Kirkhouse Trust: Consortium Projects:

STOL - Focuses on orphan legumes that are heat and drought tolerant - a resilient response to a changing climate – Across Arid and Semi-arid regions.

भाकृअनुप
ICAR

MoU

रा पा आ सं ब्यूरो
NBPGR

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Prem Mathur – STOL Coordinator

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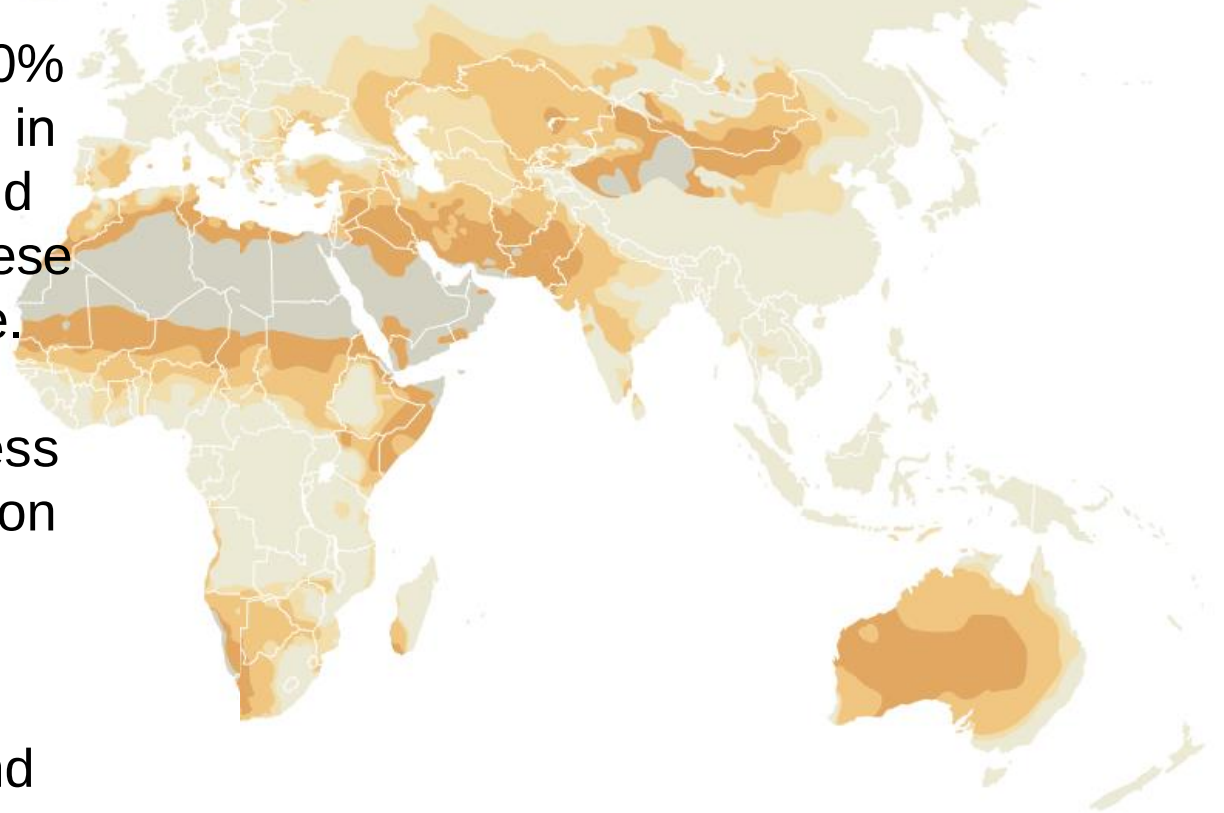
Why STOL crops are important for Arid and Semi-arid region:

- Roughly 2.5 billion people (30% of the world's population) live in arid and semi-arid regions and approximately one third of these people depend on agriculture.
- Challenges associated with crop production include: excess heat, drought, land degradation and a loss of biodiversity.
- Climate change, access to technology, poor market linkages, weak institutions and lack of partnerships.



