# Enhancing the Resilience of Livelihoods of Small Millet Farmers through Participatory Varietal Selection in India

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# Topics covered

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1. Need for the study
2. About PVS
3. Why PVS approach for SMs
4. PVS in RESMISA project
5. Status of varietal diversity
6. Results and discussion
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# Need for the study

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- Small millets (SMs- *Little millet, Finger milllet, Kodo millet, Barnyard millet, Proso millet & Foxtail millet*) are known for their superior nutritional qualities
- Also known for
  - Contribution to improved agro-biodiversity
  - Ability to meet food, income and fodder security
  - Significant cultural value in the South Asian Region
- Despites these advantages India witnessed a 76% decrease in total production (except FM) and a steep fall in consumption between 1961 and 2009

# Need for the study Cont…

- In the last two decades, the rainfed ecosystems where SMs are cultivated are affected by various climate change related issues
  - Important being change in the rainfall pattern
- Varietal selection can be an effective means for enhancing the resilience of SM farmers
- With this objective Varietal Selection of SMs is being attempted since 2011 in five sites in India under an action research project -*'Revalorising Small millets in Rainfed Regions South Asia (RESMISA)'*

# About Participatory Varietal Selection (PVS)

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## What is PVS?

- ✓ PVS is selection amongst fixed lines by farmers under target environment
- ✓ It is a simple way for breeders and agronomists to learn which varieties perform well on-farm and are preferred by farmers
- ✓ It is both a research and an extension method

# Reducing the gap between selection and target Es

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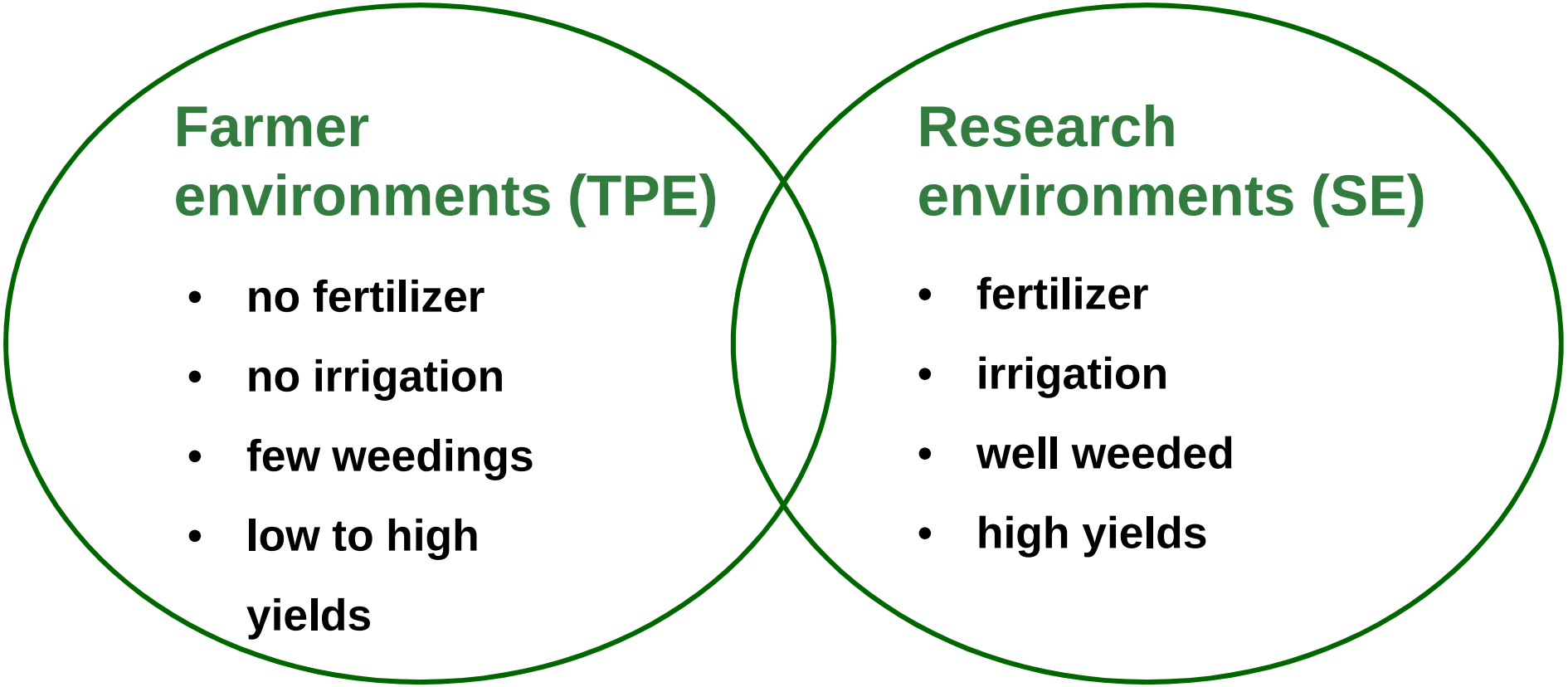


