Crop varieties research and implications on closing yield gaps and diversifying incomes—Africa RISING experiences

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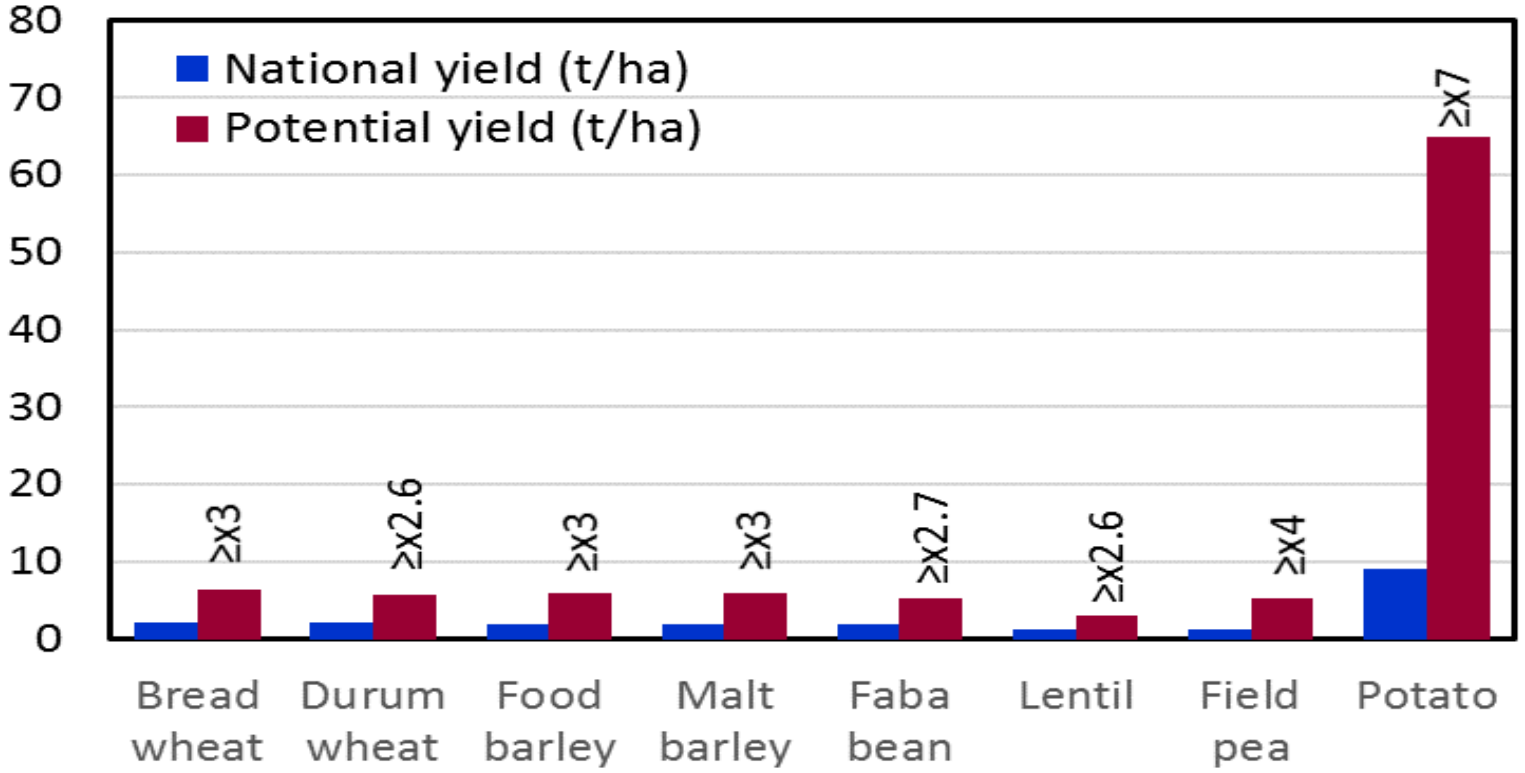
Workshop and Exhibition on Promoting Productivity and Market Access Technologies and Approaches to Improve Farm Income and Livelihoods in Ethiopia: Lessons from Action Research Projects, ILRI, Addis Ababa, 8-9 December 2016