Distribution of global drylands

From: Global Drylands: A UN system-wide response

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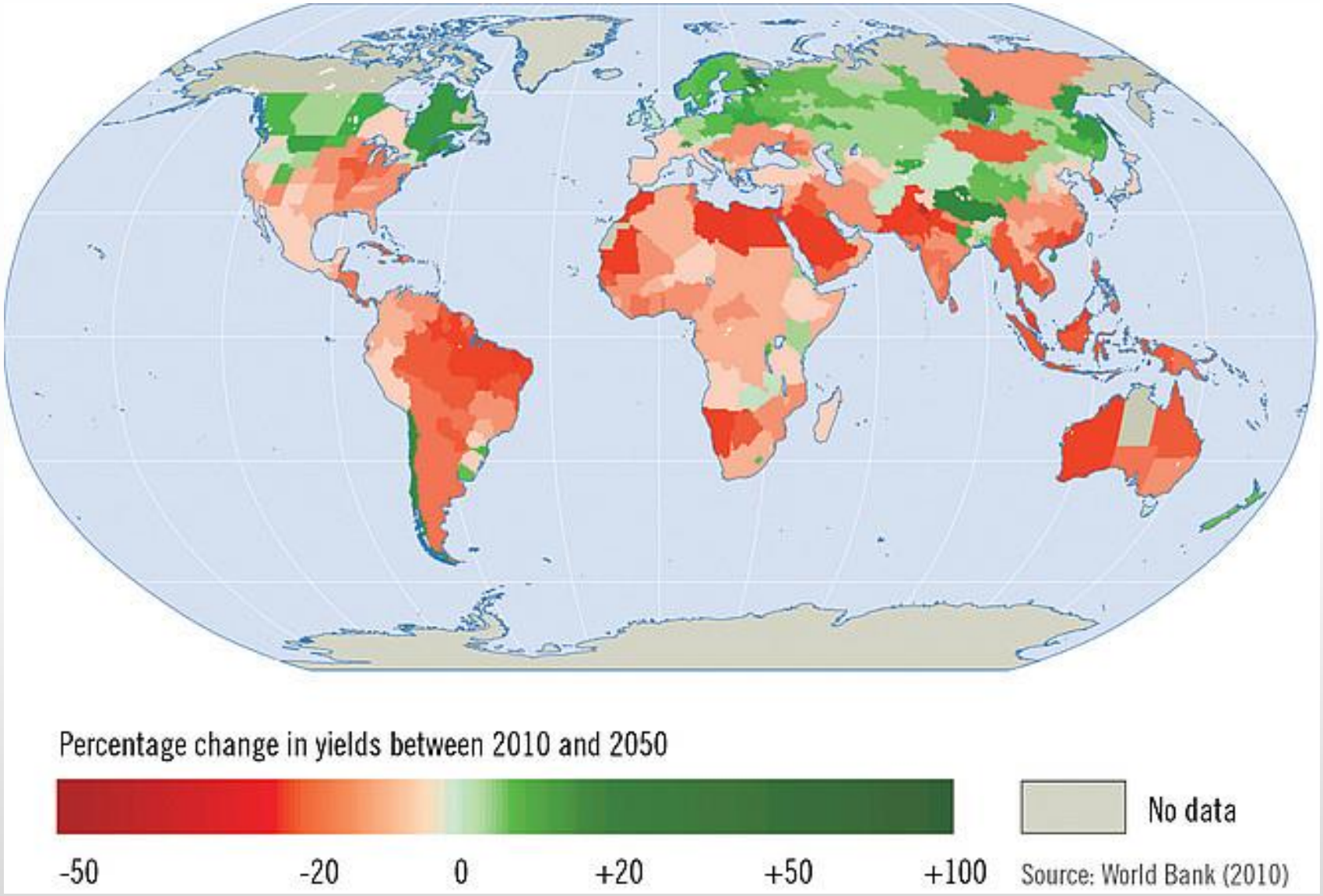
Impact of climate change on potential agricultural yields by 2050

