Project on Development of Drought Tolerant Trees for Adaptation to Climate Change in Drylands of Kenya

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PROJECT DURATION
2012 - 2017

KENYA FORESTRY RESEARCH INSTITUTE
KEFRI

FTBC
Forest Tree Breeding Center

JICA

PROJECT DESIGN

Overall Goal

Quality plantations of indigenous species are extended in the ASALs of Kenya

KEFRI's capacity for conducting research on genetic diversity of indigenous species (*Melia volkensii* and *Acacia tortilis* as pioneer trial) is strengthened.

Quality seed and seedling supply system for *Melia volkensii* is established.

Project Purpose

Research capacity and extension system necessary for promoting indigenous species plantation in the ASALs is enhanced.

KEFRI's capacity for implementing forest tree breeding of indigenous species (*Melia volkensii* and *Acacia tortilis* as pioneer trial) is strengthened.

Awareness of relevant stakeholders on the importance of quality seed and seedling is raised.

Melia volkensii

- A drought tolerant, termite resistant tree that produces high quality timber (used for making high value furniture, doors and windows frames)
- Provides fodder and fruits for animals
- Potential for large scale dryland afforestation (see suitable conditions next slide)

Acacia tortilis

- Provides fodder
- Fuelwood and charcoal
- Fuelwood of high calorific value (4400 kcal/kg)

Project Outline

Tree Breeding

Melia volkensii

Plus Tree Selection → Propagation > (Seed Orchard) → Evaluation (Progeny Test)

Acacia tortilis

Plus Tree Selection → Propagation (Seed Stand)

DNA Analysis

Study on Drought Tolerance

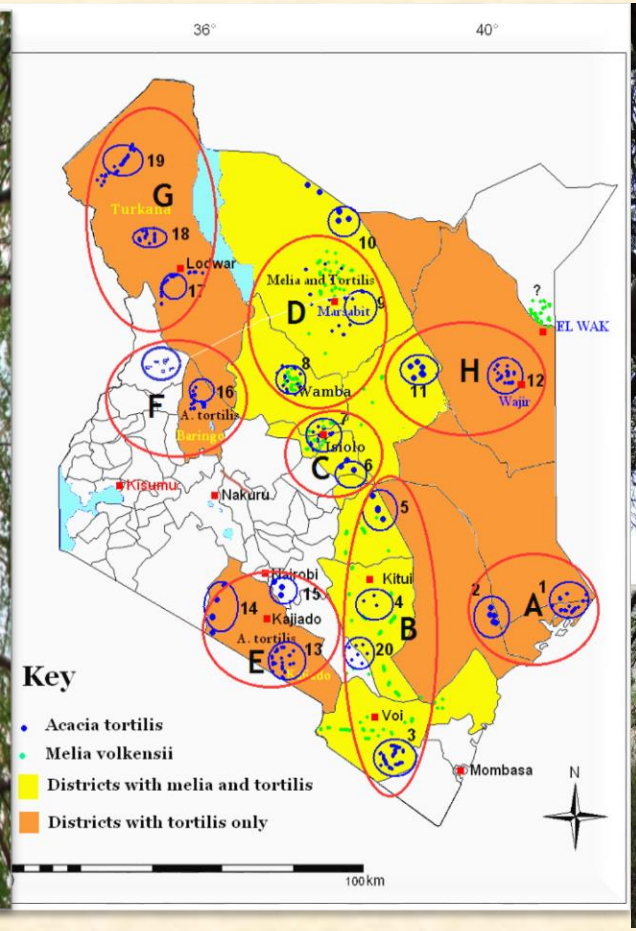
Quality Seed/ Seedlings

Extension

- Market Research
- Extension Material (Guidelines, etc)
- Seminar/Training

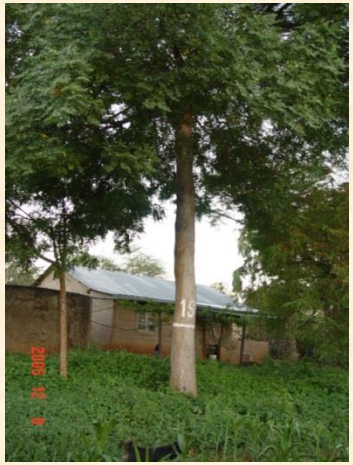
Stratification of *Acacia tortilis* and *Melia volkensii* natural populations in Kenya & Selection of Candidate Plus Trees (CPTs)

