

Appendix 3-1 Report of short term expert (Breeding and propagation)

Expertise	Name	Term
Breeding theory	Dr Hisaya Miyashita	22.8.2012~5.9.2012
Nursery	Mr Hidetaro Yamaguchi	22.8.2012~5.9.2012

Itinerary

Date	Activities
Aug 23	Arrive to Nairobi
Aug 24	Courtesy call to JICA Kenya Office, KEFRI Director Meeting in KEFRI
Aug 25	Meeting with JICA experts
Aug 26	Move to Kitui
Aug 27	Kitui Regional centre, nursery
Aug 28	Tiva pilot forest station, nursery, seed orchard
Aug 29	Kitui, scion collection
Aug 30	Kitui Regional centre, grafting exercise
Aug 31	move to Kibwezi, seed orchard
Sep 1	move to Nairobi
Sep 2	Documentation
Sep 3	Meeting in KEFRI, depart Nairobi

Activities

- Site preparation of seed orchard in Tiva
The selected site was confirmed, and ground design was discussed
- Scion collection
Experts instructed the scion collection nearby Kitui regional center
- Grafting
Experts instructed grafting techniques at the Kitui nursery
- Site selection of seed orchard in Kibwezi
Potential site was confirmed, and KEFRI CP started land rental negotiation.

Appendix 3-2 Report of short term expert (Drought tolerant)

Expertise	Name	Term
Drought tolerant	A-Prof.Dr Koichiro Gyokusen	25.8.2012~2.9.2012
Drought tolerant	Dr Eiji Goto	25.8.2012~2.9.2012

Itinerary

Date	Activities
Aug 26	Arrive to Nairobi
Aug 27	Courtesy call to KEFRI, meeting w/ CP, move to Kitui
Aug 28	Tiva pilot forest station
Aug 29	Tiva pilot forest station, dendrometer setting
Aug 30	Tiva pilot forest station, dendrometer setting, phenology survey
Aug 31	Tiva pilot forest station, dendrometer setting, Kitui nursery.
Sep 1	move to Nairobi, depart Nairobi

Activities

8.26 (Sun.)

Meeting with Mr. Muturi at hotel Prideinn

- We talked with Mr. Muturi about equipments scheduled for purchase and our C/P .
- Mr. Muturi was eager to exchange the photosynthesis equipment from ADC to Li-cor.
- He introduced two researches (Mr.Kigwa and Ms. Balla) to us as C/Ps.

8.27 (Mon.)

Courtesy call to KEFRI HQs

- We visited Kefri HQs for courtesy call.
- Deputy director explained about the organization and work contents of Kefri.
- After the call, we inspected its laboratories and nursery.

- No equipments related with plant physiological study were found in Kefri HQs.

Move from Nairobi to Kitui

- We moved from Nairobi to Kitui, where was located about 180 km east of Nairobi city.
- We stayed at the guest house of Kitui regional research center for four days.

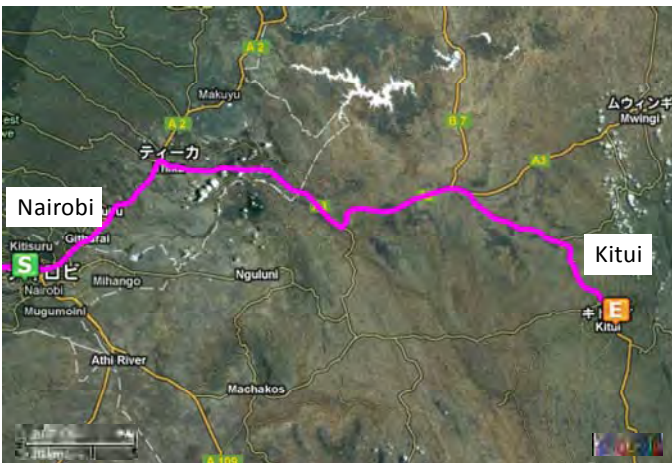


Fig.1 Location of Nairobi and Kitui city.

8.28 (Tue.)

Field survey in Tiva station (together with the breeding team)

- To find sample trees for the dendrometric study of *Melia*, we surveyed around Tiva station.
- Although there were a lots of *Melia* trees growing in the field, it seemed to be difficult for us to use these trees because of the problem of security for dendrometer equipments.

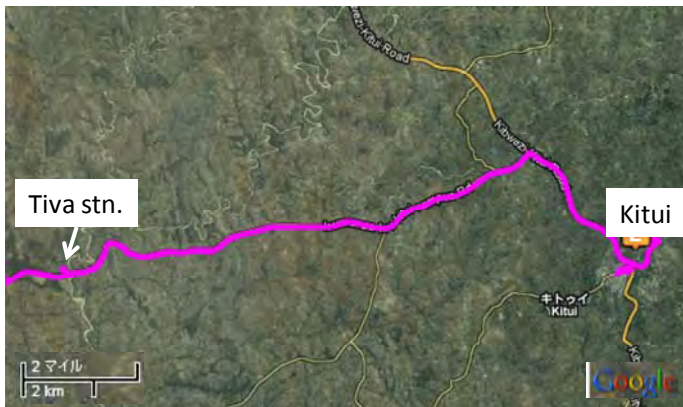


Fig.2 Location of Kitui city and Tiva station. Tiva station is located about 20km west of Kitui city.

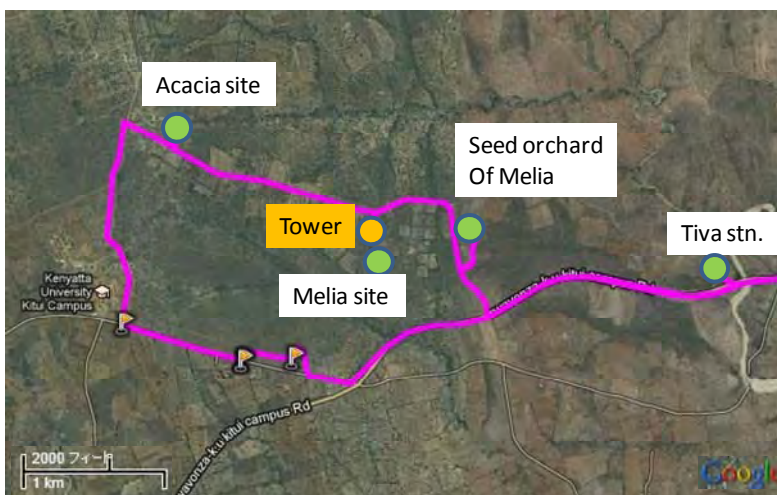


Fig.3 Distribution of pilot-forest in Tiva station

8.29 (Wed.), 30 (Thu.), 31 (Fri.)

Dendrometer installation

- We decided to use *Melia* trees growing inside Tiva station (nursery area) for dendrometric measurement. The security of this area was thought to be a little higher than that of other areas.