*M. Banzinger*

# Reducing the gap between selection and target Es…

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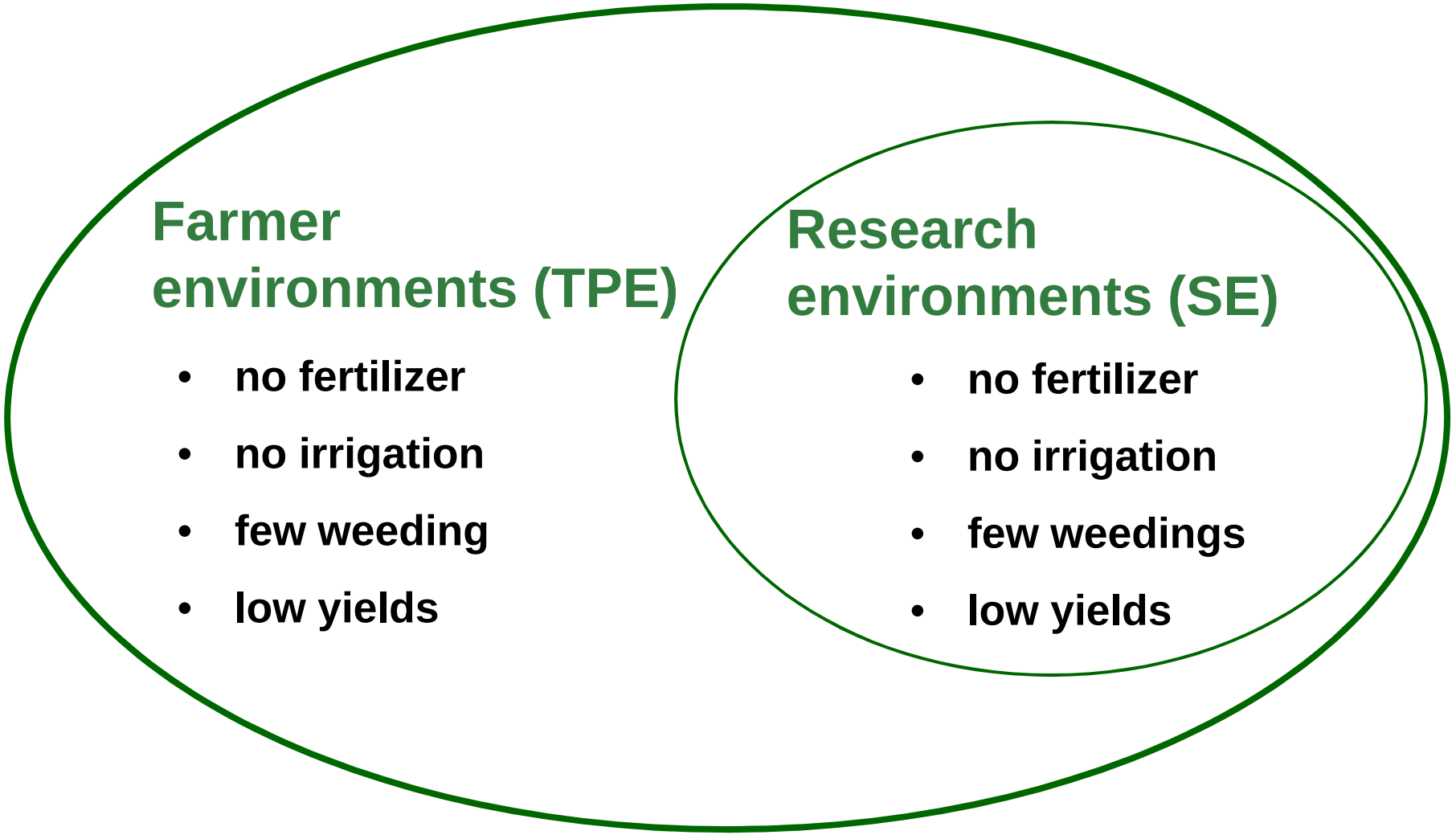