100 CP trees – M volkensii



100 CP trees – A. tortilis

Some selected *Melia volkensii* Candidate Plus Trees

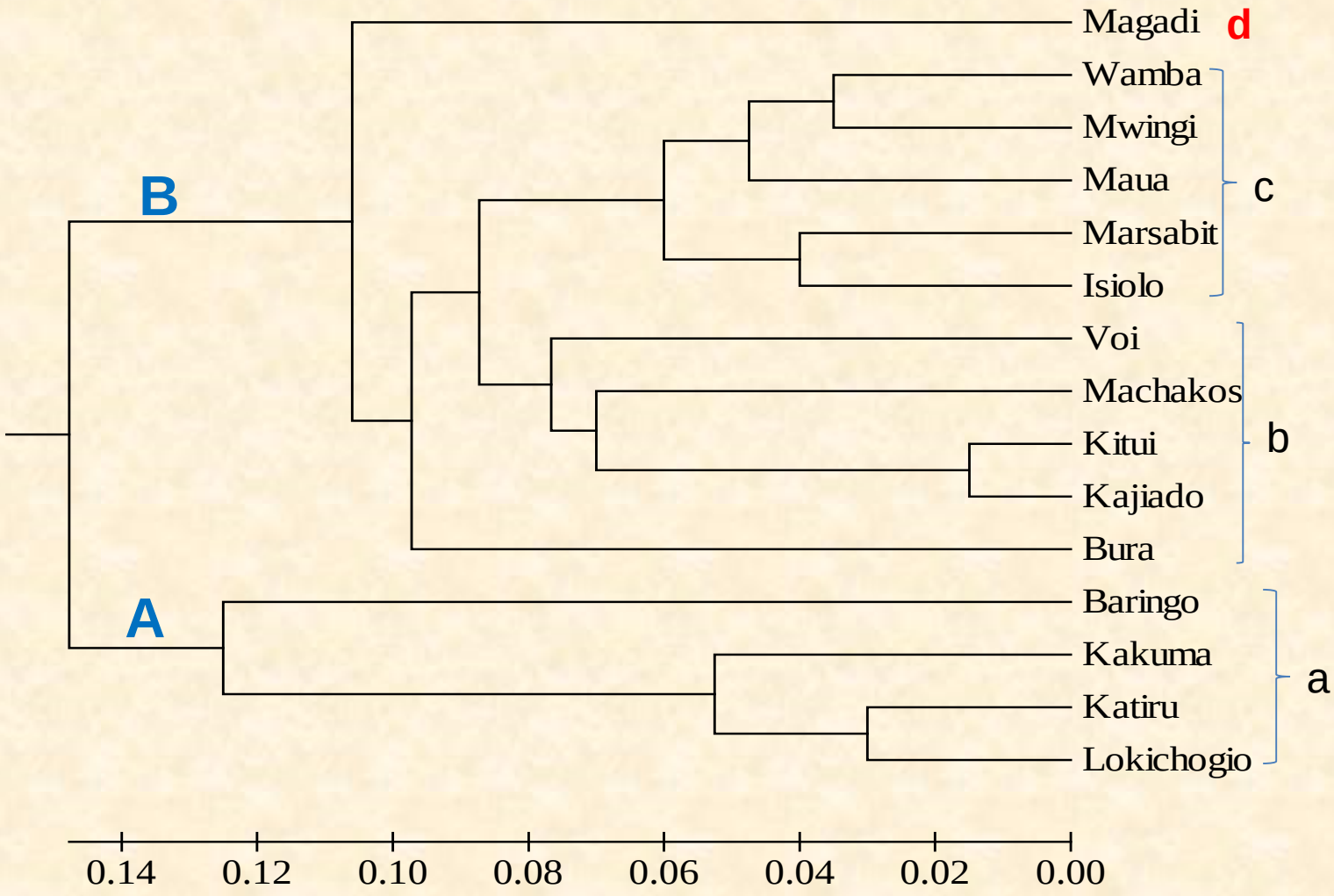


Mwea

Marimanti

Voi

Tharaka



Dendrogram showing the structuring of *Acacia tortilis* populations in two major groups (A and B)