- Ten individual trees were selected as sample trees, and ten manual type dendrometers were installed at 1.2m height in each stem, respectively (fig.4). Additionally, a multi-channel automatic dendrometer was installed in four trees growing at a nearby site, and the logger of the dendrometer was locked up in a repaired steel box (fig.4). The distribution of sample tree was shown in fig.5.

• A sheet which we asked to C/P (Ms.Balla) filling out the blanks is shown in table1.



Fig.4 Installation of two types of dendrometer

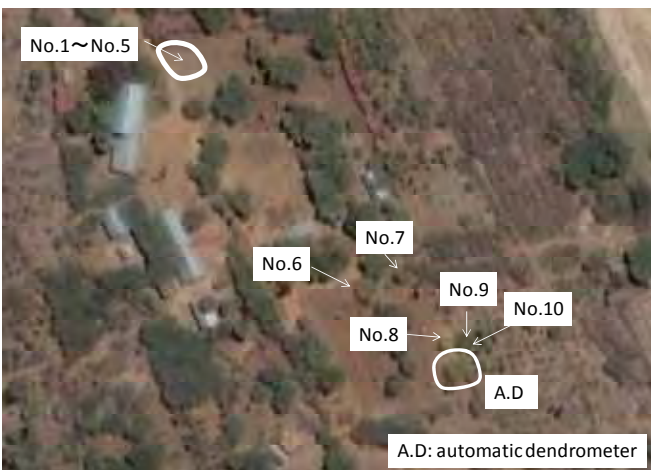


Fig.5 Distribution of sample trees installed the dendrometer

Table 1 A sheet to fill out the data of annual tree growth. (D:cm, H:m)

		2012.'8.31	9.15	9.30	10.15	10.31	11.15	11.30	12.15	12.31
No.1	D1	10.3								
	D2	10.2								
	H	7.07								
	Dendrometer	1.28								
No.2	D1	11.7								
	D2	11.5								
	H	7.16								
	Dendrometer	0.43								
No.3	D1	9.5								
	D2	9.2								
	H	7.2								
	Dendrometer	0.63								
No.4	D1	7.5								
	D2	7.7								
	H	5.68								
	Dendrometer	0.39								
No.5	D1	9.2								
	D2	9.4								
	H	5.96								
	Dendrometer	0.69								
No.6	D1	32.2								
	D2	31.2								
	Dendrometer (14.0m)	0.57								
No.7	D1	30.8								
	D2	33.8								
	Dendrometer (14.5m)	0.72								
No.8	D1	22.9								
	D2	24.7								
	Dendrometer (12.0m)	0.61								
No.9	D1	18.1								
	D2	17.5								
	Dendrometer (9.5m)	0.62								
No.10	D1	12.4								
	D2	12.1								
	Dendrometer (8.0m)	1								

8.30 (Thu.)

The pre-survey on phonological variations in *Melia* clones

- One of our purposes of this trip was to compare the leaf characteristics (eg. leaf size, chlorophyll content, SLA) of *Melia* clones planted in seed orchard. However, almost all leaves were already defoliated, we changed our purpose to compare the phonological extent of defoliation, flower, and fruit in the field.

- Leaf, flower, and fruit conditions were divided into three categories, respectively. Category 0 means that there was no element, category 1 means that small element remains, and category 3 means that there were a lots of element on the crown.

- Location and alignment of seed orchard at Tiva station is shown in fig.6, and the result of this survey is shown in Table 2.
- Almost all of the clones showed the mixture of different extends of each elements, and a few clones showed same extend in each element
- We expected that each individual tree of the same clone showed same extends of each element, if there were clonal variations in the phenology for these elements.
- From the result of this survey, we could not show the apparent evidence of clonal variations in the phenology of three elements, but could show the possibility of the existence of variations.
- We need to continue like this survey in seasonally and yearly for the comprehension of clonal variations.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100



Fig.6 Location of seed orchard at TIVA station

Table 2 Leaf, flower, and fruit conditions of selected plus clones of *Melia volkensii*

2012.8.30							
clone	Leaf	Flower	Fruit	clone	Leaf	Flower	Fruit
D2	0	0	0	ISH1	1	0	1
D2	1	0	0	ISH1	2	1	1
D2	1	0	0	ISH1	2	2	1
D2	1	0	0	ISH1	2	2	1
D2	2	0	0	ISH1	x	x	x
D2	2	0	0	ISH1	x	x	x
D2	2	0	0	ISH1	x	x	x
D7	1	0	0	ISH1	x	x	x
D7	2	1	0	ISH1	x	x	x
D7	2	1	1	ISH2	0	0	0
D7	2	2	1	ISH2	1	0	0
D7	x	x	x	ISH2	2	0	0
GAL1	0	0	0	ISH2	2	1	0
GAL1	0	0	0	ISH2	2	1	0
GAL1	0	0	0	ISH2	1	2	1
GAL1	0	0	0	ISH2	2	2	0
GAL1	1	0	0	ISH2	2	2	0
GAL1	1	1	0	ISH2	2	2	1
GAL1	2	1	0	ISH2	2	2	1
GAL1	x	x	x	ISH2	x	x	x
GAL1	x	x	x	ISH2	x	x	x
GAL2	1	0	0	ISH2	x	x	x
GAL2	2	0	0	ISH9	0	0	0
GAL2	2	1	0	ISH9	1	1	0
GAL2	2	1	1	ISH9	1	2	2
GAL2	2	2	1	ISH9	2	2	1
GAL2	x	x	x	ISH9	2	2	1
GAL2	x	x	x	ISH9	2	2	2
GAT11	1	0	0	ISH9	2	2	2
GAT11	1	0	0	ISH9	2	2	2
GAT11	1	1	0	ISH9	x	x	x
GAT11	1	1	0	KAT1	0	0	0
GAT11	2	1	0	KAT1	1	0	0
GAT11	2	1	0	KAT1	2	1	0
GAT11	2	2	0	KAT1	2	2	0
GAT11	2	2	1	KAT1	2	2	0
GAT11	2	2	1	KAT1	2	2	1
GAT11	2	2	1	KAT1	2	2	2
GAT11	2	2	1	KAT1	x	x	x
GAT11	x	x	x	KAT1	x	x	x
GAT11	x	x	x	KAT1	x	x	x