Red areas indicate negative impacts and green indicate gains



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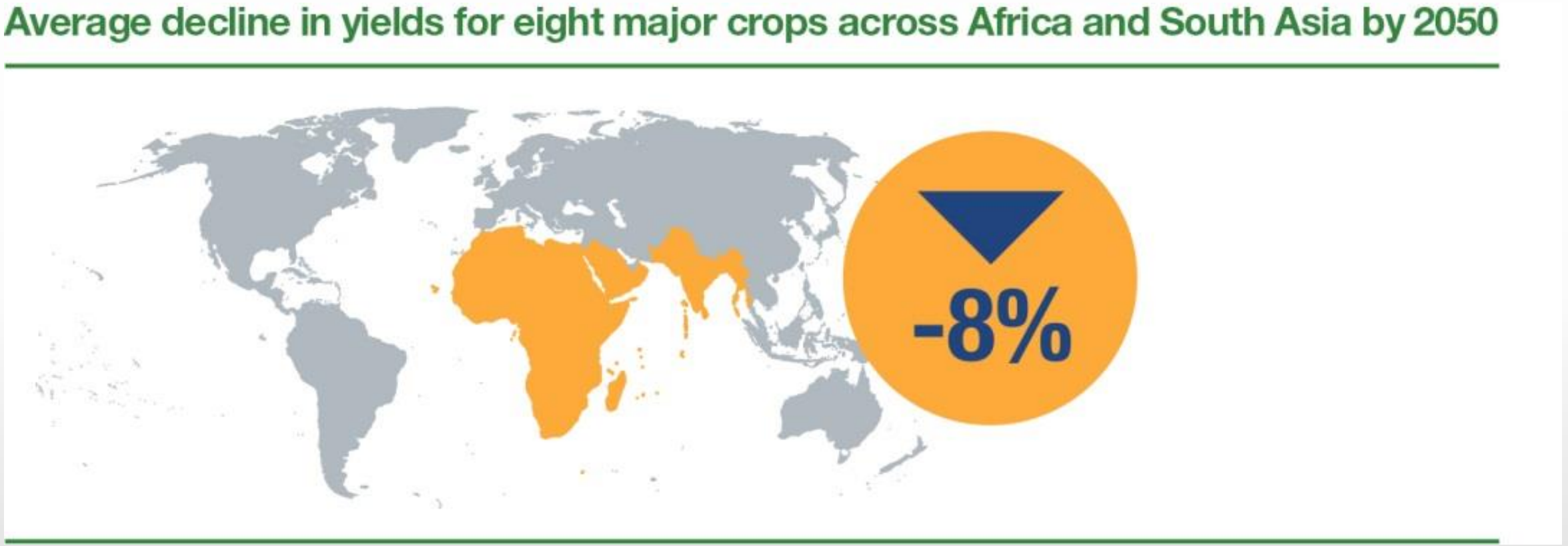
Climate change impacts



Why STOL crops are important for Arid and Semi-arid region

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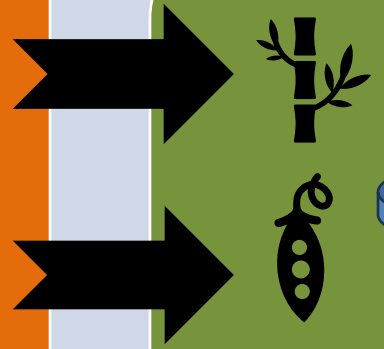
Undert current conditions: -

Farmers need to make their crops and cropping systems adapt to new conditions, quicker than ever before



New Varieties

Shift in crops

Changes in food habit

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Stress Tolerant Orphan Legumes (STOL)

Focus:

Farm diversification with introduction of new legume crops that are heat and drought tolerant – to provide a resilient response to a changing climate.

Issues:

1. **Lack of diversity among legume crops in Africa**
2. **Problem for exchange of genetic materials under International agreements**
3. **Lack of expertise for the cultivation of new introduced crops**

Goals:

1. **Assessment of existing germplasm collections**
2. **Accessibility for introduction**
3. **Adaptation trials and seed multiplication**
4. **Release of promising varieties and use in crop improvement**

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STOL – Programatic approach:

1

Many important food legumes are grown in arid and semi-arid regions of Africa and Asia, where crop productivity is hampered by biotic and abiotic stresses

2

Cultivated in isolated regions - the Indian legume species are not known for their potential in Africa and *vice versa*

3

Neglected by researchers and industry due to their limited economic importance in the global market

4

Greater investment of resources and manpower are necessary if the potential is to be unlocked and applied in the future

5

Promoting cultivation of diverse legume crops in arid region can play significant role in addressing food and nutrition security