Background

- Cool-season food legumes and cereals, and potato are key commodity in mixed farming system
- Perfectly suitable for Ethiopian highlands
- Important for food, feed and income generation
- Potato: an important crop for the “hunger months” of September to December before a grain crop is ready
- Integration of potato in cereal and legume based farming promotes soil health, plant health and productivity

Yield gaps



- Improved crop varieties
- Availability, accessibility & distribution of quality seed
- Good agricultural practices
- 80% of the small holder farmers have no access to quality seed

Description of the intervention

- **Demonstration and selection of improved varieties**

Description of the intervention

- **Establishing a seed system/seed value chain development**
  - *Seed production is a very technical and intensive operation*
  - *Quality seed needs to be clearly separated from ware produce*

Figure. Local seed multiplication approach for accessibility of seed to local small holder farmers.

Description of the intervention

➢ **Strengthening seed producers knowledge and skills on improved crop production (eg. Farmers Field School)**

(for example seed renewal, planting, spraying, harvesting etc.)

Small seed plot technique

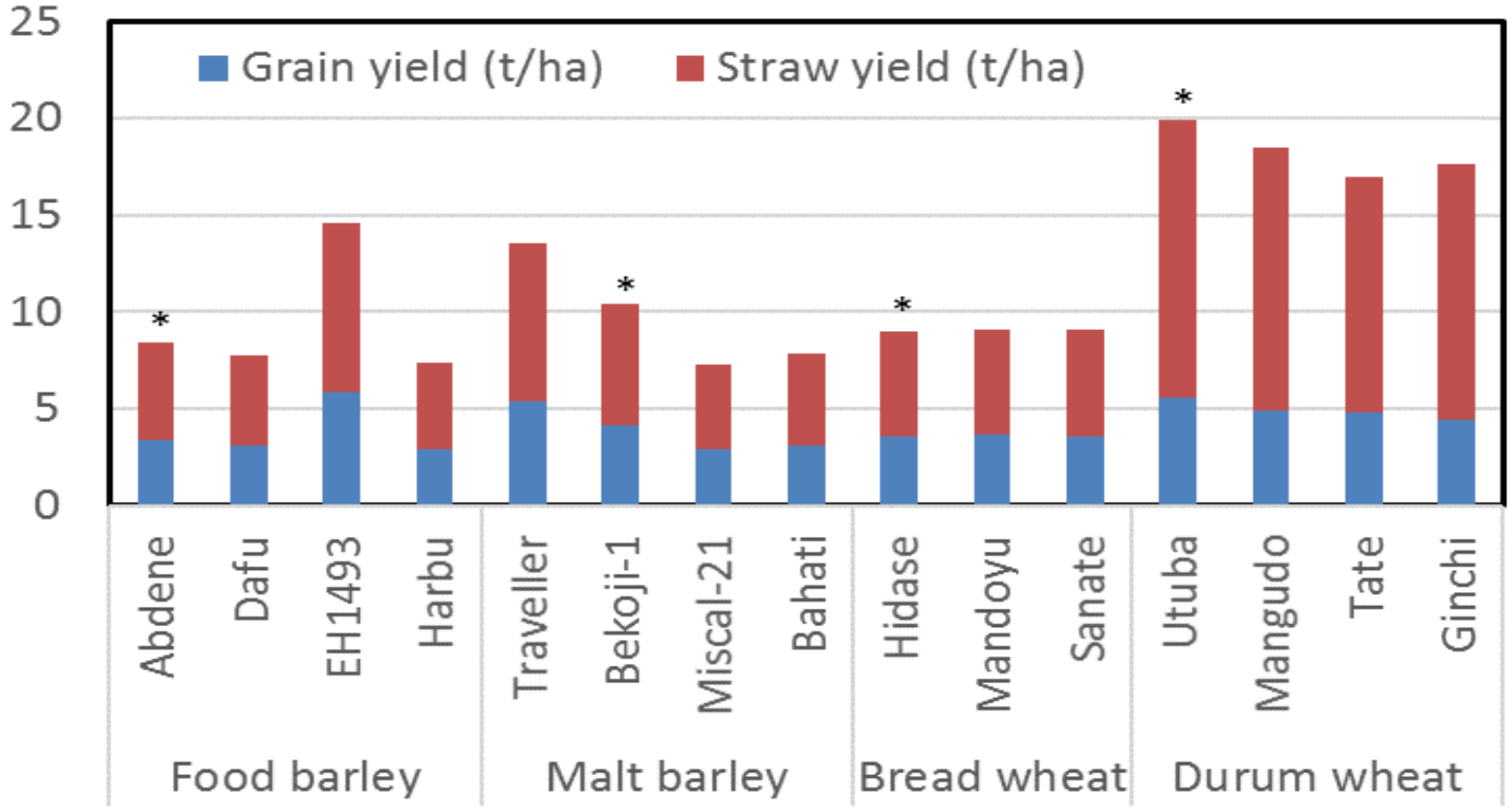
First riding after 3 leaf stage

Dehaulming after senescence

Implementation process

- **Participatory Variety Selection**
  - *Mid and end season evaluation*
  - *Belg and meher season*
  - *2-3 MFs/kebele, 2 kebele/site, 4 sites*
- **Community Based Seed Production**
  - *Mid and end season evaluation*
  - *Belg and meher season*
  - *2-3 MFs/kebele, 2 kebele/site, 4 sites*
- **Crops**
  - ***Cereal**: bread & durum wheat; food & malt barley*
  - ***Legume**: faba bean, lentil, & field pea*
  - ***Potato***

Participatory Selection of “Cereal Variety”