Continued

clone	Leaf	Flower	Fruit	clone	Leaf	Flower	Fruit
KAT2	0	0	1	MTH11	0	0	0
KAT2	1	0	0	MTH11	0	0	0
KAT2	2	0	1	MTH11	1	0	0
KAT2	1	1	1	MTH11	1	0	1
KAT2	2	1	1	MTH11	1	0	1
KAT2	2	2	1	MTH11	2	0	0
KAT2	2	2	1	MTH11	1	1	1
KAT2	x	x	x	MTH11	2	2	1
KAT2	x	x	x	MTH12	2	2	1
KAT4	1	0	0	MTH12	x	x	x
KAT4	2	0	0	MTH14	2	1	0
KAT4	2	0	0	MTH14	x	x	x
KAT4	1	1	1	MTH14	x	x	x
KAT4	2	1	0	MTH14A	2	1	0
KAT4	2	1	0	MTH14A	2	1	1
KAT4	2	2	1	MTH14A	2	2	1
MAR4A	0	0	0	MTH14A	x	x	x
MAR4A	1	0	0	MTH15	0	0	0
MAR4A	1	0	0	MTH15	1	0	0
MAR4A	1	0	0	MTH15	1	0	0
MAR4A	1	1	0	MTH15	1	0	0
MAR4A	1	1	1	MTH15	1	0	0
MAR4A	2	1	0	MTH15	2	0	0
MAR4A	2	1	1	MTH15	2	0	0
MAR4A	2	1	1	MTH15	2	1	0
MAR4A	2	1	1	MTH15	2	1	0
MAR4A	x	x	x	MTH15	2	1	1
MAR4A	x	x	x	MTH15	2	2	1
MAR5.	0	0	0	MTH15	2	2	1
MAR5.	1	1	1	MTH15	2	2	2
MAR5.	2	1	0	MTH15	x	x	x
MAR5.	2	2	1	MTH15	x	x	x
MAR5.	2	2	1	MTH4	1	0	0
MAR5.	x	x	x	MTH9	0	0	1
MAR5.	x	x	x	MTH9	2	0	0
MTH10	1	1	0	MTH9	1	1	1
MTH10	1	2	1	MTH9	0	2	1
MTH10	2	2	1	MTH9	2	2	1
MTH10	2	2	1	MTH9	2	2	1
MTH10	2	2	2	MTH9	2	2	1
MTH10	x	x	x	MTH9	2	2	2
MTH10	x	x	x	MTH9	x	x	x

Continued

clone	Leaf	Flower	Fruit	clone	Leaf	Flower	Fruit
MWAT7	0	0	0	TSE3	0	0	0
MWAT7	2	1	2	TSE3	0	0	0
MWAT7	2	2	1	TSE3	2	2	1
MWAT7	2	2	1	TSE4	1	0	0
MWAT7	2	2	2	TSE4	1	0	0
MWAT7	2	2	2	TSE4	1	0	0
MWs	2	1	1	TSE4	1	0	0
MWs	2	2	0	TSE4	1	0	0
MWs	2	2	1	TSE4	1	0	0
MWs	x	x	x	TSE4	2	0	0
MWs	x	x	x	TSE4	2	0	0
NUU1	2	0	0	TSE4	2	0	0
NUU1	2	1	0	TSE4	2	0	0
NUU1	2	1	0	TSE4	2	0	0
NUU1	2	1	0	TSE4	2	0	0
NUU1	2	2	0	TSE4	2	1	0
NUU1	x	x	x	TSE4	2	2	1
SK6	1	0	0	TSE4	x	x	x
SK6	1	0	0	TSE4	x	x	x
SK6	1	0	0	TSE5	x	x	x
SK6	2	0	0	TSE5	x	x	x
SK6	2	0	0	TSE5	x	x	x
SK6	2	1	0	TSE6	0	0	0
SK6	2	1	1	TSE6	1	0	0
SK6	x	x	x	TSE6	1	1	1
SK9	2	1	0	TSE6	2	1	1
SK9	2	1	1	TSE6	2	2	0
SK9	2	2	1	TSE6	2	2	1
SK9	x	x	x	TSE6	2	2	1
SK9	x	x	x	TSE6	x	x	x
SK9	x	x	x	TSE6	x	x	x
SK9	x	x	x	TSE9	1	1	0
TSE1	2	0	0	TSE9	2	1	1
TSE1	x	x	x	TSE9	2	2	2
TSE1	x	x	x				
TSE2	1	0	0				
TSE2	1	0	0				
TSE2	1	0	0				
TSE2	1	0	0				
TSE2	2	1	0				
TSE2	x	x	x				
TSE2	x	x	x				
TSE2	x	x	x				
TSE2	x	x	x				

8.31(Fri.)

Preparation of seedlings for drought tolerance research

- A few young *Melia* tree are necessary for us in Kitui regional center for measurements of annual changes of water relation, photosynthesis, and other many characteristics.
- Additionally, some other useful tree species in semi-arid zone growing in center are necessary to compare *Melia* tree with other species.
- However, it revealed that *Melia* tree was not growing in Kitui regional center except one individual tree which was being used for sap flow measurement in another project.
- We tried to collect seedlings of *Melia volkensii*, *Melia azedarach*, *Eucalyptus camaldurensis*, *Gmelia arborea*, and *Acacia tortalis*, the last three species were recommended by Dr. Ndufa (Director of Kitui regional center) as useful species in semi-arid zone.
- Seedlings of *Acacia tortalis* could not collect during our stay, but Kitui center promised to collect it after our departure.
- We also got a permission from Dr. Ndufa for planting these seedlings in the nursery. He appointed the corner of nursery (fig.7) as the area not to disturb grafting procedure.
- We asked to our C/P to plant them as soon as possible after all species were collected.

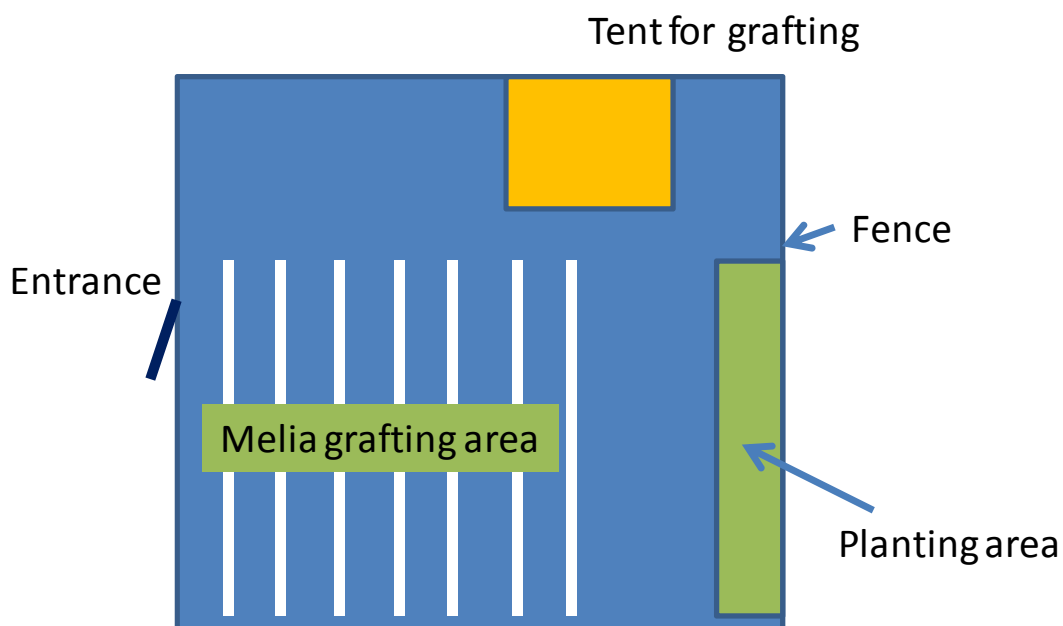


Fig.7 Planting area for five semi-arid tree species

Checking of laboratory and equipments available for physiological research in Kitui

Laboratory

- A particular laboratory was not prepared for our project. There were a lot of laboratory in Kitui center, but almost all of them were already occupied and unavailable.
- We asked to Mr. Narumi to get permission from Kitui center for the use of the short-term expert's research room as our project laboratory.
- We thought this room was the most convenient room for our research activities in the Kitui center under existing conditions.

