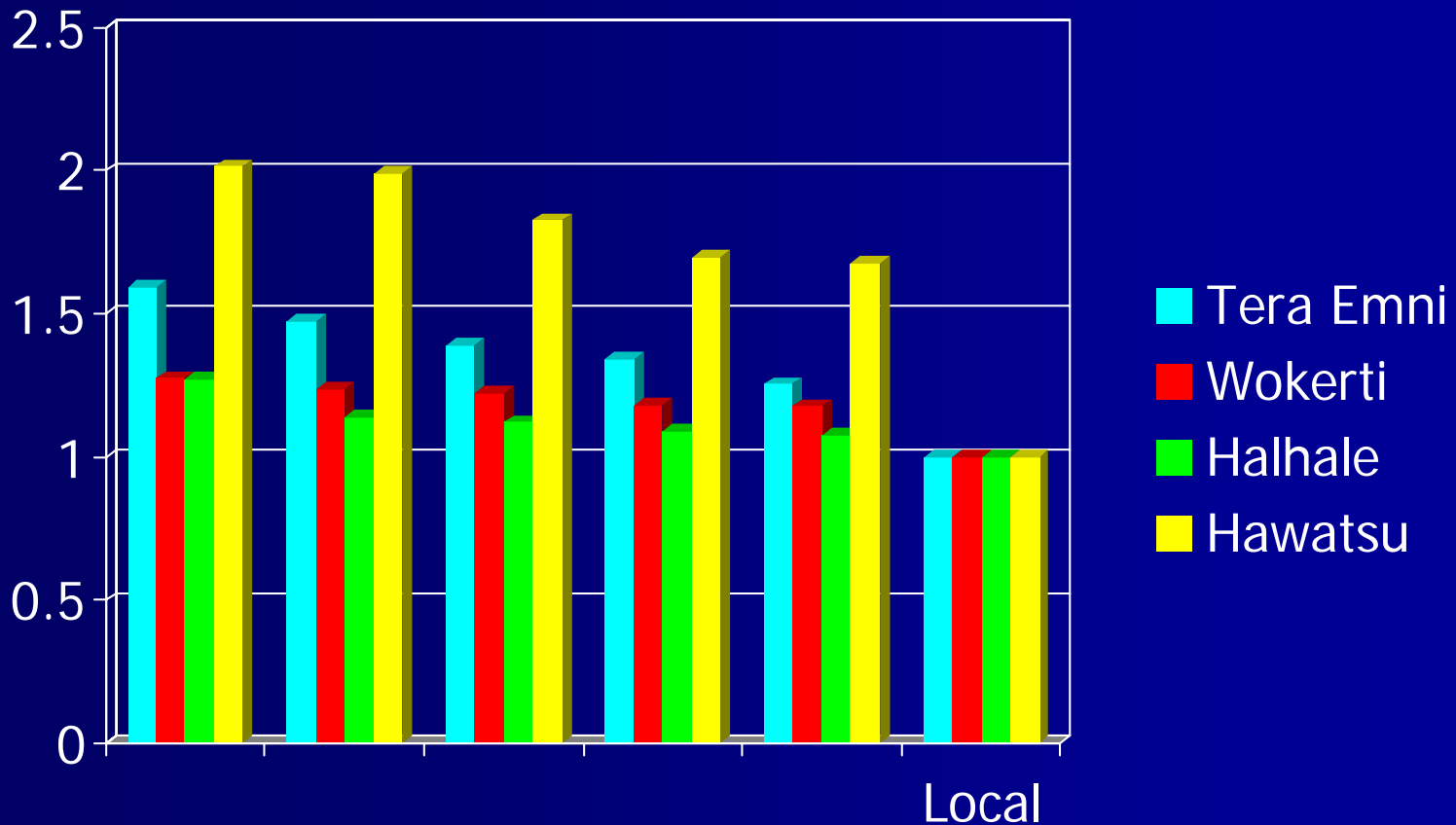


Ms Fida participated in the selection of Tekonda



Relative yield (local check=1) of the top 5 yielding wheat lines in four locations

Yield advantages from 8 to nearly 100%





New wheat lines resistant to yellow rust
Wokerti, September 2006



Legumes



Wilt and rust in lentil



Lentil line 'ILL 7978'

Outyielded local check

**Resistant to wilt and
rust**



Farmers' efficiency

Crop	Trial	Location	Top yielding	Coincidence	%
Barley	FIT	Tera Emni	23	14	0.61
		Wokerti	20	12	0.60
		Halhale	21	14	0.67
		Hawatsu	20	8	0.40
Wheat	FIT	Tera Emni	21	19	0.91
		Wokerti	20	11	0.55
		Halhale	21	19	0.91
		Hawatsu	20	6	0.30
Lentil	FIT	Halhale	10	5	0.50
Chickpea	FIT	Emni+Haili	10	5	0.50
Faba Bean	FIT	Tera Emni	10	1	0.10
		Wokerti	10	3	0.30
		Halhale	10	5	0.50