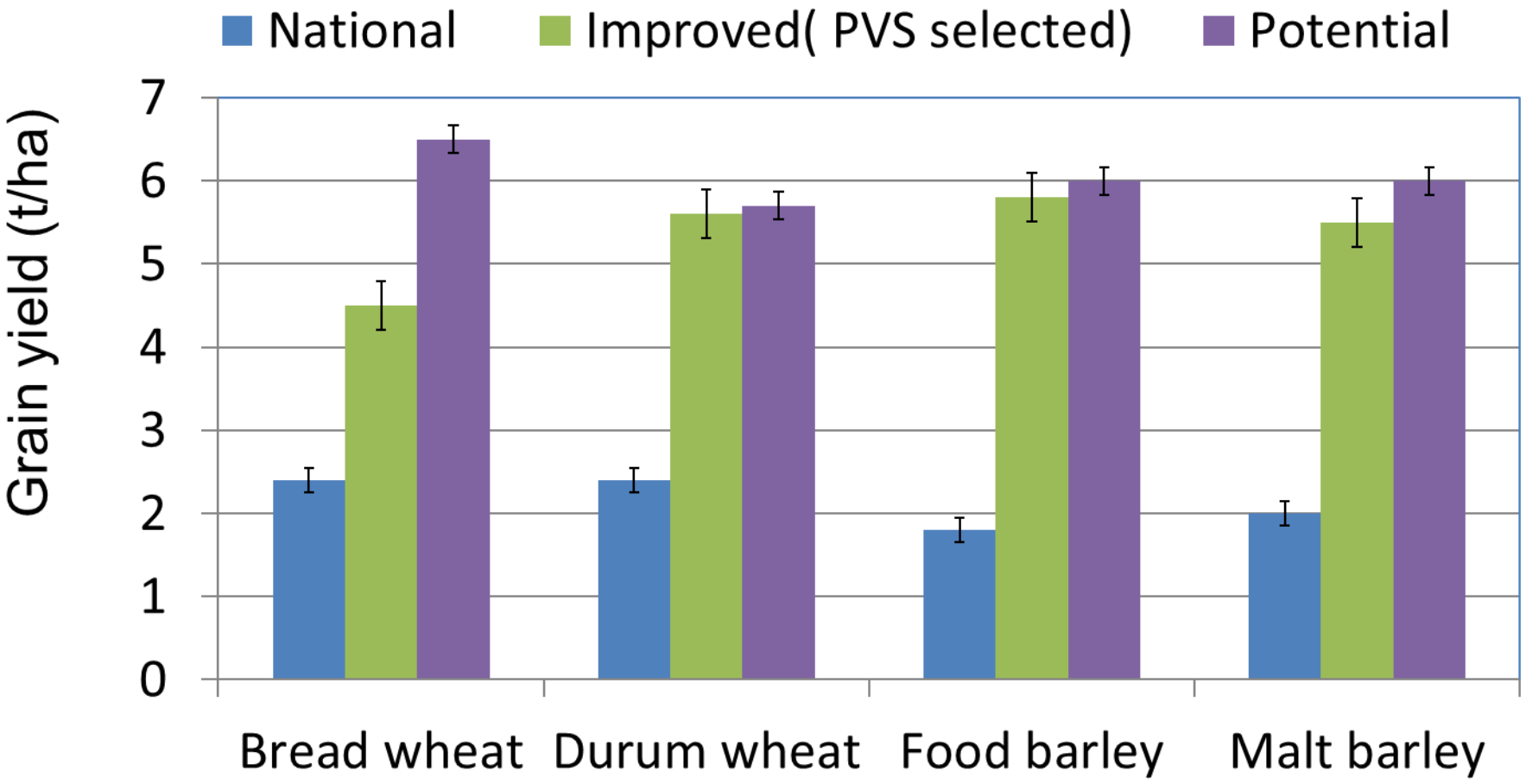
Selection criteria

Abdene: early maturity and yield