# Testing varieties with farmers

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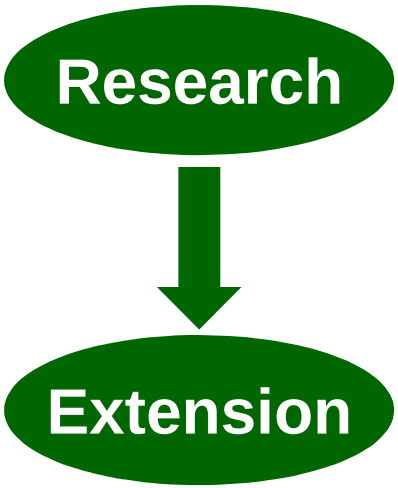
Collaborating with farmers to test varieties and get them to market

**Conventional**




**Client-oriented (participatory)**


Minimises delays between development and adoption....

# Methodology of PVS

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## Steps:

1. Situation analysis to identify farmers' and market needs in a cultivar
2. A search for suitable materials to test with farmers;
3. Experimentation on its acceptability in farmers' fields
4. Wider dissemination of farmer-preferred cultivars

# Why PVS approach for SMs?

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- There is need for varietal selection under each micro agro-ecosystem of SMs as
  - They are cultivated in many heterogeneous environments ranging from land-locked hills to coastal agro-ecosystems
  - The climate change impact vary from place to place
- To account for important traits that are needed or preferred by farmers in the changing environment *(Breeders perspective on traits needed by farmers)*
- To conserve the fast disappearing traditional varieties
- To address the issue of poor penetration of released varieties

# PVS in RESMISA project

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- In an embedded way in the farming milieu of SMs
  - Starting with varieties in the hands on local community and the nearby communities
- In an integrated way with *conservation efforts* on the one end and *local seed production and distribution* on the other end
- Interfacing of farmers with breeders from TNAU and ICAR
  - Interfacing of farmers' knowledge and formal science
- Gender sensitive research approach was followed