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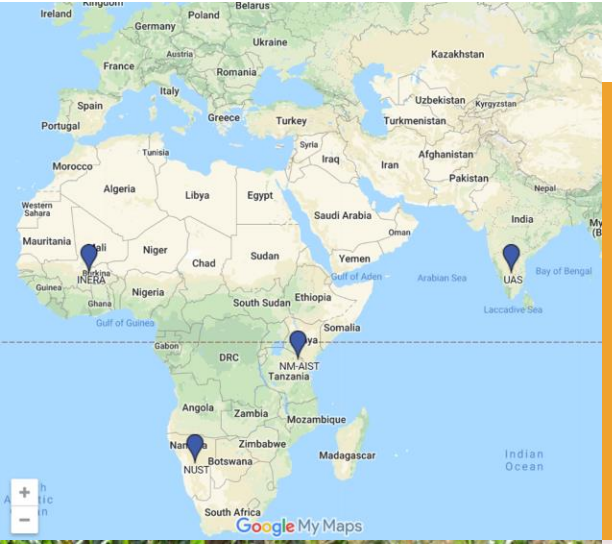
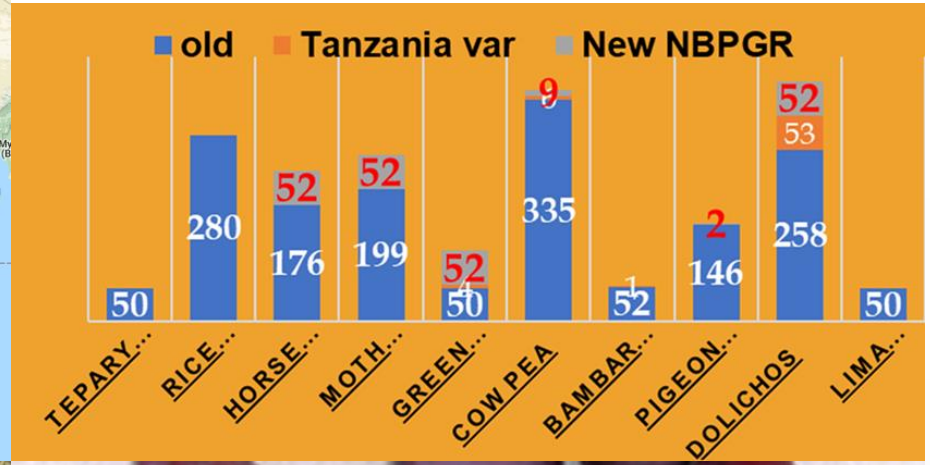


1879 germplasm collections



- **Support to improve legume crops using conventional breeding, enhanced by modern molecular techniques.**
  - ✓ India: lablab bean, moth bean, pigeonpea and horsegram
  - ✓ West Africa: Cowpea
  - ✓ Namibia: Marama
- **Germplasm collection and evaluation**
- **Agro-morphological and molecular characterization of stress tolerant orphan legumes and G x E interactions assessment.**
- **Collection and evaluation of Marama bean germplasm (521 collections)**

"Agricultural crop improvement for the relief of poverty, with a focus on legumes."

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Most of those studies have looked at the **crops individually**; little has been done comparing their response to stress conditions **under various agro-climatic conditions** located across sub-Saharan Africa and India.

Establishment of coordinated India-African partnership programme

ICAR-NBPGR-KT MoU was signed on May 2018 to April 2023 & extended until May 2025.

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Strengthen STOL Activities:

1. Moth bean (*Vigna aconitifolia*) - AVRDC
2. Mung bean (*Vigna radiata*)
3. Horsegram (*Macrotyloma uniflorum*)
4. Dolichos (*Lablab purpureus*)
5. Cowpea (*Vigna unguiculata*)
6. Bambara groundnut (*Vigna subterranean*)
7. Marama bean (*Tylosema esculentum*)
8. Tepary bean (*Phaseolus acutifolius*) – UC, Davis

9. Rice bean (*Vigna umbellata*)
10. Lima bean (*Phaseolus lunatus*)
11. Adzuki bean (*Vigna angularis*)
12. Common bean (*Phaseolus vulgaris*)