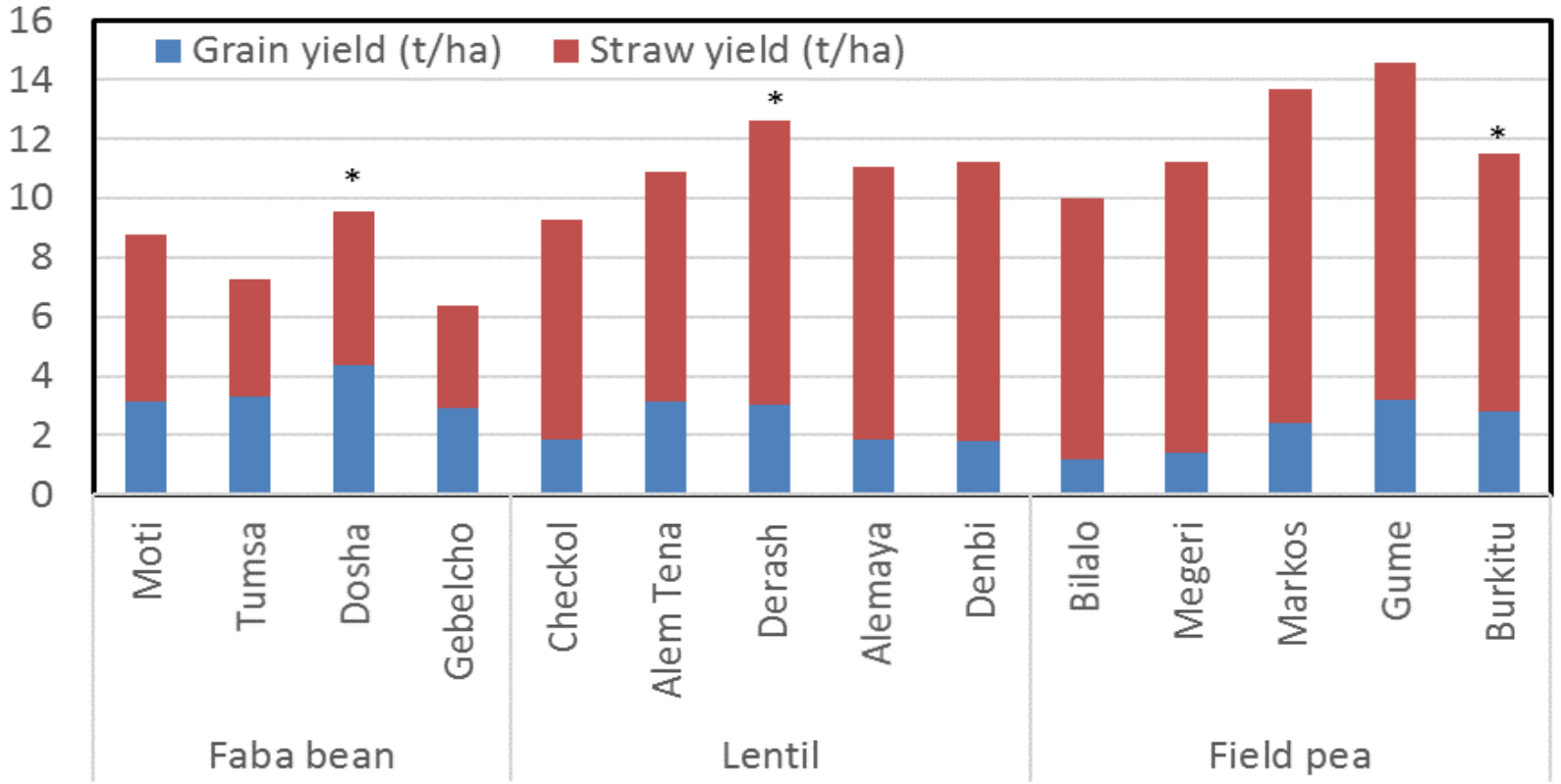
Bekoji 1: performance, early maturing and biomass yield