# RESMISA approach for On-farm conservation and improvement of varietal diversity of small millets

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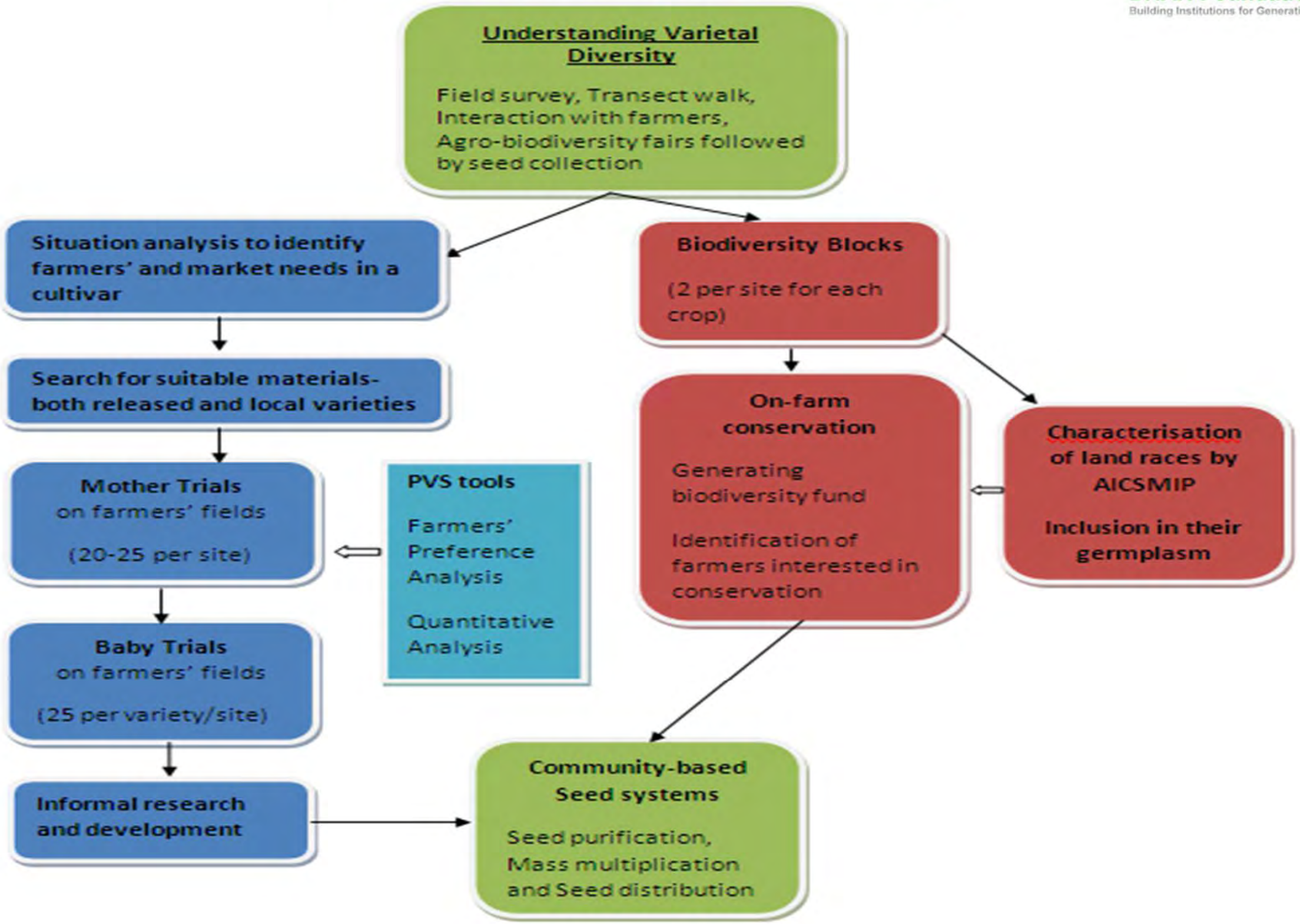

# Design of on-farm PVS trials

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1. **Mother trials** involving 8-10 promising varieties in each crop (un-replicated trials)
   - **Replicated trials (RCBD)** with same set of varieties, one in farmer's field and another in research institution
2. **Baby trials** involving 1 or 2 identified varieties in each crop
3. **IRD** – Promotion of proven varieties through mass multiplication of seeds