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1

Identification of suitable accessions/ varieties

2

Seed increase and exchange for multi-locational trials

3

Identification of suitable varieties, based on on-farm research trials

4

Multiplication and distribution of the promising varieties for on farm trials getting farmers' feedback

5

Identified promising varieties based on multi-locational testing for release of varieties in national system

6

Seed increase, capacity building through training workshops, and exchange visits

STOL

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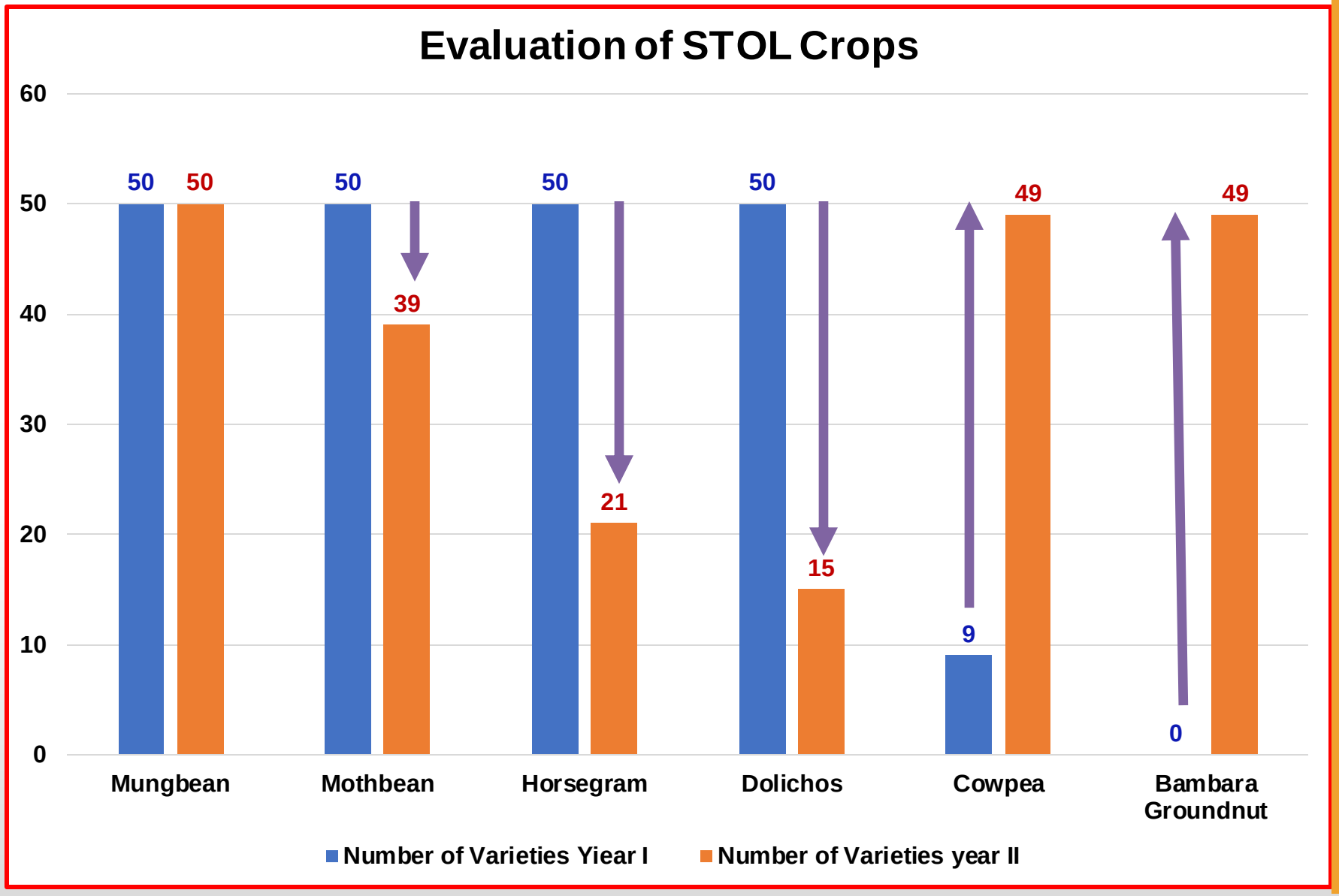