Utuba: performance, yield, and resistance to disease

Closing yield gaps through improved varieties & GAP



Participatory Selection of “Legume Variety”



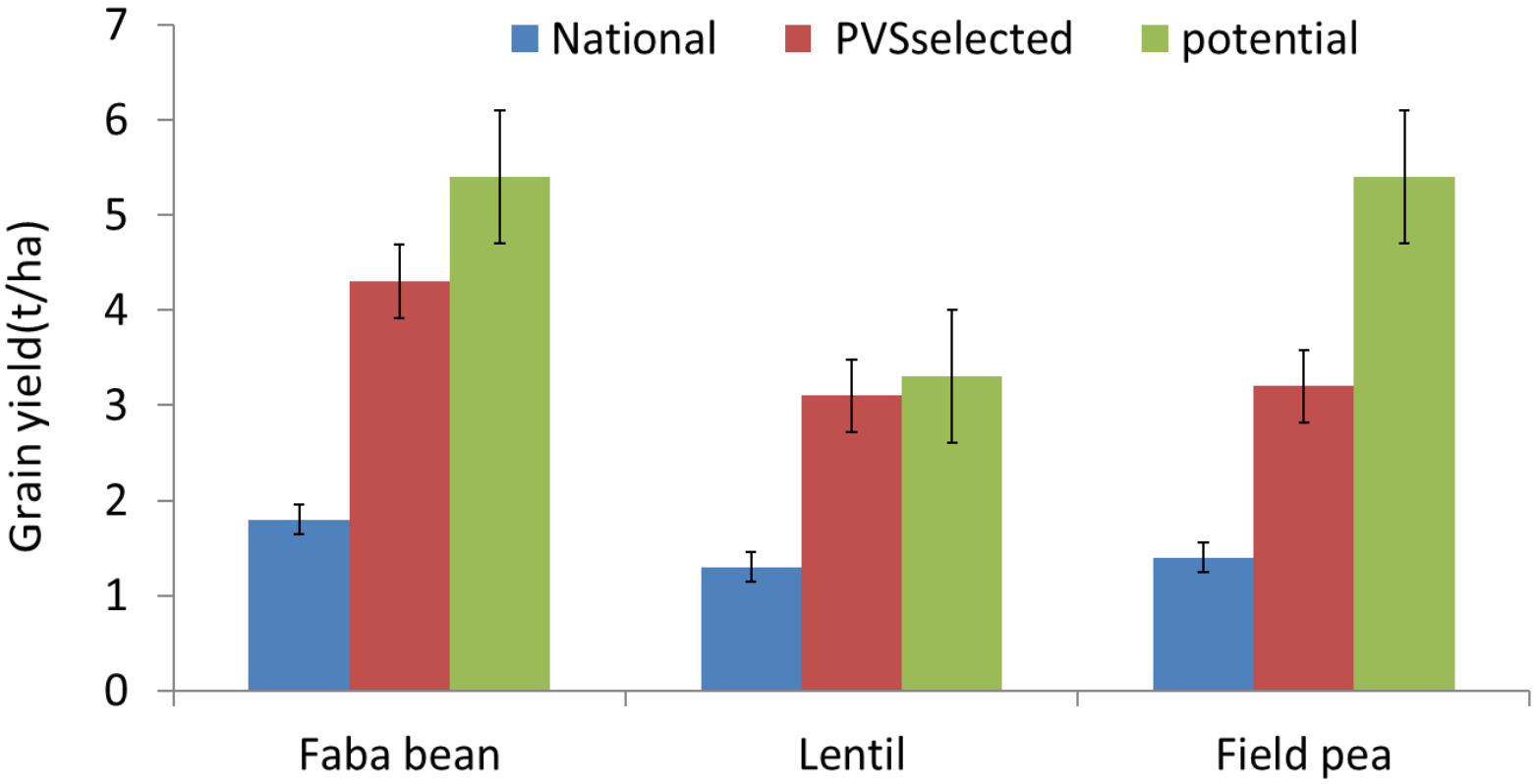
Selection criteria

Dosha: performance, yield and biomass

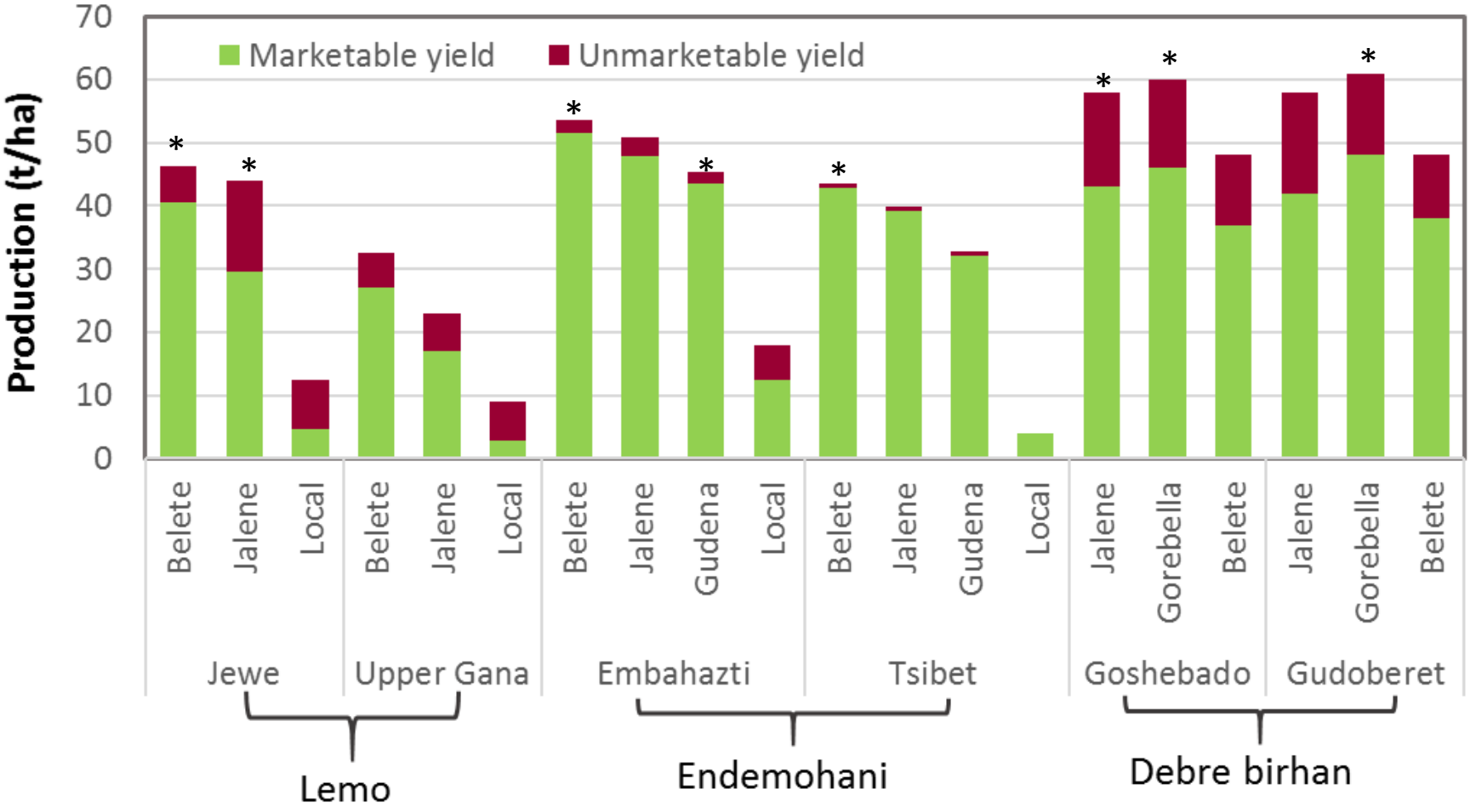
Derash: performance and yield

Burkitu: performance, yield, seed color and resistance to disease

Closing yield gaps through improved varieties & GAP