Dark room

- Although a dark room available for photosynthesis study could not be found, a part of the short-term expert's research room seemed to be possible to change for that purpose.

Equipments

• Pressure chamber

Three sets of pressure chamber (Daiki Rika Kogyo) were existed, and only one of them was available.

There was a set of air-bomb, too. We can substitute this air-bomb set for the newly scheduled pressure chamber.

• Porometer

A steady-state porometer (Li-1600, Licor) was existed, but did not work well, even it had been repaired by Japanese another project lately.

• Portable photosynthesis system

No equipments related with photosynthesis were existed.

• Leaf area meter

Leaf area meter (Licor) was existed, but was broken.

- **Dry oven**

Two dry oven were existed and available.

- **Electric balance**

Three resolution type (0.1g, 0.01g, 0.001g) were existed and available.

Appendix 3-3 Report of short term expert (Project Management)

Expertise	Name	Term
Team leader	Dr Yoshitake Fujisawa	22.9.2012~29.9.2012

Itinerary

Date	Activities
Sep 23	Arrive to Nairobi, meeting w/ JICA experts
Sep 24	Courtesy call to JICA Kenya office, meeting in JICA Kenya office Courtesy call to KEFRI Director, meeting w/ CP
Sep 25	JCC, move to Kitui
Sep 26	Kitui regional center, move to Kibwezi
Sep 27	Kibwezi station, UoN site, move to Nairobi
Sep 28	Report to KEFRI, depart Nairobi

Major Activities

- Attendance to 1st JCC
1st JCC was held on 25th Sep 2012, and the project inception report was proposed by FTBC.
- Seedling preparation for seed orchard
The expert studied progress of grafting propagation, and instructed necessary measures for seedling preparation.
- Site preparation of seed orchard
KEFRI counterparts and the expert discussed availability space for seed orchard at Kibwezi, which owned by University of Nairobi.
- Others
The expert confirmed working environment of short term expert in Kitui and Kibwezi.

JOINT COORDINATING COMMITTEE MEETING
OF
THE PROJECT
ON
DEVELOPMENT OF DROUGHT TOLERANT TREES ON ADAPTATION TO
CLIMATE CHANGE IN DRYLANDS OF KENYA

Agenda

Date: 25 September 2012 9:30 – 11:30

Venue: Boardroom of Ministry of Forestry and Wildlife
(6th Floor, Telposta Towers)

Schedule:

- 9:30 – 9:40 Opening Remarks by Permanent Secretary of
Ministry of Forestry and Wildlife
- 9:40 – 9:50 Brief from Mr. Hideo Eguchi, Chief Representative
of JICA Kenya Office
- 9:50 – 10:40 Presentation by Dr. Muturi, Dr. Fujisawa and Mr.
Ozawa
- 10:40 – 11:15 Questions and Answers
- 11:15 – 11:30 AOB

Staff Assignment

No	Component	Activities *	KEFRI/KFS				FTBC/JICA		
			Name	Sub-component	Designation	Organization	Name	Designation	Organization
1	Management	1 - 4	Dr. Ben N. Chikamai		Project Director	KEFRI HQs	Dr. Teiji Kondo	Coordinator	FTBC
			Dr. Gabriel M. Muturi		Project Manager	KEFRI HQs	Mr. Kunio Shimizu	Coordinator	FTBC
							Mr. Makoto Ozawa	Chief Adviser	JICA
2	Management assistance/ coordination	1 - 4	Mr. Joseph M. Machua		Assistant Project Manager - DNA	KEFRI Muguga	Mr. Yuzuru Kimura	Logistics Coordinator	FTBC
			Mr. Jason G. Kariuki		Assistant Project Manager - Breeding	KEFRI Muguga	Dr. Yoshitake Fujisawa	Team Leader	FTBC
			Dr. James K. Ndufa		Field Manager	KEFRI Kitui	Mr. Masaki Narumi	Coordinator JICA	JICA
			Mr. Simon Choge			KEFRI Muguga			
3	DNA Analysis	1.0 - 1.3	Mr. Joseph M. Machua	DNA Analysis	Assistant Project Manager - DNA	KEFRI Muguga	Dr. So Hanaoka	Leader of DNA analysis	FTBC
			Mr. Stephan F. Omondi	DNA Analysis		KEFRI Muguga			
			Mr. Stephen Kiama	GIS		KEFRI Muguga			
4	Tree Breeding	2.0 - 2.6	Mr. Jason G. Kariuki		Assistant Project Manager - Breeding	KEFRI Muguga	Dr. Hisaya Miyashita	Leader of Breeding	FTBC
			Mr. David K. Muchiri		Assistant Field Manager	KEFRI Kibwezi			
	Propagation / Nursery management	2.2 2.6	Mr. Bernard Kamondi	Propagation		KEFRI Muguga	Mr. Taro Yamanobe	Leader of Propagation	FTBC
			Ms Frouza M. Maingi	Propagation		KEFRI Kitui	Mr. Shutaro Yamaguchi		FTBC
			Ms Mary W. Mwangi	Propagation		KEFRI Kitui	Mr. Manabu Kashiwagi		FTBC
			Mr. Giathi	Nursery management		KEFRI Kitui			
			Ms Pauline Bala	Nursery management		KEFRI Kitui			
			Mr. Kyalo	Nursery management		KEFRI Kitui			
			Mr. Samuel Auka	Nursery management	Assistant Field Manager	KEFRI Kitui			
	Mr. Esitubi	Nursery management							
	Drought tolerance / Physiology	2.4	Dr. Gabriel M. Muturi		Project Manager	KEFRI HQs	Prof. Koichiro Gyokuse	Leader of Drought tolerance	Kyushu Univ.
			Ms Pauline Bala			KEFRI Kitui	Dr. Kotaro Sakuta		Kyushu Univ.
			Mr. Bernard Kigwa		Assistant Field Manager	KEFRI Garissa	Dr. Takahito Tsuyama		Kyushu Univ.
Mr. Muchiri					KEFRI Kibwezi	Dr. Eiji Goto		Kyushu Univ.	
5	Supply chain of quality seed / Extension	3.1 - 3.4 4.1 - 4.5	Mr. Bernard Kamondi	Supply chain quality seed		KEFRI Muguga	Dr. Yoshitake Fujisawa		FTBC
			Mr. Luvanda	Extension		KEFRI Kitui	Mr. Taro Yamanobe		FTBC
			Ms Musyoki	Extension			Mr. Makoto Ozawa	Leader of Extension	JICA
			Mr. Simon Choge	Extension		KEFRI Muguga			
			Mr. Giathi	Extension		KEFRI Kitui			
			Mr. David K. Muchiri	Extension		KEFRI Kibwezi			
			Dr. Chagalla	Training	Assistant Director, Ex	KEFRI Muguga			
			Mr. Tuwei	Training		KEFRI Muguga			
			Mr. Mwamburi	Training		KEFRI Muguga			
			Mr. Mokolwe	Training		KEFRI Muguga			
			Ms Wanjiku	Training		KEFRI Muguga			
			Ms Ochieng	Training					
			Mr. Patrick Kariuki		Deputy Director, Ex	KFS			