Phenotypic variation of *Acacia tortilis* seedlings depending on the CPT

Straight

Bending

Melia and Acacia

Melia CPT

Melia Orchard

Nursery stage

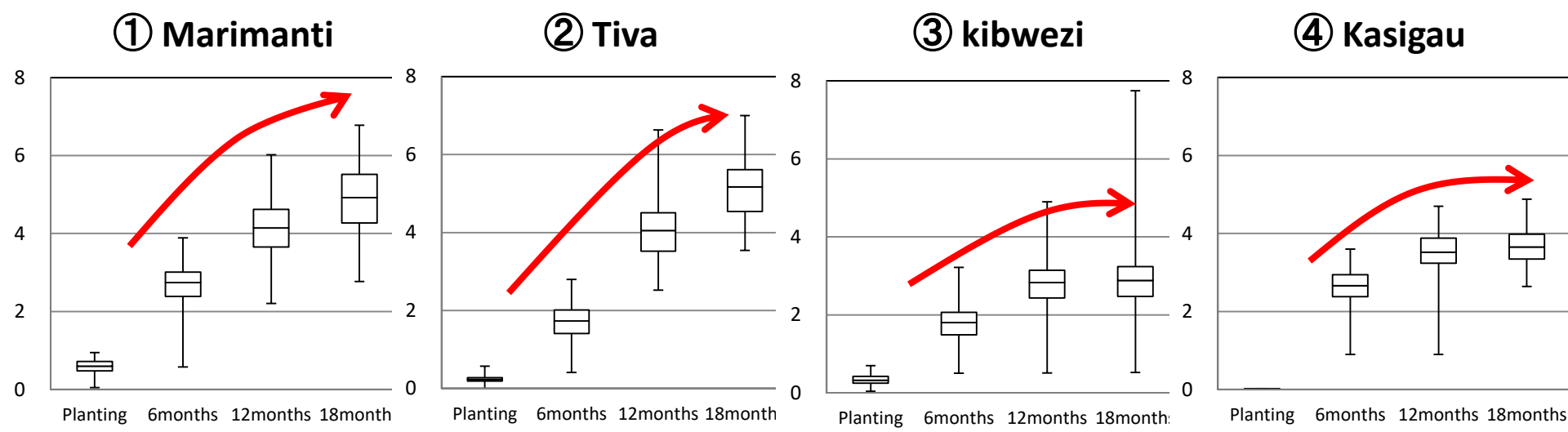
Melia Progeny test 3 years old

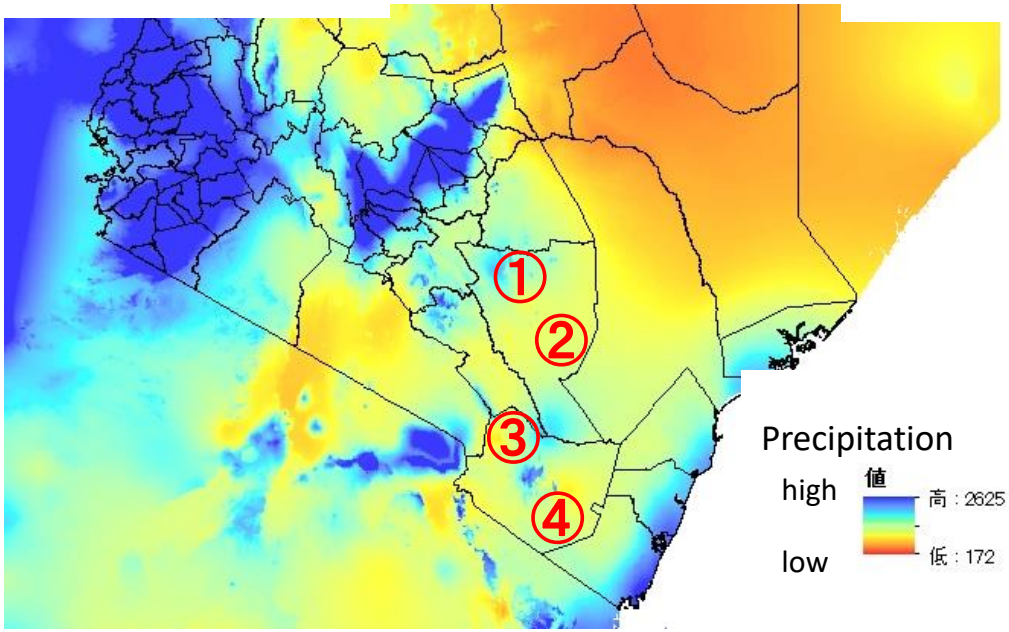
Acacia CPT

Nursery stage

Seedling seed orchard/
Progeny test

Result of Progeny Test (Height)





- We will investigate the growth and select the recommended varieties in each area
- Eventually categorize sites according to forest site index classification

Result of Progeny Test (Volume)