STOL Activities:

1. 50 germplasm each of mungbean, mothbean, horsegram and Dolichos from India identified
2. Seed increase and exchange
3. Preliminary evaluation and seed increase in each country
4. Selection of suitable varieties for further testing
5. Undertaking on-farm testing
6. Proposals for release of varieties

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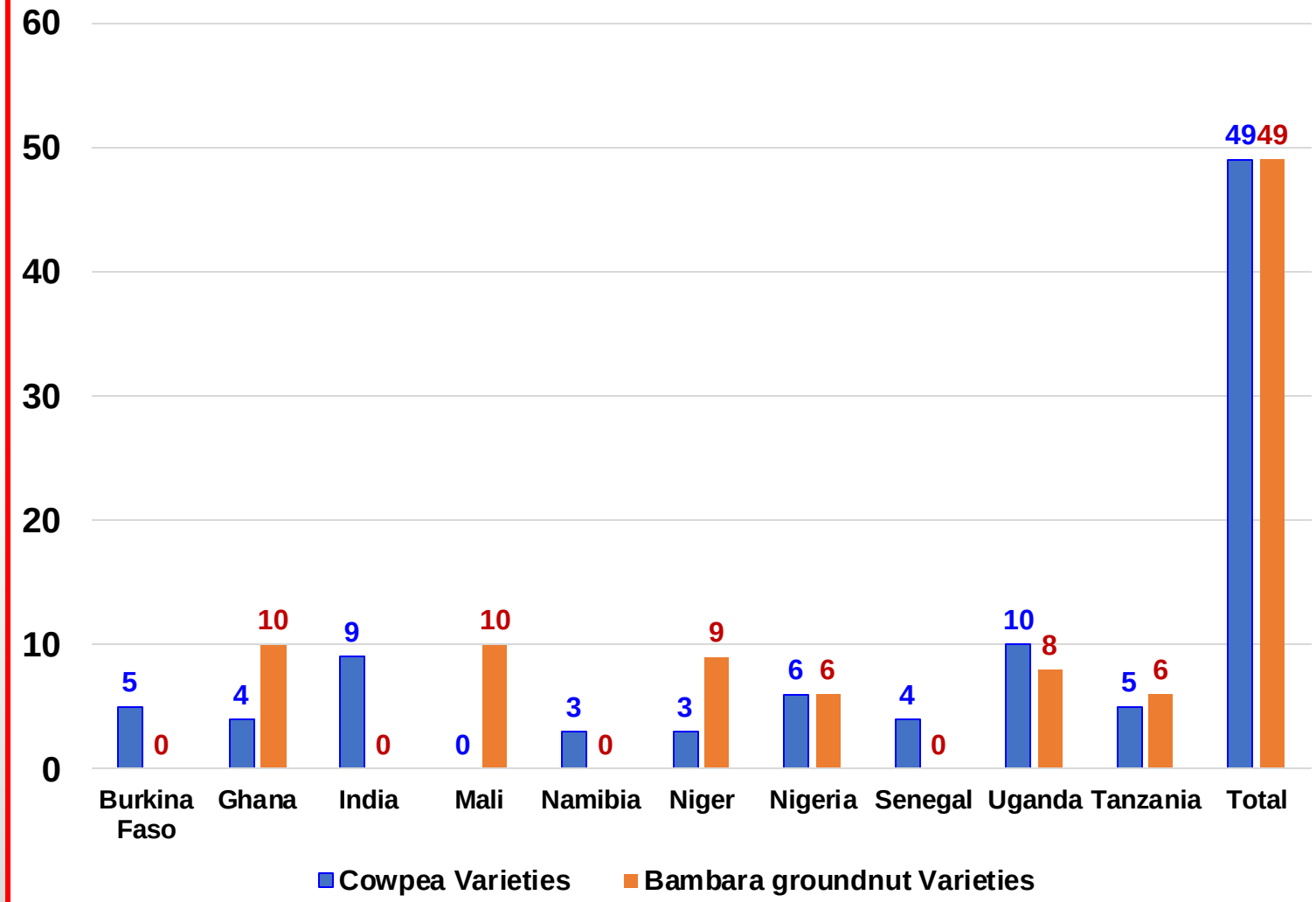
STOL Partners Sharing Cowpea and Bambara Groundnut Varieties