Appendix 3-4 Report of short term expert (DNA analysis)

Expertise	Name	Term
DNA analysis	Dr So Hanaoka	25.11.2012 ~ 8.12.2012

Itinerary

Date	Activities
Nov 25	Arrive to Nairobi, meeting w/ JICA experts
Nov 26	Courtesy call to JICA Kenya office Courtesy call to Project manager, meeting w/ CPs
Nov 27 ~ Dec 6	Technical advice about DNA analysis
Dec 7	Courtesy call to Project Director, meeting w/ CPs
Dec 8	Depart Nairobi

Result of major activities

- Upgrading DNA extracting techniques
In order to extract pure DNA from viscosity organs of woody plant, modified CTAB method was introduced, and CPs obtained necessary techniques of this procedure.



DNA is not extracted clearly



High purity DNA extraction by CTAB method

- Multiplex PCR procedure
In order to amplify multiple loci in single thermal cycling procedure, a special recipe of reagents and equipment manipulation were instructed.
- Direct sequencing
In order to reduce the cost of PCR procedure, polyethylene glycol – NaCl solution is applied for purification.
- GIS

In order to integrate the population information of Melia and Acacia, a GIS development was proposed by KEFRI staff

- Remained tasks

Delivery of the sequencing machine which is procured by Japanese Grant Aid delayed, and the practical exercise could not be implemented. Therefore following tasks will be conducted by Kenyan CPs by themselves.

- Alternative training for sequencer operation will be programmed after the delivery.
- 17 SSR markers were selected by the screening out of 144 SSR markers which were developed during the last CP training in Japan. These markers will be tested by 90 samples of 3 populations.
- 60 plus tree candidates of Melia will be identified by developed SSR makers.

Appendix 3-5 Report of short term expert (Propagation and planting)

Expertise	Name	Term
Breeding	Dr Hisaya Miyashita	25.11.2012 ~ 8.12.2012
Propagation	Mr Taro Yamanobe	25.11.2012 ~ 8.12.2012
Propagation	Mr Nobutaka Chiba	25.11.2012 ~ 8.12.2012

Itinerary

Date	Activities
Nov 25	Arrive to Nairobi
Nov 26	Courtesy call to JICA Kenya office, Courtesy call to KEFRI Assistant Director, Move to Kitui
Nov 27	Meeting at Kitui regional center, Instruction at nursery
Nov 28 ~ Dec 1	Instruction at Tiva seed orchard
Dec 2	Preparation of sampling collection
Dec 3	Instruction at Tiva seed orchard
Dec 4	Leaf sampling collection from all of planted seedling at the seed orchard
Dec 5	Move to Kibwezi, vegetation survey at seed orchard
Dec 6	Move to Nairobi
Dec 7	Courtesy call to KEFRI Director, meeting w/ CPs
Dec 8	Depart Nairobi

Result of major activities

- Instruction at the seed orchard in Kitui
Seedlings were planted as following procedures;
 - Planting locations were marked by sticks with ID number label
 - Planting holes were dug, and watered
 - Seedlings were also marked by ID number label, and planted at the hole of same ID number
 - Plastic bottle water filling system is applied, water is filled adequately
 - Cattle is prevented by fencing and guard man
- Leaf sampling
Leaf specimens were collected from all of planted seedlings in order to identify the clone by DNA analysis.
- Instruction at the seed orchard in Kibwezi
Land clearing work was observed, and necessary data for planting design was collected.
- Next year plan
Drafting work will be prepared for 20 clones.
Total 5000 stock will be prepared for grafting work.

(1) Instruction of Melia planting in Tiva seed orchard



Fencing



2m height of pole



Digging planting hole



45cm of diameter and depth



Planting location identification by ID number plastic label



Plastic label at each planting hole



Seedlings in Kitui nursery



Number of clone



Plastic label for each seedlings



ID label shows planting location



Conveyed by clone group



Seedling delivery



Seedling delivery



Instruction to the workers



Removing the pot before planting



Planting in the hole



Confirming the location number of both



Planted seedling



Symphysis between grafted scion and stock



Well grafted but tighten by mending tape



Striction by mending tape



Removing mending tape



Immature symphysis



observed in later grafted seedlings



Planting in seedling orchard



Allocation of workers in each low



Carefully handled and



Leveling the surface

(2) Instruction of seed orchard construction in Kibwezi



Under the plowing



A couple of Baobab giants are included



Removing bush trees by rake dozer



Less vegetation than Tiva



More rocks than Tiva



Survey of Baobab

Appendix 3-6 Report of short term expert (Drought tolerant)

Expertise	Name	Term
Drought Tolerant	Dr Kotaro Sakuta	12.12.2012 ~ 22.12.2012

Itinerary

Date	Activities
Dec 12	Arrive to Nairobi,
Dec 13	Meeting w/ JICA experts, Project Manager at KEFRI, Move to Kitui
Dec 14	Survey at Tiva nursery and seed orchard
Dec 15	Move to Kibwezi, survey at seed orchard
Dec 16	Vegetation survey in Kibwezi,
Dec 17	Vegetation survey at the candidate nursery in UoN, move to Kitui
Dec 18	Research in Kitui regional center
Dec 19 ~ Dec 20	Leaf shape survey (57 clone) in Kitui regional center
Dec 21	Instruction of the planting in Tiva seed orchard
Dec 22	Move to Nairobi, Depart Nairobi

Result of major activities

- Instruction of seedling planting in Kitui seed orchard
Planting and nursing procedures are instructed at Kitui seed orchard, especially for preventing insect attack and drought damage.
- Instruction of seed orchard preparation in Kibwezi
Previous vegetation was surveyed and watering measures are advised.
- Instruction of morphological survey
 - Sump method was introduced for morphological analysis of candidate plus tree clones.
 - Size and density of stoma were surveyed by a handy microscope camera. It is recommended that the digital camera scanning system will be introduced for precise microscope.
 - Area and dry weight of young leaves were surveyed. Same study of mature leaf will be done when the seedlings grown.