Participatory Selection of “Potato Variety”



Selection criteria

Dry matter content, cooking time, eye deepness, color, taste, late blight tolerance and yield

Table: Amount of seed produced from community seed producers

Crops	Tons
Durum wheat	279
Food barley	69
Bread wheat	59
Field pea	4.5
Lentil	3.8
Faba bean	29
Potato*	760

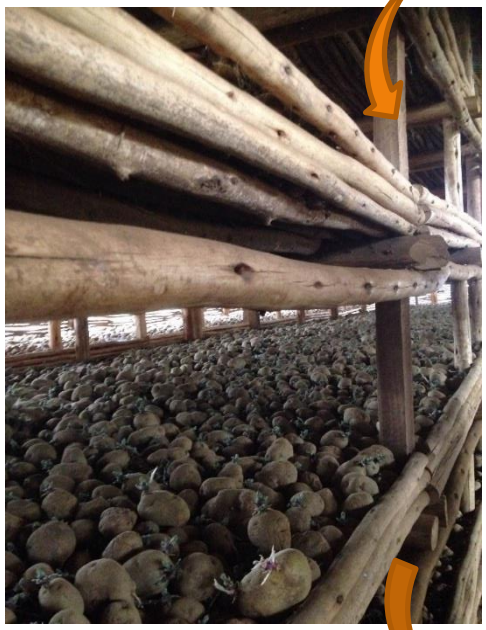


Figure: Diffused Light Storage (DLS) at Lemo

- *Potato technology included seed potato storage i.e. Diffused Light Storage as shown in Figure.
- Capacity of DLS has been increased to 240 tons
- ≥2000 HHs got access to quality seed potato
- 4 Seed cooperatives established

Practical training on storing seed legumes in triple bags

Now triple bags are locally produced in Ethiopia.

Net profit from potato production/ha was 3x ≥faba bean, 5x ≥teff, & 7x ≥barley & wheat, suggesting that potato can contribute to food security, income and nutrition.