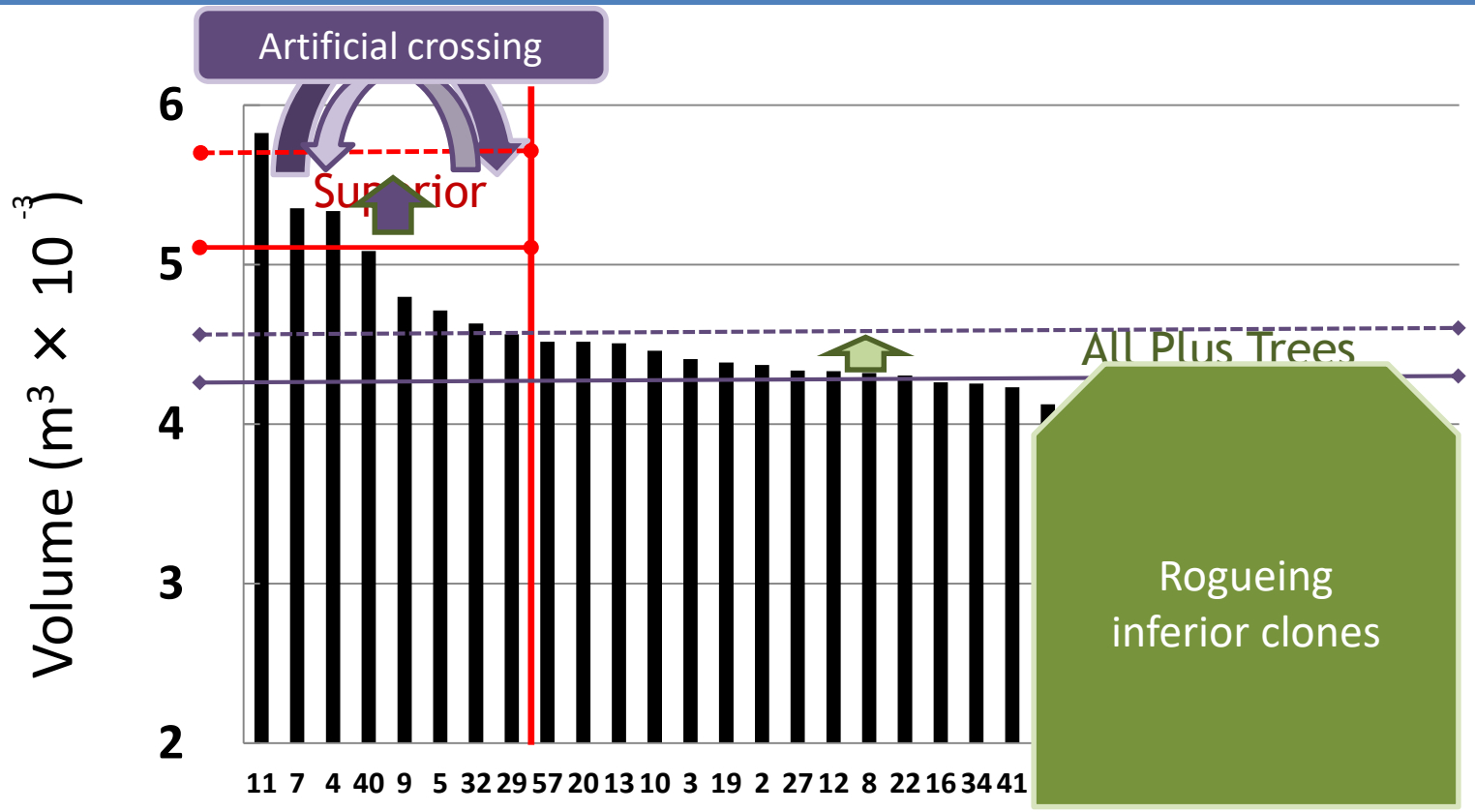


Fig. Volume of P.T. on each CPT at 1 year after planting

	Volume	
Superior	5.04	117%
ALL	4.32	

Eastern	Mwingi−Tseikuru
Eastern	Mwingi−Nuu
Central Eastern	Katulani−Kavisuni
South Eastern	Mutha−Inyali
Coastal	Voi−Mwatate