Collected leaf specimens



Slides developed by sump method

Appendix 3-7 Report of short term expert (Propagation and planting)

Expertise	Name	Term
Breeding	Dr Hisaya Miyashhita	24.1.2013 ~ 13.2.2013
Propagation	Mr Shoki Sakamoto	24.1 2013 ~ 3.2.2013

Itinerary

Date	Activities
Jan 24	Arrive to Nairobi, Courtesy call to JICA Kenya office
Jan 25	Courtesy call to KEFRI Director, meeting w/ CP Move to Kitui
Jan 26	Instruction at Tiva seed orchard, Kitui regional center
Jan 27	Move to Kibwezi, survey at the seed orchard
Jan 28 ~ 30	Instruction at the Seed orchard
Jan 31	Move to Kitui Survey at Kitui Regional Center
Feb 1	Meeting among Japanese experts Move to Nairobi
Feb 2	Documentation
Feb 3	Documentation (Mr Sakamoto Depart Nairobi)
Feb 4	Survey at Forest Products Research Center (Karura) Meeting w/ Chief advisor
Feb 5	Meeting w/ Project Manager
Feb 6	Meeting w/ Project Manager
Feb 7 ~ 9	Documentation
Feb 10	Meeting w/ Project Manager
Feb 11	Meeting at JICA Kenya office
Feb 12	2 nd JCC in MFWL Nairobi
Feb 13	Depart Nairobi

Result of major activities

- Instruction of the seed orchard development in Kibwezi
Following activities were instructed.
 - Label identification of hole location and seedling
 - Hole digging and watering
 - Planting
 - Nursing

- Instruction of the seed orchard maintenance in Tiva
Following maintenance activities were instructed.

- Spline support against the lean by strong wind
 - Lateral buds removing and pruning, inducing good shape of tree crown
 - Drip watering by using plastic bottle
 - Surveying and Recording
- Operation plan 2013
 - Candidate plus tree selection - 20 clones (2012), 20 clones (2013)
 - Preparation of progeny test fields and supplemental test fields
 - Seed seedling stand of *A. tortilis*
 - Nursery allocation for *Melia* grafting in Kibwezi sub center
 - Seedling stand for clonal comparison and drought tolerant experiment in Kitui regional center
 - Dark room for chlorophyll fluorescence measurement
 - Additional grafting propagation 2013 - Total 4,000 root stock will be prepared for grafting works
- Information gathering in KEFRI Forest Products Research Center -Karura
Information of forest products were gathered as follows;
 - Wood demand in Kenya
 - Major wood products in Kenya
 - Possibility of timber production by using dryland forest resources
 - Wood test laboratory
- CP training in Japan 2013
Trainee appointment and contents were discussed between senior staff of KEFRI and Japanese experts
- Japanese expert dispatchment 2013
Details of Japanese experts' mandate were discussed among CPs and Japanese experts.

(1) Seed orchard construction in Kibwezi



After plowing



Seedlings



Identification Label



Meeting among researchers



Explanation to workers





Watering before planting



Watering after planting



Planting workers



One day after planting



Rainfall during planting



Group photo with workers

(2) Seed orchard maintenance in Tiva



Planted seedlings



Average height 70-80cm



Diseases in old seed orchard



Necrosis of Melia stem



Necrosis in under part of tree



Half of branches infected

(3) Nursery facilities in Kibwezi sub center



Germination facility



Seedling production facility



Germination bed



Weather station



Working place in nursery



Water supply

(4) KEFRI Forest Products Research Centre (in Karura)



Main building



Workshop



Laboratory



Many of JICA stickers on equipments



Kiln



Workshop



Multi function analyzer



Researchers desk



Compression and distortion analysis



Field notes



Melia timber specimens



Result of actual size examination

Appendix 3-8 Report of short term expert (Drought tolerant)

The report of research activities in Kenya (from 2013.01.26 to 2013.02.03)
Koichiro Gyokusen, Kyushu University

Expertise	Name	Term
Drought tolerant	Ass Prof Dr Koichiro Gyokusen	26.1.2013 ~ 3.2.2013

1. Schedule

Jan. 2013 (Short-term Expert)

2 Drought Tolerance

Duration; 2013.1.26-2013.2.03
 Member; Dr Koichiro Gyokusen

	AM	PM	
1.26(Sat.)		22:00 Departure (Tokyo)	
1.27 (Sun.)	Dubai 0345 Dubai 1045	14:45 Arrival (NAIROBI)	Nairobi
1.28(Mon.)	Courtesy call to JICA office	Movement from Nairobi to Kitui	Kitui
1.29 (Tue.)	Field survey in Tiva pilotforest	Field survey in Tiva pilotforest	Kitui
1.30 (Wed.)	Field survey in Kitui nursery	Data analysis	Kitui
1.31 (Thu.)	Field survey in Tiva pilotforest	Data analysis	Kitui
2.1 (Fri.)	Field survey in Kitui nursery	Data analysis	Kitui
2.2(Sat.)	Kitui to Nairobi	16:40 Departure (NAIROBI)	
2.3 (Sun.)		17:35 Arrival (TOKYO/NARITA)	

2. Activities

01.28 (Mon.)

[In the morning]

- Courtesy call to JICA office in Nairobi
- We met Mrs. Fukae and obtained a lots of information about JICA projects in Kenya.

[In the afternoon]

- Meeting with Dr NDUFA, the director of Kitui center, concerning about our research activities and purposes of this visit.
- He accepted our two requests, one is about the new nursery and the other is about the meteorology box. He has already selected the candidate site as the new nursery in the Kitui center, and promised to weed around the site just before my departure. He accepted also to set a box in nursery for measurement of air temperature and soil water contents.

- Seedlings from the old orchard was now preparing. Seeds from two superior clones were already collected and now waiting for the ripening of other clones. They will saw them after finishing the collection of all clones, and may be able to provide some seedlings by my next visit.



Photo1. The candidate site for the new nursery. Grass was cut from Jan.28 to Jan.30.



Photo 2. A box made of wood to store the water content meter and thermometer.

01.29 (Tue.)

[In the morning]

- Visited the Tiva pilot forest together with Dr. Muturi.
- Checked dendrometer equipments set last visit.
- Visited the new and old seed orchards.

[In the afternoon]

- Downloaded the tree growth data logged by automatic dendrometers.
- Analyzed tree growth data.

[Results]

Stem growth of No.1 tree, air temperature, and precipitation from 2012.9.1 to 2013.1.31 were shown in fig.1. There was no growth from 0 day to 80 days, conversely a little shrink was monitored. Growth had started around 80 days and finished around 120 days. The beginning of stem growth was

corresponded with the beginning of rainy season.