# The Mother and Baby Trial

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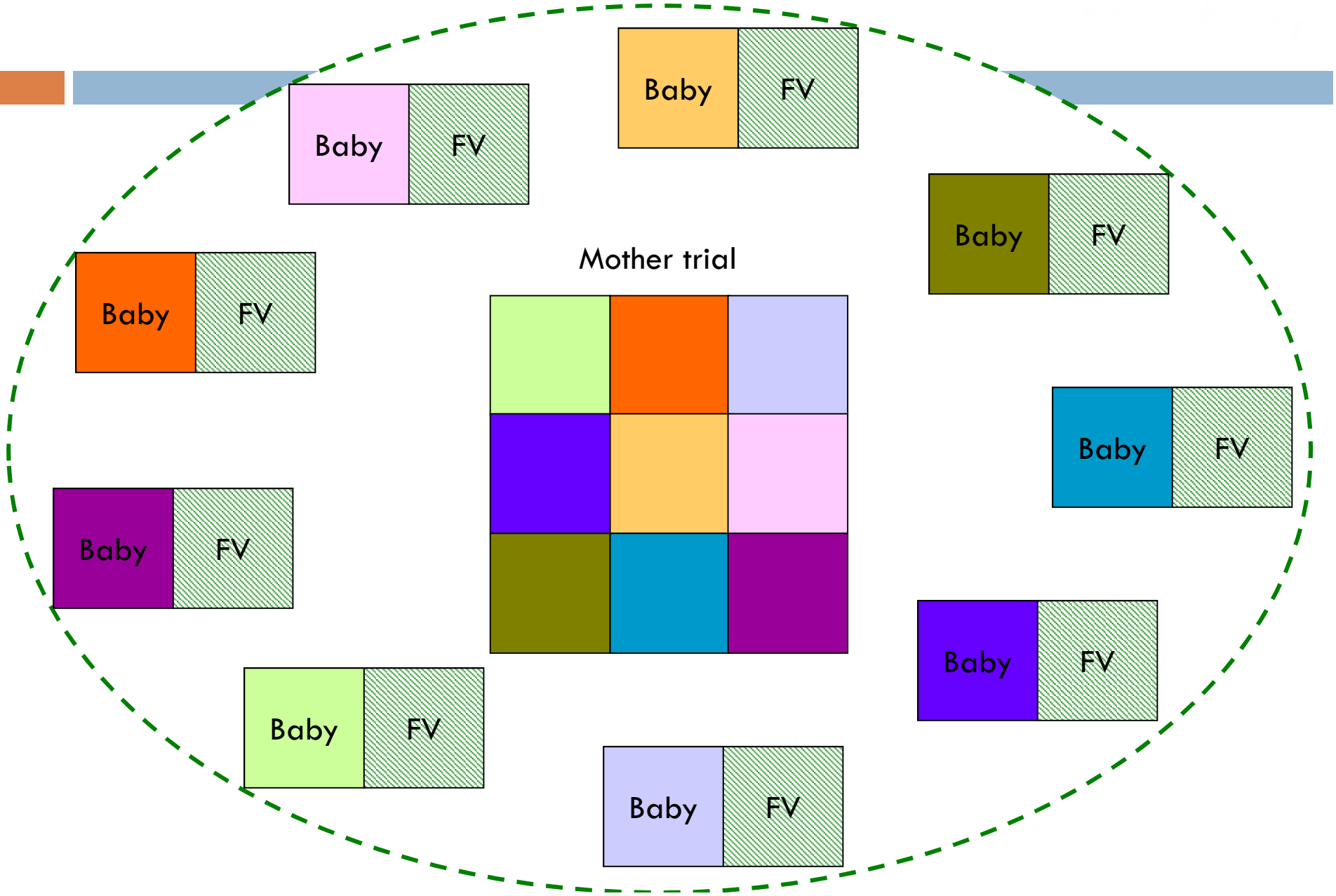

# Statistical analysis followed

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**Mother trial and RCBD**

Quantitative analysis

- Growth and yield parameters were analysed
- ANOVA was followed
  - Trials on individual farmers' fields were considered as replications

Qualitative analysis

- Farmers' preference analysis- Individual score values of each variety (as 1st, 2nd and 3rd preference) were converted into weighted scores
- The top scored varieties along with quantitative data were identified as the most preferred varieties

# Statistical analysis followed…

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**Baby trials and IRD**

- Frequency analysis of positive and negative values of trial farmer's opinion was followed