Village base seed enterprise



Seed multiplication of Shishai, near Tera Emni, 40 km south of Asmara, Eritrea



Conclusions

- Yield increases are possible by exploiting existing genetic variability
- Farmers have an extraordinary ability to identify the highest yielding varieties
- Farmers are very happy with the participatory work
- Participatory plant breeding improves the interaction between farmers, researchers, extension agents, and other stakeholders

The University professor



The lentil breeder



The bread wheat breeder



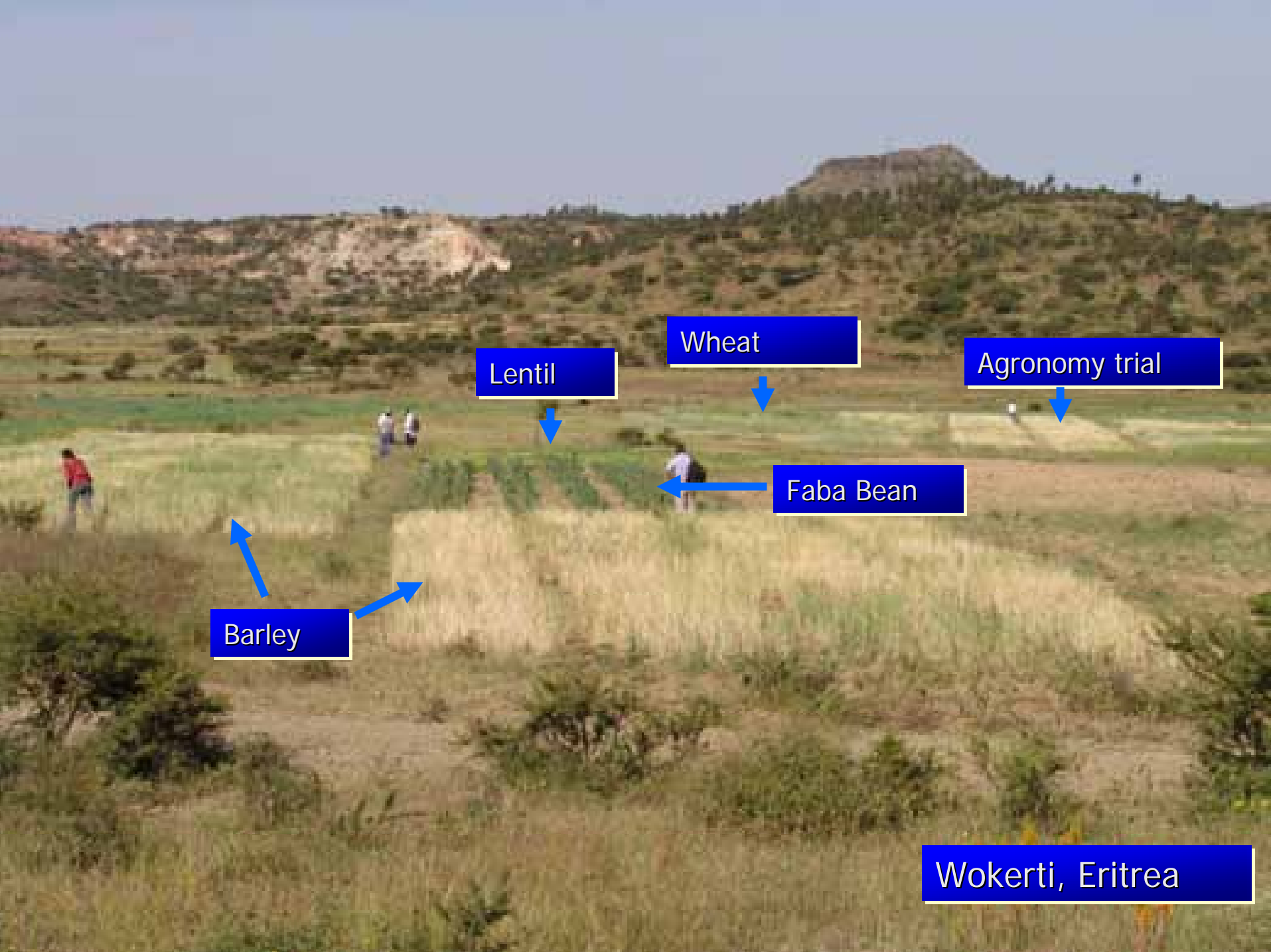
The NARS' DG



Conclusions

Participatory plant breeding offers the possibility of improving more than one crop within the same program





Lentil

Wheat

Agronomy trial

Faba Bean

Barley

Wokerti, Eritrea



Thank you