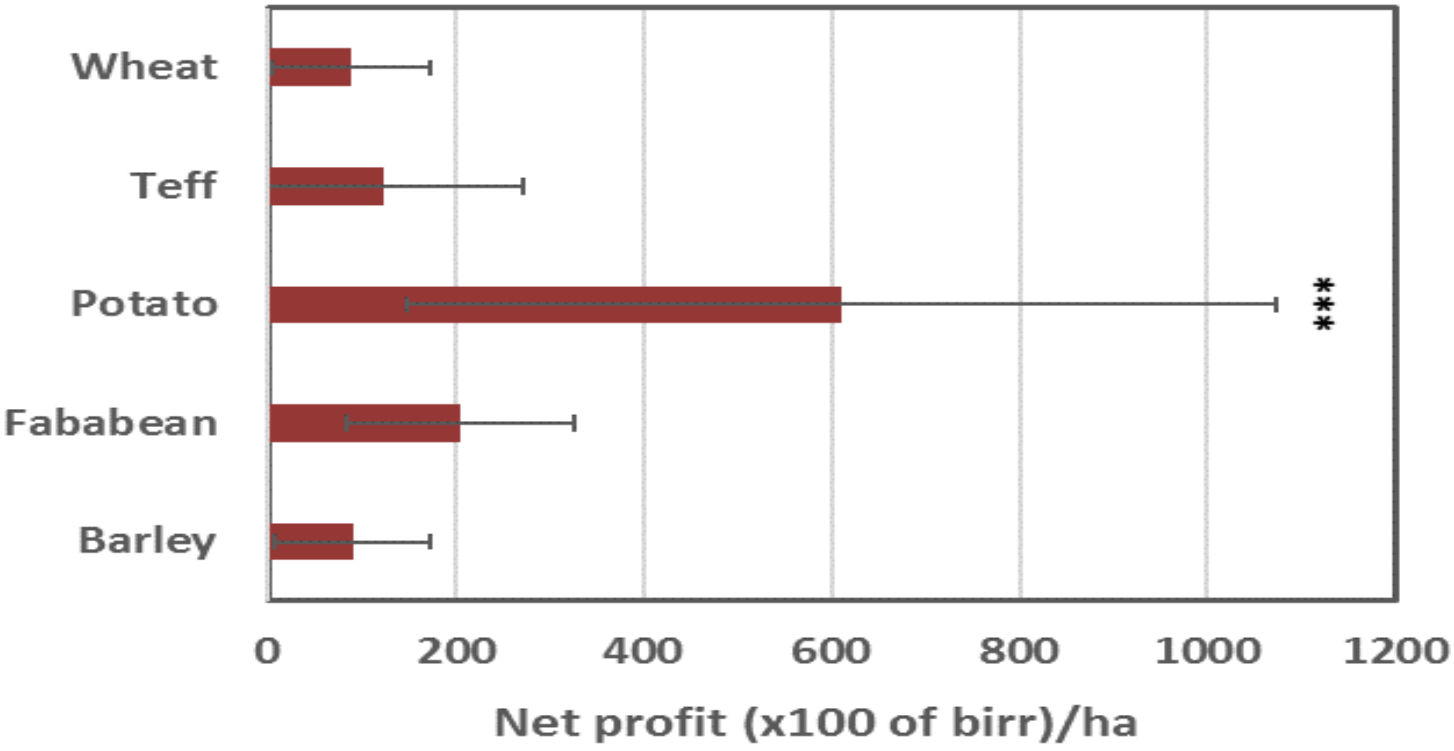


Figure: Net profit/ha from Wheat, Teff, Potato, Faba bean & Barley.

Key Lessons Learnt and Challenges

- ✓ Crop diversification ensures sustainable production
  - Policy intervention to introduce high yielding alternative cereals, food legumes and potatoes is needed
- ✓ Farmer and industry participation in variety selection speed up adoption of new technologies
- ✓ Working in partnership enhances technology selection and promotion
- ✓ Informal seed multiplication and delivery enhance technology adoption
- ✓ Field days and IP create unique opportunity for knowledge and information exchanges

Africa RISING CGIAR partners in Ethiopia

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IFPRI

World Agroforestry Centre

CIP
CENTRO INTERNACIONAL DE LA PAPA

IWMI
International Water Management Institute

Africa RISING local partners in Ethiopia

- **Academic institutions:**
  - Wachemo, Mekelle, Madawolabu, Debre Berhan and Hawassa universities; Maichew Agricultural College
- **Regional research organizations:**
  - Amhara Regional Agricultrural Research Institute, Southern Agricultural Research Institute, Tigray Agricultural Research Institute, Oromia Agricultural Research Institute
- **Federal research organizations:**
  - Ethiopian Institute for Agricultural Research, Ethiopian Health and Nutrition Research Institute
- **Offices of Agriculture:**
  - Endamekoni (Tigray), Basona Worena (Amhara), Lemo (SNNRP) and Sinana (Oromia)
- **Agricultural Transformation Agency**

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