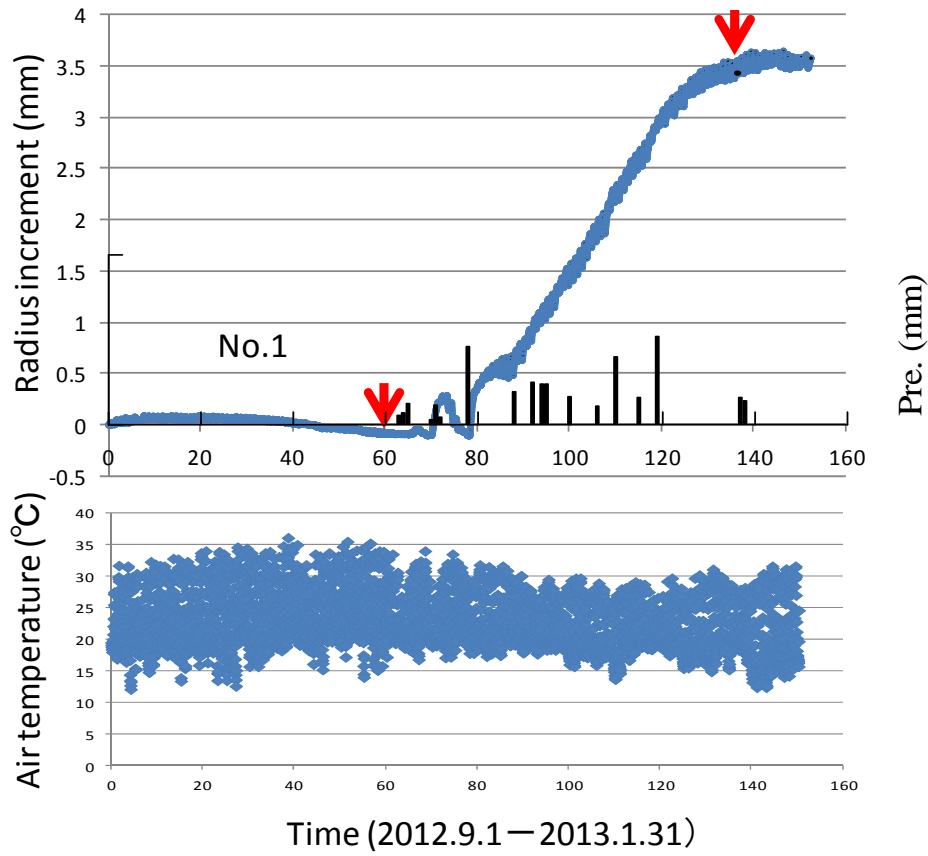


Fig.1 Seasonal changes of stem radius increment and air temperature

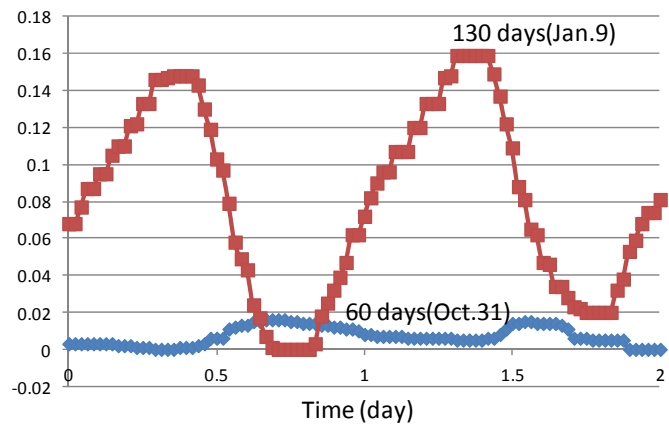


Fig.2 Diurnal changes of stem radius of *Melia volkensii*

Diurnal fluctuations of stem radius were shown in fig.2. Two types of diurnal changes were shown in

fig.2, namely, one was the rainy season (Jan.9-10) and the other was dry season (Oct.31-Nov.1). A large fluctuation was observed in wet season and a small change was observed in dry season. The fluctuation patten was differed with two seasons. The shrink of wet season occurred in the afternoon but that of dry season occurred in the early morning. The reason of the difference is not known in this instance.

01.30 (Wed.)

[In the morning]

- Setting an equipment to measure water contents in Kitui center.

I dug a hole about 1 m depth at the nursery planted five tree species and set four sensors in different depths, namely, 0.2m, 0.4m, 0.6m, 0.8m, respectively.

[In the afternoon]

Discussed about the difference between the tree growth data collected with automatic dendrometer and those of collected with manual dendrometer.

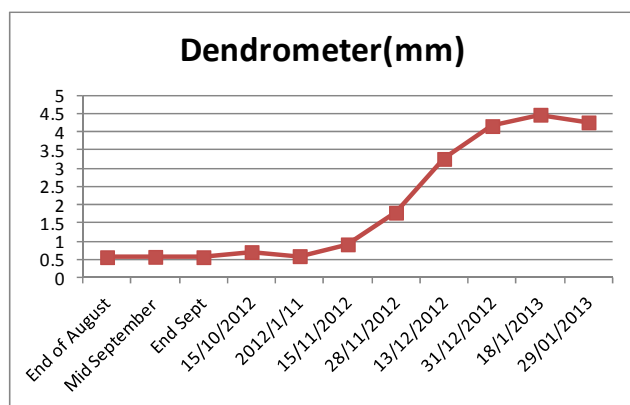


Fig.3 Diameter growth of No.6 obtained by digital dendrometer.

[Results]

Similar growth patterns were obtained with both of automatic dendrometer and manual dendrometer. I can say that Manual dendrometer introduced here is useful for measuring diameter growth of *Melia volkensii*, and can be applied for the comparison of growth difference in superior and inferior clones. However there is a security problem to set them in the field, we have to think more to set them in the field (e.g.: old or new seed orchard).

01.31 (Thr.)

[In the morning]

Visited to Tiva pilot forest to repair and reset the dendrometer.

Collected leaves from superior or inferior clones at old seed orchard

[In the afternoon]

Checked the water content meter and thermometer and set them in a wooden box put in the nursery.

02.01 (Fri)

[In the morning]

Measured the size of five tree species planted in Kitui center.

[Results]

Five tree species were planted in nursery of Kitui center. These five species were *Melia volkensii*,

Melia azedarach, Eucalyptus camaldulensis, Gmeina arborea, and Vitex payos. Although one more species (Acaccia tortolis) was planted nearby lately, they are too small to measure the size.



Photo 3. A scenery of the nursery planted of five tree species.

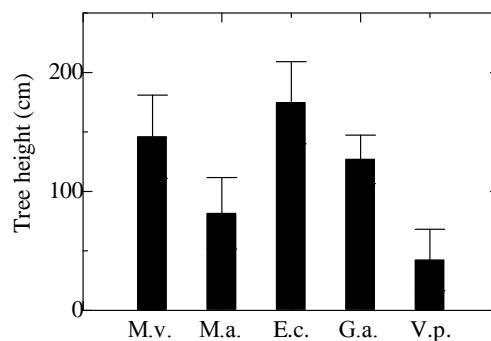
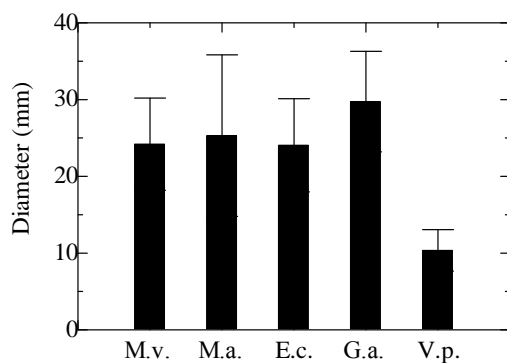
Photo 4. Tree shapes and growth conditions of each tree.