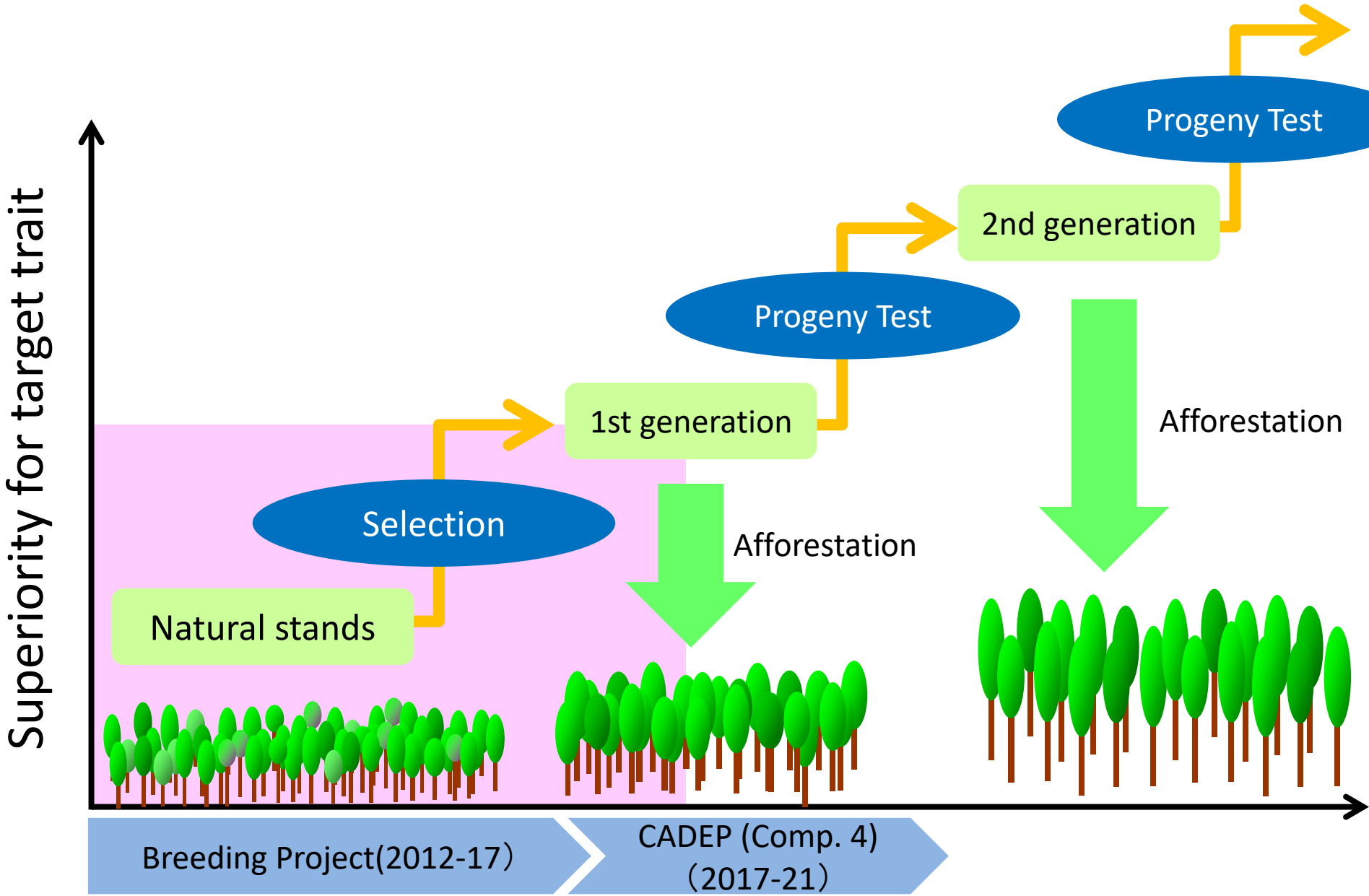
Marimanti Progeny test site

1 month

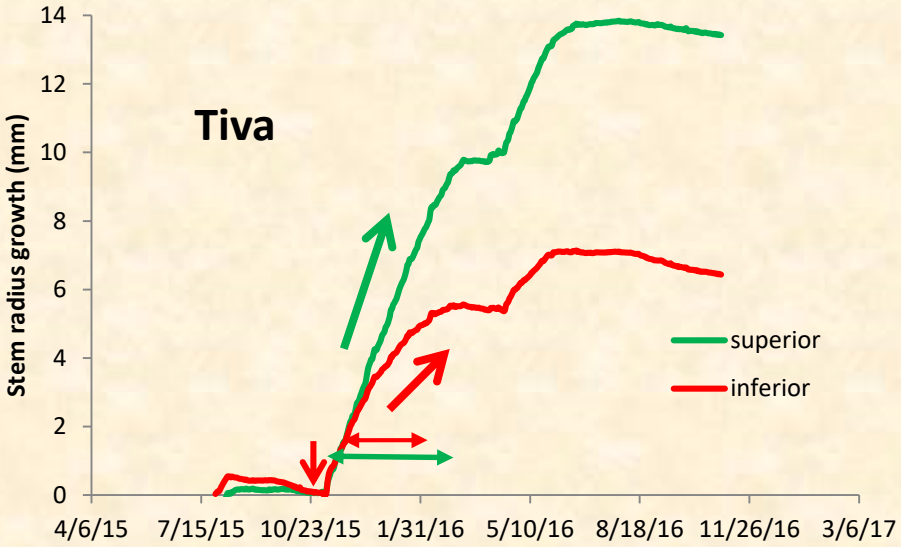
8 months

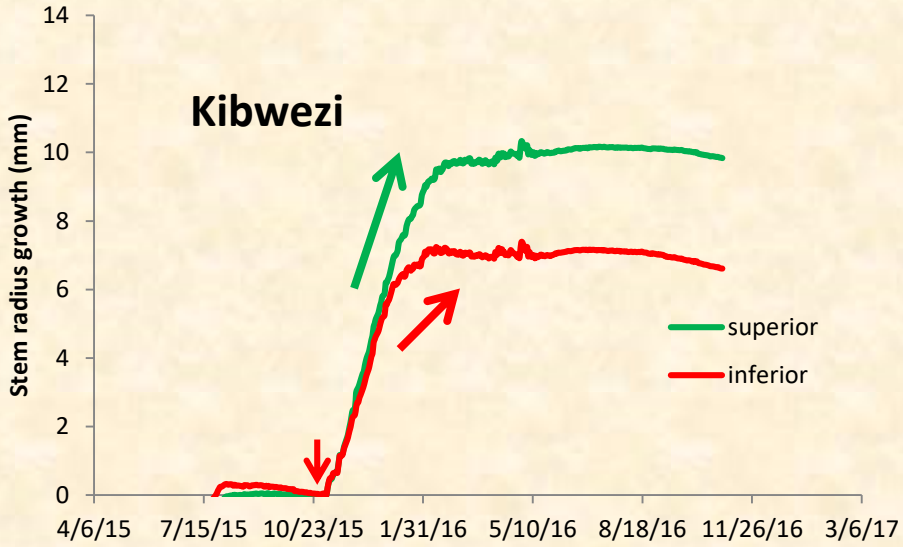
3 years

Roadmap of Tree Breeding



Results: Variation of growth duration and trends between fast and slow growing clones at Tiva and Kibwezi





☑ Stem growth started together and the slope of growth was same with Inferior and superior clones.

☑ Inferior clones stopped their growth earlier than superior clones.

☑ As a result, the growing period of inferior clone became shorter and dormant period longer than those of superior clones.