# Project sites

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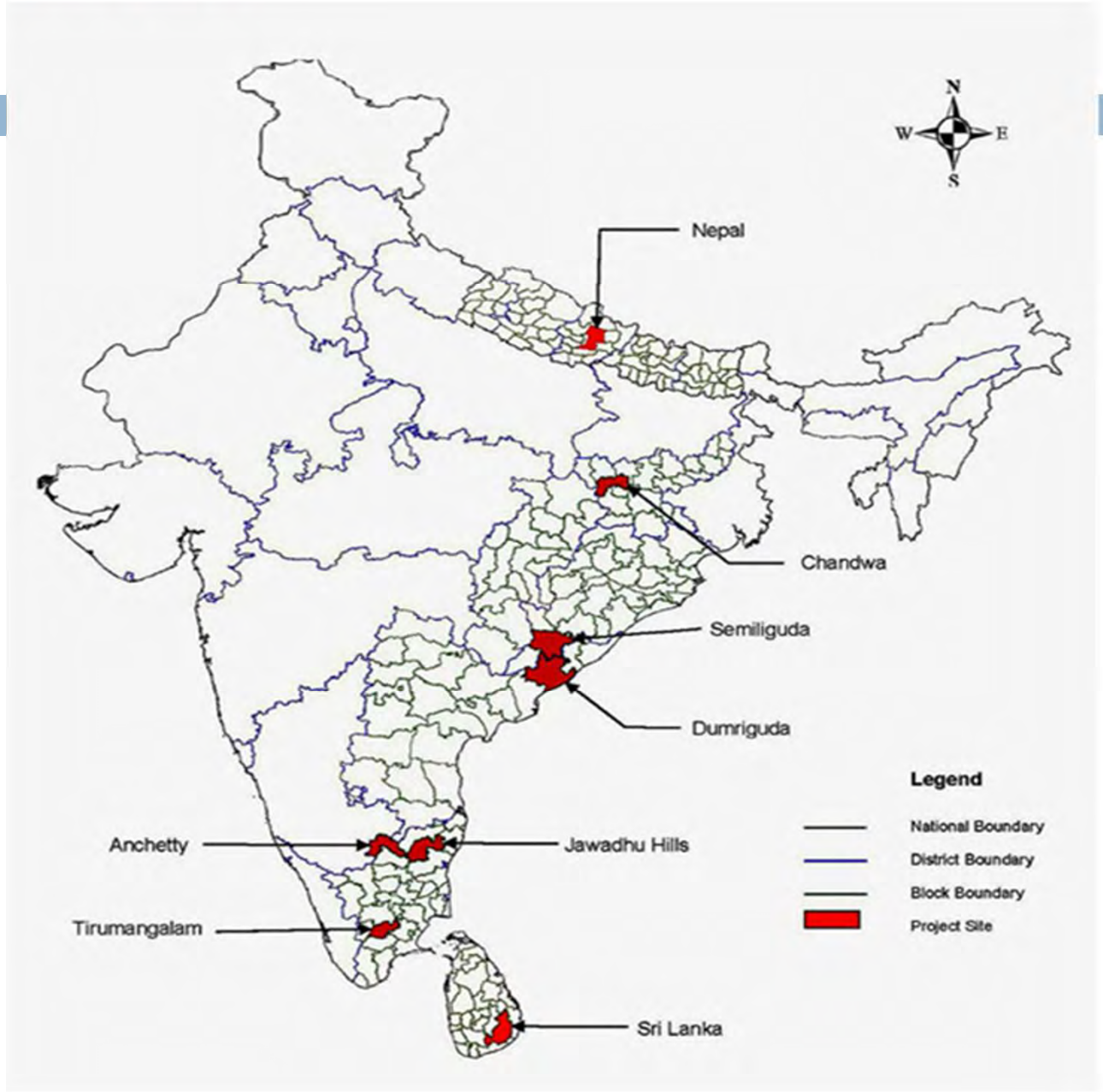

# Status of varietal diversity in SMs

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| Site | Finger millet | | | | Little millet | | | | Kodo millet | | | | Barnyard millet | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Present | | Popular | | Present | | Popular | | Present | | Popular | | Present | | Popular | |
| | LV | RV | LV | RV | LV | RV | LV | RV | LV | RV | LV | RV | LV | RV | LV | RV |
| SG | 19 | 2 | 4 | | 8 | 2 | 1 | | | | | | | | | |
| Be | 4 | | 2 | | | | | | | | | | | | | |
| Ac | 2 | 2 | | 2 | | | | | | | | | | | | |
| JH | 2 | | 1 | | 9 | | 3 | | | | | | | | | |
| Pe | | | | | | | | | 3 | | 2 | | 2 | | 1 | |

LV- Local variety; RV- Released variety

# Existing status of varietal diversity

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- Some of the local varieties has become rare and may disappear if specific efforts are not taken
- Many of the local varieties show impurity

# Results and Discussion

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## Results pertains to following PVS trials

1. Mother trials in 2011 and 2012
2. Baby trials in 2012
3. Promotional trials (IRD) in 2013

# Participatory Varietal Selection- Mother trial

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# Participatory Varietal Selection- Preference analysis