Melia volkensii Melia azedarach Eucalyptus camaldulensis Gmenia arborea Vitex payos

[Results]

Tree height, diameter at 10cm height from ground level, and H/D ratio were shown in fig. 4,5,6, respectively. The order of the tree height was E.c.>M.v.>G.a>M.a.>V.p. and the order of diameter was G.a.>M.a.>M.v.>G.a>V.p.. Tree height and diameter were not corresponded, then the H/D ratio was E.c.>M.v.>G.a.>V.p.>M.a. From these results, we can conclude that E.c. and M.v. seem to have a strong apical dominant characteristics compared with other three species.



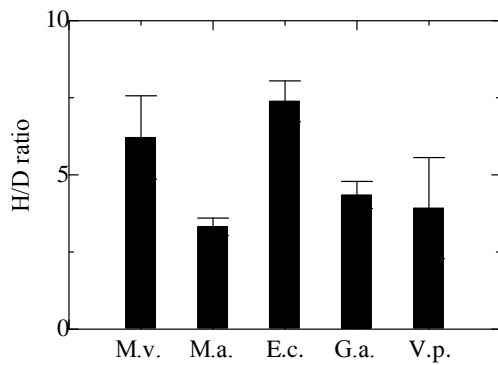


Fig. 7,8,9 Tree height, diameter, and H/D ratio of five tree species used as common planting tree.

[In the afternoon]

Measurement of leaf and leaflet size collected from old orchard.

[Results]

The representative leaf copy of each clone was shown in photo 4. I could not pick up any differences between superior and inferior clones, but found a large variation in leaflet size among clones, especially TSE4 had very small leaflets. We should continue more research regarding the relationship between leaf structure and its physiology.



Photo 5. Leaf copy of 6 clones.

The growth of upper 3 clones (SE4, TSE6, MTH15) were better than these of lower three clones (MWAT1, GAL1, TSE2).

02.02.-02.03 (Sat. and Sun.)

Movement from Kitui (Kenya) to Narita (Japan)

Appendix 3-9 Report of short term expert (Project management)

Expertise	Name	Term
Coordinator	Mr Yuzuru Kimura	6.2.2013 ~ 13.2.2013

Itinerary

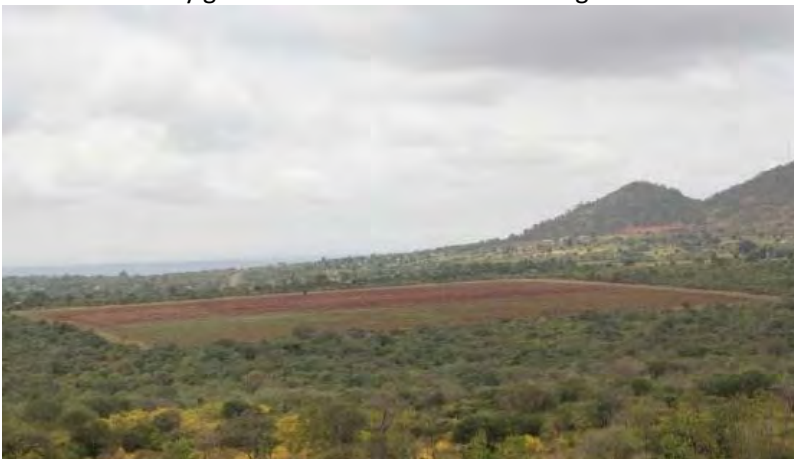
Date	Activities
Feb 6	Arrive to Nairobi, meeting w/ JICA experts, Project Manager
Feb 7	Move to Kitui, visit Tiva seed orchard, Kitui regional center,
Feb 8	Move to Kibwezi Kibwezi station, UoN site
Feb 9	Move to Nairobi
Feb 10	Meeting w/ Project manager, chief advisor
Feb 11	Courtesy call to JICA Kenya office Courtesy call to KEFRI Director, meeting w/ CP
Feb 12	2 nd JCC in MFWL Nairobi
Feb 13	Depart Nairobi

Result of major activities

- Field survey

- Tiva seed orchard

Ten hectares of seed orchard was established in Tiva research station area, and melia clone seedlings were planted in last December. The seedlings are maintained very well and some of them have already grown more than one meter height.



- Tiva research station

In Tiva area, many useful research materials and facilities are provided by KEFRI and former JICA

project, such as progeny test field, provenance test plantation, lookout tower, and nursery. Dr gyokusen utilizes those materials for dendrometer survey and seedling stand for physiological survey.

- **Kitui Research Center**
Well maintained facilities equipped such as nursery, laboratory, green house, meeting room, and dormitory. Small scale seedling stand and darkroom will be prepared by the project in next year.
- **Kibwezi seed orchard**
The other ten hectares of seed orchard was established nearby Kibwezi town, and melia seedlings were planted in January. KEFRI staff has eagerly maintained the seedlings though harassed condition of tick weed and drought.



- **Kibwezi Research Sub Center**
Some nursery space is vacant which is good enough for melia grafting for seed orchard in Kibwezi.
- **Melia plantation by farmer**
Since 2006, a leading farmer established melia plantation by the technical support of KEFRI. Total ten thousand of seedlings were planted nearby his dwelling and have been well maintained.
- **Melia plantation in elementary school**
In 2009, KEFRI promoted school forest in Nguumo elementary school. The planted trees have been well maintained by stakeholders. This is the potential style of progeny test field by our project.



- Training program 2013
The training program in 2013 was discussed among Japanese expert and KEFRI staff, and tentatively agreed as follows;
 - DNA analysis course: 2 participants, 5 weeks
 - Breeding theory course: 2 participants, 3 weeks
 - Propagation techniques course: 2 participants, 3 weeks
 - Drought tolerant course: 2 participants, 4 weeksAll of course will be implemented in June and July 2013.

- Expert dispatchment 2013
The dispatchment schedule of Japanese experts was discussed among both side, and tentatively agreed as follows;
 - Project management: May, October, and February
 - DNA analysis: November (possibly in July also)
 - Propagation: August and December
 - Breeding theory: August and December
 - Drought tolerant: June, August, September, November and DecemberTotal eighteen experts will be dispatched.

- Procurement of tools
FTBS support the procurement if necessary, and utilize training budget for the tools procurement in Japan and deliver by the experts.

- Activities 3 and 4
Market research might be conducted under the contract with local consultant or NGO. The consultant TOR should be proposed by the consultant and considered by Japanese expert and KEFRI staff.
Training materials will be divided into several parts and subsequently be prepared year by year.

- 2nd JCC

2nd JCC was held on 12th February 2013 in MFWL in Nairobi city, and discussed the project progress and next year plan. FTBC proposed the training program in Japan and the expert dispatchment.