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- **Farmers' field days were organised**
- **Impressed with the introduction of new STOL crops**

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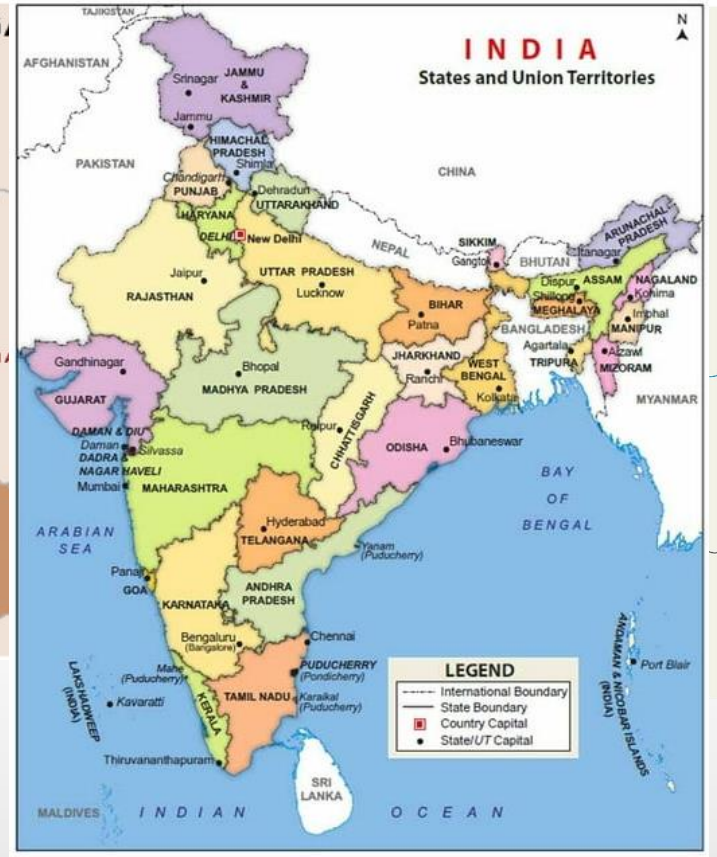
Farmers' Choices over Cowpea

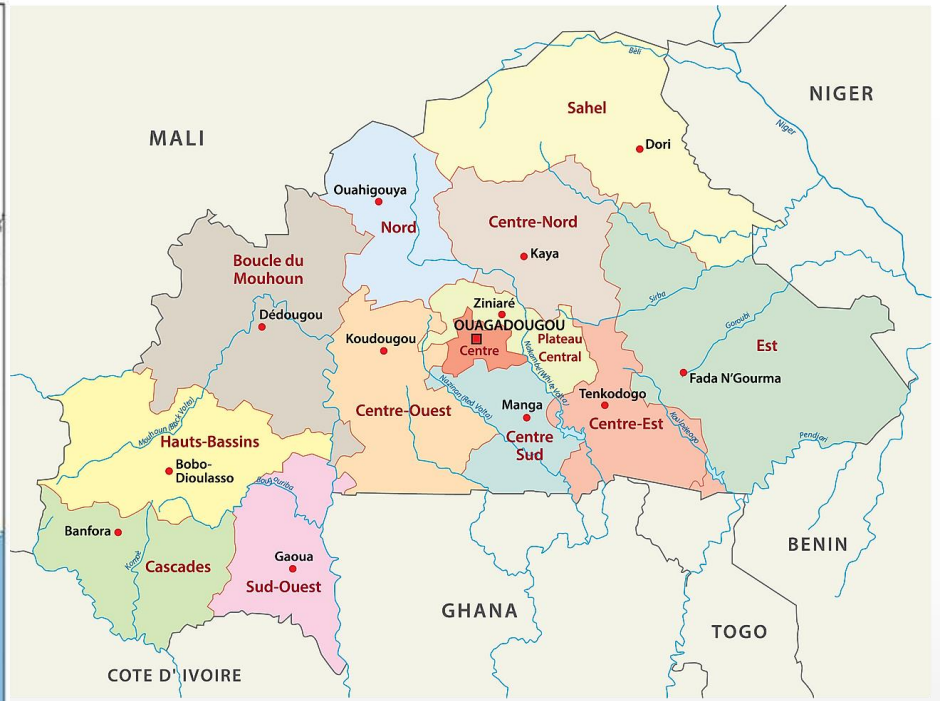
1. **Mungbean:** Preferred across all countries due to early maturity, high seed and fodder yield, many harvesting cycles, ease of harvesting, suitable for mixed farming
2. **Mothbean:** Early maturity, high seed yield, extreme drought resistance, good soil coverage and as fodder crop
3. **Horsegram:** Early maturity, high fodder yield, suitable for mixed farming
4. **Dolichos:** Bold seed size, erect plant type and large leaves for high fodder production
5. **Bambara Groundnut:** High seed and fodder yield, large seed size