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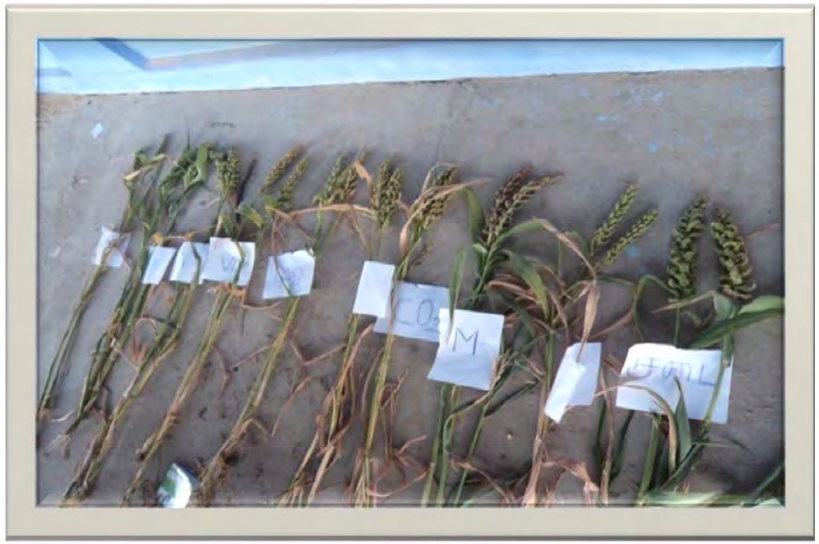

# Participatory Varietal Selection- Baby trial

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# Summary of results of PVS trials

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In the two cycles of PVS trials across the five sites 578 men and 333 women farmers were involved

# Results of PVS trials- 2011 and 2012

| Site | Crop | No. of varieties included | | | No. of varieties selected | | | |
|---|---|---|---|---|---|---|---|---|
| | | Local | Rele | Pre-R | Local | Rele | Pre-R | Total |
| SG | F. Millet | 18 | 5 | 2 | | 2 | 2 | 4 |
| | L. Millet | 5 | 5 | | 1 | | | 1 |
| Be | Finger millet | 4 | 4 | 2 | | 2 | 2 | 4 |
| JH | L. Millet | 8 | 5 | | 2 | 1 | | 3 |
| | F. Millet | 5 | 5 | 2 | 2 | 1 | 1 | 4 |
| An | F.Millet | 7 | 9 | 2 | 2 | 1 | 1 | 4 |
| Pe | BY. Millet | 8 | 9 | | 3 | 1 | | 4 |
| | K.Millet | 5 | 3 | 4 | 1 | | 1 | 2 |
| Total | | 60 | 45 | 12 | 11 | 10 | 7 | |

# Research findings of PVS

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- The preferences of local farmers though found to be in agreement with the quantitative analysis of the yield parameters, they also look for other parameters like grain quality, crop duration and adaptability to local rainfall pattern and cropping system
- Few traditional varieties from the nearby area were identified as potential ones for the sites- *Indicates the possibilities for varietal improvement*
- It was possible to identify one to four additional varieties for each crop in each of the four sites, indicating the utility of the approach to show results in a short period of time

# Research findings of PVS

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- Immediate benefits were realised by the target groups- *They had access to large number of potential varieties and they have saved seeds of promising varieties for future use*
- The study indicated the need for local community organisations to locate these participatory efforts
- The study helped to recognise the potentials of local popular varieties in all the 4 crops, which need to be further exploited in the breeding process

# Conclusion and next steps envisaged

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PVS approach was found to be more robust, effective and efficient to address the issues related to varietal improvement for enhancing resilience of small farmers in diverse situations of rainfed farming

Next steps:

1. Conservation of vanishing local varieties
2. Purification of potential local varieties
3. Promotion of the identified varieties as well as the existing popular ones through community-based seed systems to enhance varietal diversity in each site
4. In order to utilize the local germplasm of each crop more efficiently, PPB can be tried in the coming years

# Policy support needed

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Community:

1. Support for establishing community-based seed systems that effectively integrate on-farm conservation, varietal improvement and varietal distribution

Formal seed system:

- Inclusion of popular local varieties in the State formal seed system- *Presently it is not the case*
- Recognition of farmers' rights related to the varieties and secure the same through various ways, including geographical indication

NARS :

1. Mainstream agricultural research institutions need to recognise PVS
    1. Make PVS mandatory for regional research stations (RRS)
    2. Exploit the potential local varieties in the breeding efforts in RRS

# Thank you