Contribution of drought index development to tree breeding

Drought tolerance

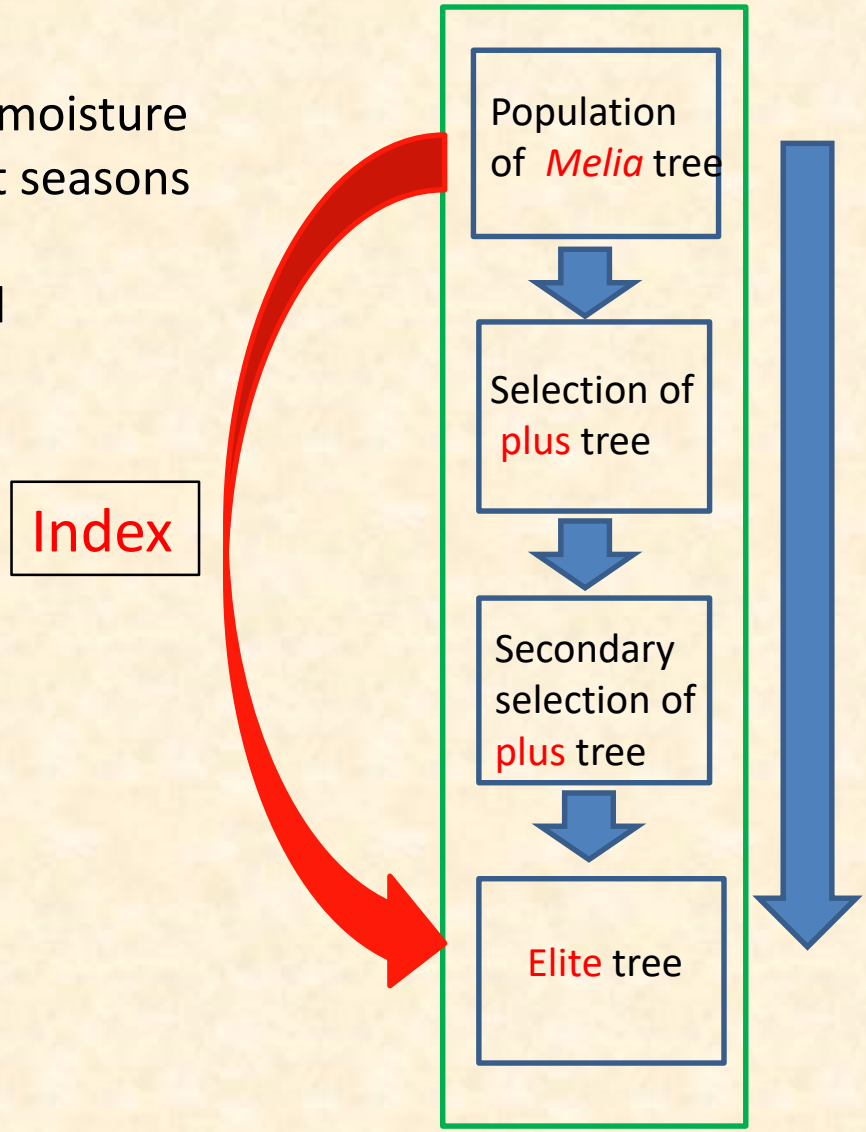
Growth response to soil moisture

Growth during dry & wet seasons

Photosynthetic rates

Xylem pressure potential

Chlorophyll fluorescence