Current activities:

- Varietal evaluation trials of mungbean and mothbean
- Seed multiplication of STOL crops.



- Field evaluation of STOL crops
- Initial evaluation of Bambara groundnut, Tepary bean and Marama bean



- Varietal evaluation trials for mungbean and Dolichos
- Seed multiplication of STOL crops.

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Supply of trait specific cowpea germplasm to Namibia for identifying and developing bruchid-resistant cowpea varieties:

Trait	Number of Accessions
Early maturity (<60 days maturity)	3
High protein content in seed	1
Erect, determinate, high yielding	4
Erect	3
Early, Erect	2
Early, erect, purple podded	2
Mungbean type pods	3
High 100 seed weight	1
Root rot resistant	1
Bruchid resistant	25
Total	**45**

Characterization and evaluation of Bambara Groundnut Germplasm

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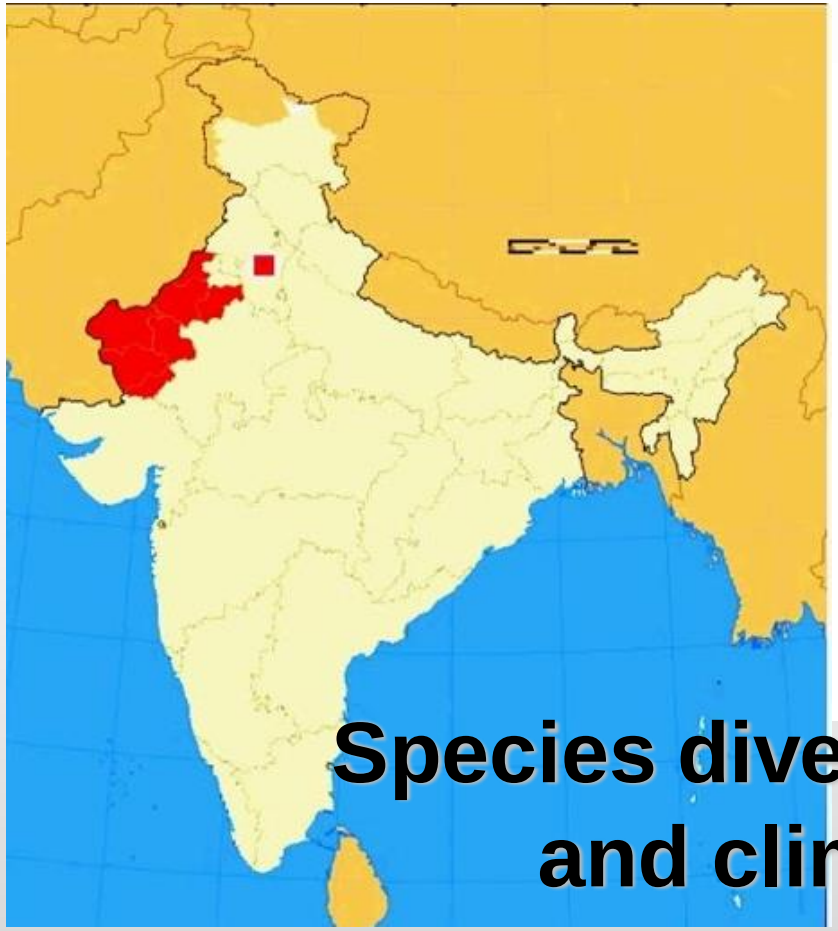
THANKS



Species diversity is key for food security and climate change adaptation

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