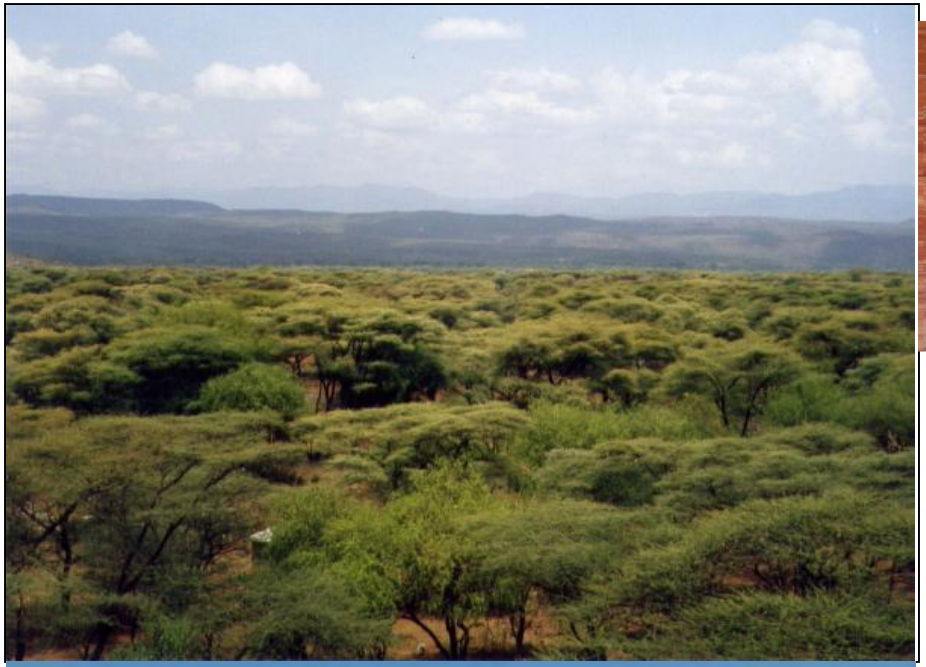
General procedure for selecting elite tree

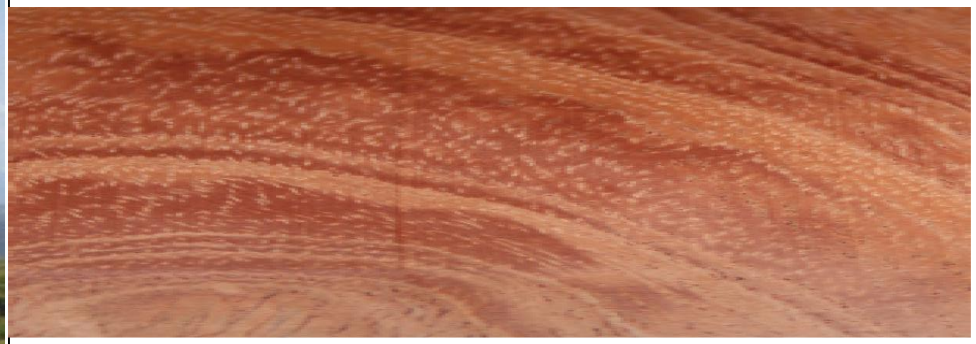
Extension: Establishment of Matithini demo plot through FFS

FFS Training at formative stage

FFS Members' session

FFS members and staff from KEFRI and KFS





Thank You